

# Final Environmental Management & Assessment Framework

## Strategic Cities Development Project (SCDP)



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### Abbreviations and Acronyms

<b>AIA</b>	Archaeological Impact Assessment
<b>CCD</b>	Coast Conservation Department
<b>CDF</b>	Confined Disposal Facility
<b>CEA</b>	Central Environmental Authority
<b>DMDP</b>	Dredge Material Disposal Plan
<b>DoA</b>	Department of Archaeology
<b>DWLC</b>	Department of Wildlife and Conservation
<b>EA</b>	Environmental Assessment
<b>EAMF</b>	Environmental Assessment & Management Framework
<b>EIA</b>	Environmental Impact Assessment
<b>EMP</b>	Environmental Management Plans
<b>EPL</b>	Environmental Protection License
<b>GoSL</b>	Government of Sri Lanka
<b>GMC</b>	Galle Municipal Council
<b>GSMB</b>	Geological Survey and Mines Bureau
<b>ICTAD</b>	Institute for Construction Training and Development
<b>IEE</b>	Initial Environmental Examination
<b>KMC</b>	Kandy Municipal Council
<b>LA</b>	Local Authorities
<b>MCUDP</b>	Metro Colombo Urban Development Project
<b>MPPA</b>	Marine Pollution Prevention Authority
<b>NEA</b>	National Environmental Act
<b>NWPC</b>	North Western Provincial Council
<b>PCR</b>	Physical Cultural Resources
<b>PEA</b>	Project Executing Agency
<b>PMU</b>	Project Management Unit
<b>PID</b>	Provincial Irrigation Department
<b>SAP</b>	Sediment Analysis Plan
<b>SCDP</b>	Strategic Cities Development Project
<b>SLLRDC</b>	Sri Lanka Land Reclamation & Development Cooperation
<b>ToR</b>	Terms of Reference
<b>UDA</b>	Urban Development Authority

## The Strategic Cities Development Project

### Chapter 1 : Project Description

#### 1.1 Project concept & objective

In keeping with Sri Lanka's urban vision to develop as *a system of competitive, environmentally sustainable and well-linked cities*, the Government has justly turned its attention to the development of its secondary cities in a bid to foster economic growth and prosperity in major urban centers outside of Colombo. It is intended that this process will help produce a more spatially balanced distribution of economic opportunities, which is currently concentrated in the Colombo Metropolitan Region, reduce congestion in the capital city and bolster overall national economic growth.

In order to achieve its urban vision and national development objective, the Government of Sri Lanka has set out the **Sri Lanka Strategic Cities Program** as a common platform where the Government and its development partners could undertake strategic investments in selected cities either in parallel or in phases. The World Bank will embark on the first phase of this program by investing in selected strategic interventions in the cities of **Kandy** and **Galle** where it will address a number of issues that are preventing these cities from realizing their full economic potential.

The project development objective (PDO) is **to contribute to the improvement of urban services and livability in selected strategic cities of Sri Lanka**. This would be achieved through shaping city transformations based on the cities' cultural and economic assets with strategic investments.

#### 1.2 Project Description

The project comprises of three components. Component 1 encompasses interventions for Kandy City Region while Component 2 focuses on the interventions for Galle City Region. Component 3 provides implementation support. In each City Region, the project will target two broad categories of strategic investments: (i) integrated urban services improvement – with system-wide basic services improvement thereby enhancing the functional aspects of the city; and (ii) public urban spaces enhancement – with catalytic urban upgrading efforts thereby enhancing the attractiveness and livability of the city.

1. **Component 1 – Kandy City Region Urban Interventions.** This supports priority improvements to relieve traffic congestion and upgrade municipal services to enhance livability and to sustain the world heritage city and its agglomeration areas. This component includes:

*Urban services improvements and public urban spaces enhancements.* This will include: (i) traffic improvements, such as the rehabilitation of selected by-pass roads, improvements to selected public transport facilities and traffic management measures; (ii) augmentation and rehabilitation of Kandy municipal water supply system; (iii) rehabilitation of major drains; (iv) urban upgrading, including the enhancement of selected streetscapes and public spaces, restoration and adaptive reuse of historic and landmark buildings, and development of an integrated master plan.

*Institutional strengthening and capacity building.* This will include the provision of capacity building support for PPAs to plan, design and maintain urban infrastructure; and to provide municipal services.

**Component 2 – Galle City Region Urban Interventions.** This supports priority improvements to reduce flooding and coastal erosion, and upgrade public urban spaces to improve and sustain the City Region. This component includes:

*Urban services improvements and public urban spaces enhancement.* This will include: (i) flood reduction measures, including the rehabilitation of selected canals and surface drainage infrastructure; (ii) coastal erosion reduction measures for selected areas; (iii) urban upgrading, including the enhancement of selected streetscapes and public spaces, restoration and adaptive reuse of historic and landmark buildings, and development of an integrated master plan.

*Institutional strengthening and capacity building.* This will include the provision of capacity building support for PPAs to plan, design and maintain urban infrastructure; and to provide municipal services.

**Component 3 – Implementation Support.** This component will provide support needed to implement the project such as: (i) implementation support in the areas of project management, monitoring and evaluation, procurement, financial management, and environmental and social safeguards, including compliance; (ii) public awareness and communications support regarding project interventions; (iii) purchase of vehicles, office furniture, and IT equipment for the PMU; and (iv) operating costs of the PMU; and (v) support for the national Strategic Cities Program such as preparatory studies and planning for other strategic cities, and other implementation and management tools.

### **1.3 Objective of the Environmental Management Framework**

Projects and Programs financed with IDA resources need to comply with World Bank Operational Policies. Therefore, sub-projects and components eligible for funding under this project will be required to satisfy the World Bank's safeguard policies, in addition to conformity with environmental legislation of the Government of Sri Lanka (GOSL). However, since detail designs for a majority of sub-projects or investments under SCDP have not been finalized at this stage, site-specific Environmental Assessments (EA) cannot be conducted. What is possible at this stage would be to carry out an identification of generic issues that are typically associated with the type of sub-projects proposed and determine safeguard procedures and instruments to be applied to sub-projects as and when they become technically ready for implementation.

Therefore, the main purpose of this document is to (a) carry out a generic assessment of environmental impacts from SCDP and (b) outline a framework for environmental screening, assessment and management, giving details of potential environmental issues, screening criteria and guidelines on what type of environmental tools need to be applied for the various investments prior to commencement of activities. The EAMF will serve as the basis for carrying out safeguards due diligence for all sub-projects under the SCDP.

The objectives of this Environmental Assessment & Management Framework are:

- i. To describe of the proposed project area in terms of key physical, hydrological and biological features and carry out an early assessment of anticipated environmental impacts from SCDP
- ii. To establish clear procedures and methodologies for environmental screening, planning, reviewing, approval and implementation of subprojects
- iii. To specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental concerns related to subprojects

- iv. To determine the training, capacity building and technical assistance needed to successfully implement the provisions of the EAMF and;
- v. To provide practical resources for implementing the EAMF

Specifically, the EAMF includes the following sections;

- A description of proposed investments under SCDP and the level of readiness at appraisal
- The technical framework for environmental safeguards management including screening, preparation of EA/EMP, review and approval of sub-projects
- Preliminary assessment of anticipated environmental impacts from the project, general mitigatory measures for construction related impacts, guidelines for anticipated significant environmental issues, preparation and approval of EA process and a description of EA tools
- Safeguards implementation arrangement and roles and responsibilities of various parties involved
- Procedures for stakeholder consultation and disclosure
- Key environmental issues in Metro Colombo area related to flood and drainage management
- Strategic planning needs of the SCDP



## Chapter 2 :Policy, Legal and Administrative Framework

### 2.1. Overview of Environmental Legislation

Sri Lanka is one of the leading countries in the South Asian region in enacting environmental legislations. Its concern for environment dates back to over two and a half millennia. The constitution of the Democratic Socialist Republic of Sri Lanka under chapter VI Directive Principles of State policy and Fundamental duties in section 27-14 and in section 28-f proclaim “The state shall protect, preserve and improve the environment for the benefit of the community”, “The duty and obligation of every person in Sri Lanka to protect nature and conserve its riches” thus showing the commitment by the state and obligations of the citizens.

The overall environmental concerns are addressed by the National Environmental Act No. 47 of 1980 (and subsequent amendments by act no 56 of 1988 and act no 53 of 2000). It is the umbrella legislation for environmental protection in the country. In addition several other sectoral legislative enactments are in place (see section below and the summary table of sectoral legislative enactments in **Annex 1**). The national organization that has the mandate to protect and take measures to safeguard the environment is the Central Environmental Authority. It currently operates in the entire country except in the North Western Provincial Council (NWPC), where the NWPC has enacted a separate statute under the 13th amendment to the Constitution of Sri Lanka and had created a separate provincial institute.

There are several other key national agencies with a mandate for environmental management and protection. The Forest Department, the Department of Wildlife Conservation, Department of Archeology, Department of Coast Conservation, Disaster Management Center and Geological Survey and Mines Bureau have their regional offices and staff to cater to and monitor the environmental safeguards as per the policies and regulations governing them. In addition there are several national agencies that are impacting on the environment and adopting environmental safeguards as well. They are the Sri Lanka Land Reclamation and Development Corporation, Urban Development Authority, Water Supply and Drainage Board and Irrigation Department.

The Local Authorities (LA) are also have provisions under their respective acts to safeguards and provide useful facility and maintain the same for the convenience of the public in their respective areas. The Municipal Council (MC) Act No. 19 of 1987 & Urban Council (UC) Act No. 18 of 1987 provide for the establishment of MCs and UCs with a view to provide greater opportunities for the people to participate effectively in the decision making process relating to administrative and development activities at a local level and it specify the powers, functions and duties of such LAs and provide for matters connected therewith or incidental thereto. These acts contain sixteen and eight parts respectively, several schedules and 327 & 249 sections respectively. The MC act, spell out its status, powers & functions in Section IV, Section V and Section VI in sections 34 to 154 and covers public health, drainage, latrines, unhealthy buildings, conservancy & scavenging, nuisance etc. Further the respective local authorities have mandate regionally to implement the project activities and monitor the progress of compliance work.

### 2.2 Detail Review of Key Environmental and Urban Services Related Legislation

#### 1. The Constitution of Sri Lanka & the 13<sup>th</sup> Amendment

The Constitution of Sri Lanka contains several provisions, relating to the environment 9 Article 27 (14) and article 28 (f). The 13<sup>th</sup> amendment to the constitution introduced a new level of institution for environmental protection and management. Therefore the provincial government also has legislative and executive power, the North Western Provincial

Environmental Authority to control, prevent and monitor all environmental related activities.

**Application to SCDP:** Overall responsibility of individuals and organizations to protect and conserve the natural environment. All project proponents/implementers and public are responsible.

## **2. The National Environmental Act. No. 47 of 1980 & its amendments**

The National Environmental Act (NEA) provides conservation and development guidelines for natural resources including water, soil, fisheries resources, forest, flora and fauna in Sri Lanka. It also paved the way for the creation of the Central Environmental Authority (CEA). Further it spells out the creation of an Environmental Council in collaboration with the respective line agencies to advise the CEA (Section 7) and provide necessary guidelines to establish District Environmental Agency under the chairmanship of the District Secretary. The NEA is the basic national decree for environmental protection. The three main regulatory tools implemented under the NEA are Environmental Impact Assessment/Initial Environmental Examination, Environment Protection License (EPL) and Schedule Waste Management License supported by standards for discharge and waste disposal guidelines.

A comprehensive description of EIA/IEE process is given in the Annex 6. It is the key regulatory tool enabling any developer to implement the development activity in line with the NEA and thereby assuring the long term sustainability of the development undertaken while paying due respect to the environment.

The second regulatory tool under the provisions of the National Environmental Act is the Environmental Protection License (EPL). The EPL procedure has been introduced to prevent or minimize the release of discharges and emissions into the environment from industrial activities in compliance with national discharge and emission standards, to provide guidance on pollution control for polluting processes and to encourage the use of pollution abatement technology such as cleaner production, waste minimization etc. Here the industries are classified into three lists named A, B and C. List A is comprised of 80 potentially high polluting industries, List B is comprised of 33 medium polluting industries and List C is comprised of low polluting industrial activities. The operational details are given in CEA website ([www.cea.lk](http://www.cea.lk)).

The third regulatory tool deals with the disposal of scheduled waste. The gazette notification No 1534/18 of 1<sup>st</sup> February 2008 made by the Hon. Minister under section 23A and 23B of the National Environmental Act No. 47 of 1980 is referred to as the National Environmental (protection & quality) regulations No. 1 of 2008. It deals with waste from specific and non specific sources. The notification has three parts and eight schedules. The Part I deal with the Issue of Environmental protection License for Emission of Disposal of waste. Part II deals on issue of license for the management of scheduled waste (Hazardous Waste) and Part III on General matters including definitions and the effectiveness and validity of the license issued under National Environment (protection & quality) regulation No 1 of 1990 published in extraordinary gazette No 595/16 of February 1990. The eight schedules include the tolerance limits, applications, formats for reporting, categorization of non specific and specific waste etc.

The 1994 amendment delegated the authorization to the local authorities to issue EPL for low polluting industries. The CEA's environmental management functions are holistic and they are very well set out in section IV of the act. Along with the EPL procedures several standards also have been gazette with regard to disposal of effluents to land and water bodies.

**Annex 2** contains a detail description of the EIA/IEE procedure in Sri Lanka. For further information of prescribed projects please visit [www.cea.lk](http://www.cea.lk)

**Application to SCDP:** While the investment package for both cities is being finalized, investments that have been confirmed so far including those selected as year 1 projects have been screened and it is deemed that no EIA/IEE would be required under the NEA, as they do not fall within the prescribed thresholds. Considering the low impacts of year 1 subprojects, the present assessment carried out in compliance with World Bank's safeguard policies would be sufficient with continuous monitoring during the construction, operation & maintenance phases.

### **3. State land Ordinance Act No13 of 1949**

The State Lands Ordinance provides necessary guidelines to:

- The protection of the source, course or bed of any public stream
- The protection of springs, reservoirs, lakes ponds lagoons, creeks, canals, aqueducts etc.
- The construction or protection of roads, paths, railways and other means of internal communication.
- The prevention of the erosion of soil.
- The preservation of water supplies.

In addition, section 75 of the State Land Ordinance highlights on riparian proprietors activities. The occupier of land or the bank of any public lake or public stream shall have the right to use the water in that lake or stream for domestic purpose and shall not be diverted through a channel, drain or pipe or by means of a pump or other mechanical contrivance but shall be removed in a bucket or other receptacle.

**Application to SCDP:** This has significant influence on the waterbodies that will come under the project for improvements by way of bank stabilization, erosion control and other small infrastructure development etc. Some of the project interventions support the mandate of this act by ensuring the protection and preservation of the canals and its banks. Further no supplies of water through the network of canals are proposed and hence none of the project investments are in violation of its provisions.

### **4. The Coast Conservation Act No.57 of 1981 amended by Act No.64 of 1988**

The Coast Conservation Act (CCA) makes provisions for the regulation and control of development activities within the coastal zone as well as formulates and executes schemes of work for coast conservation. Under the section 6 of the act, there is provision to appoint a Coast Conservation Advisory Council (CCAC) which would advise the Coast Conservation Department on all development activities proposed to be implemented in the coastal zone and review its coastal zone management plans. The law specifies that projects located wholly or partly within the coastal zone (the area lying within a limit of three hundred meters landwards of the Mean High Water line and a limit of two kilometers seawards of the Mean Low Water line and in the case of rivers, streams, lagoons, or any other body of water connected to these either permanently or periodically, the landward boundary shall extend to a limit of two kilometers measured perpendicular to the straight base line drawn between the natural entrance point thereof and shall include waters of such rivers, stream and lagoons or any other body of water so connected to the sea) must undergo the approval process that is laid down in the Coast Conservation Act irrespective of its size.

Only those projects located totally outside the Coastal Zone will be subject to the approval process laid down in the National Environmental Act. Therefore, any development work taking place within this zone falls under the jurisdiction of CCD. According to the CCA, Director of the CCD has

the discretion to request for an EIA/IEE from the project proponent if the initial screening reveals significant impacts in the coastal areas by the project. The process is very much similar to the NEA excepting that the Director of the CCD reserves the right to request for an EIA/IEE depending on the nature and scale of anticipated impacts of the proposed investments rather than on pre-determined prescribed limits as in the NEA and also to make a final decision. The Director is advised by the CCAC on the findings of EIA/ IEEs.

**Application to SCDP:** Investments confirmed so far in the greater Galle area that fall under the coastal zone includes development such as improvements to canals, roads, walkways and leisure areas along the coastal belt. The GMC has discussed with CCD and shared the details of the proposed investments for their perusal. As none of these investments are expected to trigger serious environmental impacts and the possibility of the CCD requesting for a separate EIA/IEE is unlikely. However, the PMU would need to obtain CCD permission for all work commencing in the coastal zone. It is also recommended that a copy of the EAMF should be shared with the CCD, if necessary.

#### **5. The Marine Pollution Prevention Act no 59 of 1981**

The act provides room to establish a Marine Pollution Prevention Authority and it has the mandate to safeguard the sea from oil or any other pollutant. It has provisions to prevent discharge of oil or pollutants to sea/SriLankan waters. It also specifies the power vested on the Minister to implement International conventions with the approval of the cabinet. Under the proposed SCDP investments no major impacts on the marine environment is envisaged. Hence clearance from the Marine Pollution Prevention Authority is considered not necessary at this stage.

#### **6. The Flood Protection Ordinance Act No.22 of 1955**

This act provides room for the Minister to declare any area in the country as flood area. It has provisions to prepare scheme for protection of flood area, creation of flood authority, regulations for management of flood area and acquisition of land for the purpose of the ordinance. The flood authority is usually the District Secretary of the affected area. In case of a large area of a Municipality is coming under flood the Minister may substitute the District Secretary by appointing the Mayor of the Municipality.

**Application to SCDP:** Overall knowing the experiences in the past, this need to be considered. Both Kandy and Galle has experienced high intensity rains and subsequent flash floods. The flood mitigation is a primary objective of this project that will facilitate the flood mitigation efforts project and strengthened the storm water management interventions and improve drainage in both cities.

#### **7. The Fauna & Flora Protection Ordinance Act No. 49 of 1993 & its amendments**

This act provides the protection, conservation and preservation of the fauna and flora of Sri Lanka. Under the Fauna and Flora Protection Ordinance (FFPO), five categories of protected areas are established viz. Strict Nature Reserves, National Parks, Nature Reserves, Jungle Corridors and Intermediate Zones including sanctuaries. According to this Act, any development activity of any description what so ever proposed to be established within a national reserve or within one mile from the boundary of any national reserve, is required to be subjected to EIA/IEE, and written approval should be obtained from the Director General, Department of Wildlife Conservation prior to implementation of such projects. The FFPO follows a similar process as the NEA in conducting scoping, setting the TOR, preparation of EA ,review of EA and public consultation and disclosure. The decision of project approval or disapproval is finally granted by the Director General of the Department of Wildlife Conservation.

**Application to SCDP:** The only area protected under the FFPO in the vicinity of project boundaries is the Hikkaduwa Marine National Park which is a coral reef. As no impacts to the coral reef are expected as a result of project activities, provisions of this act will not apply.

#### **8. The Sri Lanka Land Reclamation & Development Corporation Act No.15 of 1968**

The Act provides the formation of the Sri Lanka Land Reclamation & Development Corporation. The latest amendment to this act is the No35 of 2006 which incorporated section 2A- Prohibiting filling or developing and reclaiming land, section 2B-Declaring areas as low lying marshy or swampy and section 20 C- stipulating that pollution of canal as an offence. In addition Section 28 of the principal enactment has added new definition- retention areas. The gazette regulations under this act also had declared several areas as wetland.

**Application to SCDP:** The project supports and enhances the provisions set out in the act through improvement to the canal network for the smooth flow of storm water in both cities. Also, the SLLRDC, who implements this act, will be involved as a designer in the project although none of the SLLRDC acquired areas are found within both project sites.

#### **9. The Urban Development Authority Act No.41 of 1978**

This act has provided provisions to establish the Urban Development Authority, declaration of areas as urban development area. Its Part II outlines 22 point powers and functions of the UDA. Under Part IV it has power to acquire immovable property and sale of land belonging to the authority. The act provides room to make regulations for the purpose of carrying out or giving effect to the principles and provisions of this law. The amendment brought in Act no 2 of 1980 under special provisions provided room to declare lands urgently require for urban development projects and remedies to affected parties and the uphold the power of Supreme court. The amendment brought under Act No 4 of 1982 in its Part II A describes the planning procedure, appointment of planning committees, preparation of draft development plans, approval of the same also provide room for subsequent amendment. It also provides room to issue permits for development work, and delegation of the powers of the authority and procedures to be followed if activity takes place in contrary to the permit issued. Further the principle enactment amended by the addition of section 29 by adding a schedule, indicating the matters for which provisions may be made in the development plan. The subsequent amendments deal with levies, joint venture development projects etc.

**Application to SCDP:** Both Kandy and Galle are UDA declared area and all the development plans should be cleared by the UDA. Hence the subprojects undertaken by the KMC and GMC and other agencies need to be assessed and cleared by the UDA for consistency with the UDA regulations. This will provide more scientific planning and avoid adhoc development activity which has led to most of the current issues in these urban areas. Some of the project investments will involve land acquisition and resettlement and hence relevant provisions in the act will be triggered. As UDA is the key implementing agencies of the SCDP, facilitation of UDA clearance will not be a difficult task.

#### **10. The Mines and Mineral Act No.33 of 1992**

The Geological Survey and Mines Bureau established under the Mines and Minerals Act No.33 of 1992. 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.

**Application to SCDP:** Earth and quarry material will be needed for the development work undertaken by the respective implementing agencies either directly or through contractors. In such cases quantities specified need to be extracted and permission from the GSMB is required. Alternatively, the project contractors can procure them from the open market but they will have to make sure that such sources/traders are operating with valid licenses.

### **11. Local Authorities acts**

The Municipal Council (MC) Act No.19 of 1987 & Urban Council (UC) Act No.18 of 1987 provide provisions for the establishment of MCs and UCs with a view to provide greater opportunities for the people to participate effectively in decision making process relating to administrative and development activities at a local level and it specify the powers, functions and duties of such Las and provide for matters connected there with or incidental there to. These acts contain sixteen & eight parts respectively, several schedules and 327 & 249 sections respectively. The MC act, spell out its status, powers & functions in Section IV, Section V and Section VI in sections 34 to 154 and covers public health, drainage, latrines, unhealthy buildings, conservancy & scavenging, nuisance etc. Further the respective local authorities have mandate regionally to implement the project activities and monitor the progress of compliance work.

**Application to SCDP:** Since two local authorities are involved in implementing the sub projects these acts are relevant. The infrastructure improvement subprojects funded under SCDP through the Las comprise of the basic services they ought to render to the public in line with these acts. Subsequently maintaining these infrastructure would be the prime duty of the local authorities.

### **12. National Wetland Policy**

The National Policy & strategies on Wetlands (2005) seeks to give effect to National Environment Policy and other relevant national policies, while respecting national commitments towards relevant international conventions, protocols, treaties and agreements on wetland protection to which Sri Lanka is a party. Among the International Conventions, Ramsar Convention on Wetlands of International Importance(1971),the Convention on Conservation of Migratory Species of Wild Animals(1979)and the Convention on Biological Diversity(1992)are significant.

The definition given for Wetlands in the policy is “Areas of marsh, fen, peatl and or water, where natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters and may incorporate riparian and coastal zones adjacent to the wetlands and islands or bodies of marine water deeper than six meters at low tide within the wetlands”.

The policy has six sections, Introduction, need for a national policy on wetlands, principles, objectives, policy directions and explanation of key concepts. The policy directions address wetland management, institutional arrangement, inter-sectoral linkages, research, development and education. The local level and national level institutions are proposed to be established. All sectoral development plans should be based on principles of wetland ecosystem management.

Institutional Arrangement to manage wetlands is well established at present. A multi-stakeholder National Wetland Steering Committee has been established in the Ministry of Environment to advise on wetland issues in the country and wetland management unit has been set up at the Central Environmental Authority to oversee and facilitate policy implementation.

**Application to SCDP:** Project investments identified so far have no direct impacts on wetlands. However there are a number of freshwater marsh patches and mangrove habitats along some of the canals and the coastal area of Greater Galle, respectively. Any impacts to these areas will be identified in the respective project specific screening and EAs and mitigatory measures will be identified.

### **13. The Irrigation Ordinance(Chapter453)**

The ordinance in its part VI covers the protection of irrigation works and conservation of water in section 64. The section 65 deals with removal of encroachments. The Part V covers the construction and maintenance of major and minor irrigation schemes in sections 33, 34, 46, 54, 61, 62 and 63.

**Application to SCDP:** Tank Rehabilitation work for the Dulumadalawa and Rosneath Tanks, improvements to the water quality of the Kandy lake as well as the rehabilitation of a number of canals in both cities will be undertaken via project interventions. As such, some of the proposed development work is in line with the legal provisions of this act. In Kandy the Irrigation Department holds the management and maintenance responsibility of both Tanks as well as the Kandy Lake and will be directly designing and implementing the project interventions.

### **14. The Antiquities Ordinance**

The Antiquities Ordinance of (Revised in 1956 & 1998) is the main legislation dealing with Cultural Asset Preservation in Sri Lanka. Section 16 covers Ancient Monuments and their declaration as well as the declaration of specified trees as ancient monuments. According to Section 21, the restoration, repair, alteration or addition in connection with any protected monuments has to be conducted in accordance with the conditions of a permit issued by the Director General of Archaeology, or in accordance with an agreement entered into under Section 20. Section 24 prohibits or restricts subjects to certain prescribed conditions, the erection of buildings or carrying out mining, quarrying, or blasting operations on any land within the prescribed distance of any ancient monument situated on Crown land or any protected monument. As per the ordinance the Director general of Archaeology "shall cause an impact assessment survey to be undertaken at the expense of the sponsors of such project or scheme to assess the consequences thereof upon the antiquarian, historical or archaeological aspects or value of the land in question or on any antiquities upon it and shall, within such period of time as may be agreed on.

**Application to SCDP:** The project activities will be conducted in proximity to a number of ancient monuments, both in Kandy and Galle. Necessary clearances and permits will be obtained from the Department who will also be the main implementers for restoration work of interventions under the downtown upgrading component of any heritage buildings or properties demarcated as ancient

monuments, in both Galle and Kandy.

## 2.3 World Bank Safeguard Policies

### a. OP 4.01 on Environmental Assessment

Projects and programs funded by IDA resources need to comply with the World Bank's operational policies. Therefore, all sub-projects eligible for funding under this project will be required to satisfy the requirements of the safeguard policies of the World Bank, in addition to conformity with national environmental regulations. The Strategic Cities Development Project (SCDP) undertakes several infrastructure subprojects and they have to be screened and impacts have to be identified. The World Bank OP4.01 discusses the environment assessment process to be followed.

The WB Operational policies that require consideration under this project OP/BP/GP4.01: Environmental Assessment, OP/BP 4.01: Natural Habitats, OP/BP 4.11: Physical Cultural Resources and will be triggered under the proposed project. Special emphasis should be given to ensure during the subproject design stage to have no or minimum impacts to the natural environment.

### World Bank safeguards policies triggered by the project

<b>Safeguard Policies Triggered by the Project</b>	<b>Yes</b>	<b>No</b>
Environmental Assessment (OP/BP/GP 4.01)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Natural Habitats (OP/BP 4.04)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pest Management (OP 4.09)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Physical Cultural Resources (OP 4.11)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Involuntary Resettlement (OP/BP 4.12)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Forests (OP/BP 4.36)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Safety of Dams (OP/BP 4.37)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Projects in Disputed Areas (OP/BP/GP 7.60)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Projects on International Waterways (OP/BP/GP 7.50)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

This policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts in its area of influence. The policy requires environmental assessment (EA) of projects proposed for World Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. EA should take into account the natural environment, human health and safety and social aspects in an integrated way. It should also take into account the variations in project and country conditions, the findings of country environmental studies, national environmental action plans, the country's overall policy framework and national legislation, the project sponsor's capabilities related to the environment and social aspects, and obligations of the country, pertaining to project activities, under relevant international environmental treaties and agreements. As Environmental Assessment is an umbrella policy, within its

The pollution prevention and abatement measures and emission levels that are normally acceptable to World Bank is described in the *Pollution Prevention and Abatement Handbook*. However, taking into account country's legislation and local conditions, the EA may recommend alternative emission levels and approaches to pollution prevention and abatement for the project.

### Project Categorization



When OP 4.01 is triggered, the World Bank classifies proposed projects in to one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

(1) A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.

(2) A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas including wetlands, forests, grasslands and other natural habitats are less adverse than those of Category A projects. These impacts are site specific; few if any are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects. The scope of an EA for Category B projects may vary from project to project, but it is narrower in scope when compared with Category A projects.

(3) A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. For example, technical assistance projects on institutional development, computerization, and training fall in Category C.

(4) A proposed project is classified as FI when the Bank provides funds to participating national banks, credit institutions and other financial intermediaries (FIs) for on lending at the FIs' risk to final borrowers.

In the case of such projects, the FI screens each sub project proposed for financing, and classifies it in to any one of three categories: A, B or C. FIs must prepare an Environmental and Social Management Framework, following the Bank's consultation and disclosure requirements as in the case of other safeguards documents (e.g., EAs, RAPs, IPPs). The ESMF, including the screening process for categorization of subprojects, must be spelled out in the operational manual.

**Classification of Sub Projects** (as per WB OP 4.01 Para 8)

Category	Impacts	Bank Requirement
A	Subprojects in the proposed project are characterized by creating significant adverse environmental impacts, with regard to sensitivity, diversity, irreversibility, and/or unprecedented impacts.	Comprehensive EIA and EMP
B	Subprojects in the proposed project are characterized by being small in volume and size, implying reversible environmental impacts.	Simplified EIA and EMP
C	Subprojects in the proposed project do not comprise construction works, and do not cause air, soil and water contamination.	No EA required
F1	Proposed Projects that involve investment of bank funds through a Financial Intermediary (FI), in subprojects that may result in adverse environmental impacts	The FI should screen each sub project and ensure that each sub-borrower carries out appropriate EA according to sub-project category

**Environmental Assessment**

SCDP has been placed under environment **category A** primarily given that the project takes a

framework approach, both sites are in UNESCO declared areas and also some project activities would involve inherent risks including resettlement issues. In the long run, the project is expected to bring about environmentally and socially beneficial outcomes through improved urban services and infrastructure. During the construction stage, project interventions will trigger environmental impacts. These will vary in extent, scope and nature depending on the type of intervention and the topographical setting of the sites. At the moment most of the interventions confirmed are category B type where the impacts tend to be localized and mitigatable.

As for year 1 investments which are fairly straight forward and rather uncomplicated such as improvement to existing roads, drainage and urban landscaping, adverse impacts are expected to be minimal.

### **Environmental Management Plans**

According to annex C of the World Bank OP 4.01 an Environmental Management Plan(EMP) is an essential element of EA reports for Category A projects. The EMP should consists of a set of mitigation, management, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan should also include the actions needed to implement these measures. In preparation of an EMP, the EA consultant should:

- a. I d e n t i f y the set of responses to potentially adverse impacts
- b. D e t e r m i n e requirements for ensuring that those responses are made effectively and in a timely manner
- c. Describe the means for meeting those requirements.

A guide to preparing EMPs is attached in **Annex 3**

#### **b. OP 4.04 on Natural Resources**

OP 4.04: Natural Habitats seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water areas where most of the native plant and animal species are still present). Specifically, the policy prohibits Bank support for projects which would lead to the significant loss or degradation of any Critical Natural Habitats, whose definition includes those natural habitats which are either:legally protected, officially proposed for protection, orunprotected but of known high conservation value. In other (non-critical) natural habitats, Bank supported projects can cause significant loss or degradation only whenthere are no feasible alternatives to achieve the project's substantial overall net benefits; andacceptable mitigation measures, such as compensatory protected areas, are included within the project. Identification and assessing of impacts to natural resources is generally undertaken as part of EA work. Where significant impacts are anticipated special habitat management plans will be required, depending on the circumstances. Also, it is essential to ensure any formal clearances/approvals are taken from relevant government authorities as per National legislations

This policy has been triggered mainly on precautionary basis because some of the project sites will be within or adjacent to protected natural habitat such as the stream restoration and roads proposed for improvements in Kandy. Also, in Galle, there are wetlands associated with the natural storm-water drainage network and could possibly be damaged during canal dredging. However, major impacts are not anticipated.

**c. OP 4.36 on Forests**

The forest policy is a follow on from the Natural Habitats policy and applies specifically to all types of natural forests and plantation forests. The key objective of this policy is to assist the borrowing countries to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into economic development and protect vital local and global environmental services that forests provide. The Bank will not finance projects that in the Bank's opinion would involve significant conversion or degradation of critical natural forests or those that contravene applicable international environmental agreements. If a project involves significant conversion or degradation of forests the Bank must determine they are not critical, there are no other feasible alternatives and that comprehensive analysis has been carried out that demonstrates benefits outweigh environmental costs. Identification and assessing of impacts to forests is generally undertaken as part of EA work. Where significant impacts are anticipated special forest management plans will be required, depending on the circumstances. Also, it is essential to ensure any formal clearances/approvals are taken from relevant government authorities as per National legislations. The policy also has strict stipulations on commercial forest harvesting and community aspects on forest management. The policy is usually triggered when projects are expected to have impacts on health and quality of forests, rights and welfare of people who depend on forest resources and those that aim to bring about changes to management, protection and utilization of forests and plantations.

This policy has been triggered mainly on precautionary basis because some of the project sites will be within or adjacent to protected natural habitat such as stream restoration and roads proposed for improvements in Kandy.

**d. OP 4.11 on Physical Cultural Resources (PCR) Policy**

Cultural resources are important as sources of valuable historical and scientific information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The loss of such resources is irreversible, but fortunately, it is often avoidable. The objective of OP/BP 4.11 on Physical Cultural Resources is to avoid, or mitigate, adverse impacts on cultural resources from development projects that the World Bank finances. Identification and assessment of impacts to PCRs is generally undertaken as part of the EA process and any mitigation measures will be included in the EMPs. Where restoration of heritage assets are undertaken, an approved restoration plan will be necessary. Under this policy too it is essential to ensure any formal clearances/approvals are taken from relevant government authorities as per National legislations.

This policy has been triggered as both Kandy and Galle are UNESCO World Heritage Sites and possess many important heritage sites and buildings which could be adversely affected during construction activities if precautions are not taken.

**Consultations and Disclosure Requirements**

For all Category A projects and as appropriate for Category B projects during the EA process, the project sponsor should consult project-affected groups and local non-governmental organizations (NGOs) about the project's environmental aspects and take their views into account. The project sponsor should initiate such consultations as early as possible. For Category A projects, the project sponsor should consult these groups at least twice (a) shortly after environmental screening and before the terms of reference for the EA are finalized, and (b) once a draft EA report is prepared. In addition, the project sponsor should consult with such groups throughout project implementation, as necessary to address EA related issues that affect them.

**Application to SCDP:** In order to comply with the safeguard policies triggered the GOSL is carrying out an Environmental Assessment and Management Framework (EAMF) and project-specific screening and preparation of EMPs for year 1 investments. The implementing agency will publicly disclose this draft final EAMF for public review and comment in appropriate locations for a period of 120 days in keeping with the Pelosi requirement for Category A projects of the World Bank. It has also been made available in the MODUD website. News paper and other media outlet will be needed to alert the community to the availability of the documentation. The EAMF will also be made available at IDA's public information center.

## **2.4 World Heritage Convention**

The United States initiated the idea of cultural conservation with nature conservation. A White House conference in 1965 called for a 'World Heritage Trust' to preserve "the world's superb natural and scenic areas and historic sites for the present and the future of the entire world citizenry." The International Union for Conservation of Nature developed similar proposals in 1968, and they were presented in 1972 to the United Nations conference on Human Environment in Stockholm. States Parties are countries which have adhered to the World Heritage Convention. They thereby agree to identify and nominate properties on their national territory to be considered for inscription on the World Heritage List. When a State Party nominates a property, it gives details of how a property is protected and provides a management plan for its upkeep. States Parties are also expected to protect the World Heritage values of the properties.

Under the World Heritage Committee signatory countries are required to produce and submit periodic data reporting providing the World Heritage Committee with an overview of each participating nation's implementation of the World Heritage Convention and a "snapshot" of current conditions at World Heritage properties.

**Application to SCDP:** Both Kandy and Galle have undergone an appraisal and were demarcated as UNESCO world heritage sites in 1988. In both cities heritage committees have been established within the Municipalities to collaborate with Department of Archeology and the Central Cultural Fund that are the main bodies that are responsible for conducting periodic reporting to UNESCO on the status of management and monitor the implementation of the World Heritage Convention. Periodic reporting is conducted every ten years. The last disclosed periodic reports for Galle and Kandy were completed in 2003. Status of Conservation reports have thereafter been completed for Galle with the latest being done in 2013. A primary goal of the SCDP is to ensure the sustainable management and conservation of these two heritage cities, to enhance their value and ensure it is conserved. Project interventions will look at the maintenance of many demarcated heritage buildings, monuments etc and any proposed activity will be implemented by the Department of Archeology and the Municipalities who are responsible for the ensuring all aspects of the Conventions are complied with.

## **Chapter 3 : Description of the Project Area**

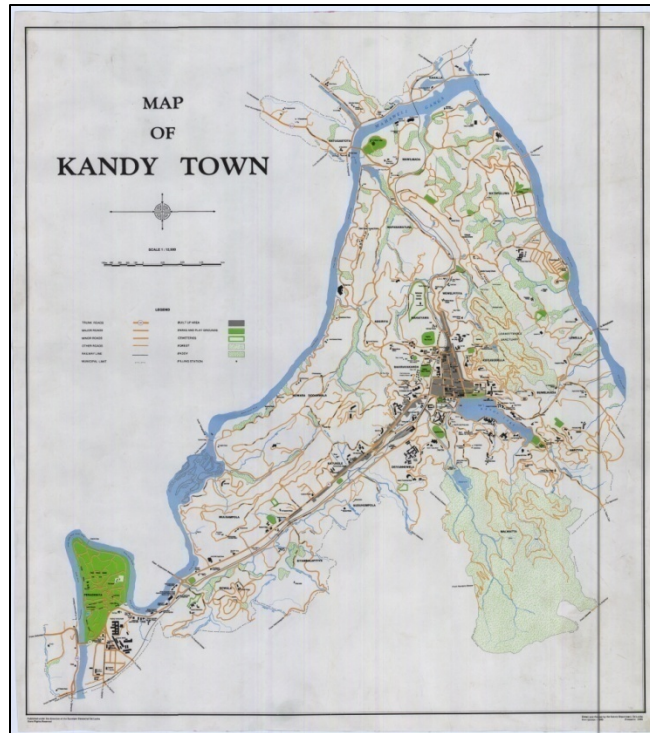
### **3.1 Kandy**

Located at the center of Sri Lanka, at an altitude of 488.6m (1629 Feet) above sea level, the city of Kandy is well known both locally and internationally for its historical significance and scenic beauty. Surrounded by the Hantanne Mountain range, the city has been established in the Valley of the Mahaveli River and covers a land area of 1917 square Kilometers. The Mahaveli River, which is the longest running river in Sri Lanka, flows on the Northern, Western and Eastern edges of the city. Referred to as “MahaNuwara,” which means “Great City,” it is the capital of the Central Province and Kandy District of Sri Lanka. The Central Province encompasses three districts, Kandy, Matale and NuwaraEliya, which are all located in the central region of the Island. Kandy has become both a residential and commercial hub over the last few decades and has experienced rapid urban development

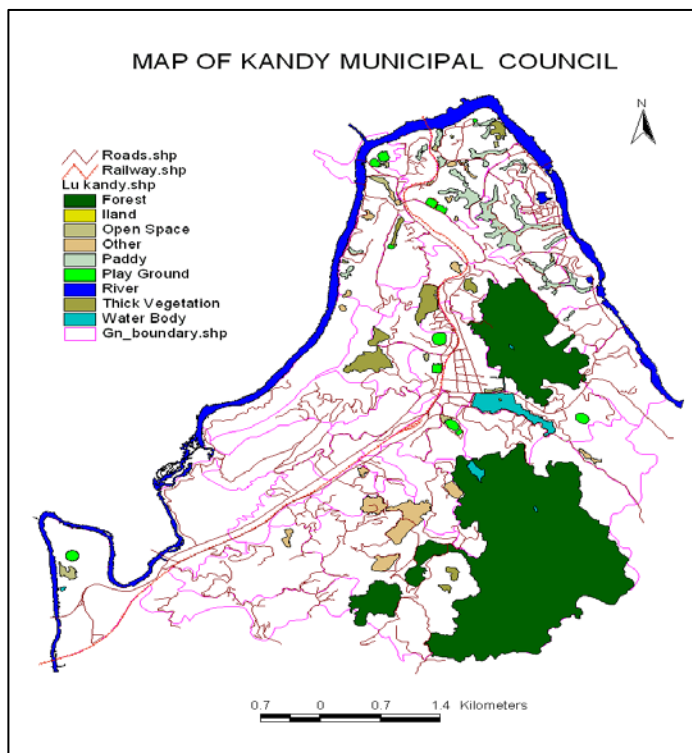
#### **3.1.1 Urban Morphology**

Being the gateway to the central highlands, Kandy’s geographic location has made it a major transportation and commercial hub. The city is accessible via road from all directions of the island and the railway line that connects the western province to the central highlands also runs across Kandy. Over the years its strategic positioning has made the city a residential, commercial and administrative hub and it has grown to becoming the second largest city on the Island. The city sees a large influx of people daily as many of the provinces major schools, hospitals, commercial and administrative units are located within the city limits of Kandy. A large number of local pilgrims and tourists also visit the city as it is the home of the Dalada Maligawa, the Temple of the Sacred Tooth Relic of Lord Buddha and the Royal Palace complex, the Royal Botanical Gardens, and a number of other historically and culturally significant sites. Kandy was designated a World Heritage Site by UNESCO in 1986.

Almost 50% of the land area in Kandy consists of residential and commercial areas .The Kandy Municipal area is divided into 23 Municipal Council Wards and 39 GramaNiladari Divisions. A GramaNiladari Division is basically a designated neighborhood that falls under the administration of a member of the local authority referred to as a GramaSevaNiladari. A central business district is located at the center of the city, also referred to as the grid city, surrounded by three commercial zones. Peradeniya, Mahaiyawa-Katugastota and the Tennekumbura areas form these commercial zones. Residential areas in the city follow almost three fourths of the perimeter of the inner city. Commercial activities are mostly active in the central business district; the areas along the Peradeniya Road and towards the Katugastota area are the city’s main urban localities. The cities administrative complex, except for the Municipal Council and District Secretariat, were moved to the Kundasala area in order to reduce congestion within the municipal city limits.



The city is also home to three forest reservations, the UdawattaKalle Rainforest Reserve in the Center of the city and the Dulumadalawa Sanctuary and Hantanne Forest Area, which is yet to be demarcated a forest reserve officially, to the South East of the city. About 15% of the land has been designated as forest reservations.



<b>Kandy: Demographics</b>	
Area	28'53 Sq Km
Population	
Living	150,000
Transit	600,000
Assessment Units	
Residential	28000
Other	17000
Wards	23

### 3.1.2 Physical Environment

#### 3.1.2.1 Topography

Kandy is surrounded by a triangular mountain range, namely the Hantana and Knuckles mountain ranges. The three entrances to the city are located at each apex of the triangle and the other towards the valley on the eastern mountain range. The elevation of these entrances are approximately 450m in the north side (A10 road), 520m in the eastern side (A26 road), 580m southern side (B39 road) and 530m western direction (A1 road) respectively. The area encompassing of greater Kandy consists of hilly terrain. According to the National Building Research Organization, building on steep slopes have made this terrain susceptible to landslides and earth slips, predominantly during seasons of heavy rain. Areas such as Suduhumpola, Mahaiyawa, Bahirawakanda, Nuwarawela and Ginihiriya, in the greater Kandy area, have been zoned as areas of high risk landslide areas.

#### 3.1.2.2 Climate

Due to its geographic location being in the center of the island, at a high elevation, Kandy has a wetter and cooler climate than the tropical climate common to other regions of Sri Lanka. The city has a dry season from December through April followed by a season of Monsoonal rain from May through July and December to January. Mean Annual rainfall recorded from the South-west Monsoon (April to August) is 1800-2500mm. During the intermonsoonal period, from March throughout mid-May, the city experiences light rain and strong humidity. Average levels of humidity in greater Kandy have been recorded between 70-79%.

<b>Typical Climatic Data for Kandy-2012</b>													
<b>Mon th</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Year</b>
Daily Mean Temperature (°C)	23.4	24.2	25.6	26.1	25.7	24.8	24.5	24.4	24.3	24.4	24.2	23.7	24.7
Precipitation (mm)	79	74	71	188	144	132	128	113	155	264	296	196	1,840
Avg. rainy days	6	5	8	14	11	15	14	13	13	17	16	14	146

*Source-World Climate*

#### 3.1.2.3 Main Water bodies and flow regimes

##### **Kandy Lake**

The Kandy Lake is a man-made body of water in the center of the city, built under the decree of the last Kandyan King Sri WickramaRajasingha. Historical records document that the lake was built on land that was previously a paddy field over the period of 1810-1812. Situated opposite the Dalada

Maligawa, the lake is connected to the Palace moat and drains out in to the Meda Ela. A number of canals from the hilly regions along Rajapihilla Mawatha and the Ampitiya area also feed in to the lake.

Features of the Kandy Lake	
Catchment Area	2.85 Sq.Km
Water Surface Area	0.81 Sq..Km
Perimeter	3.05km
Capacity	0.867mcm
Maximum depth	12.5m
Spill Gates	2
Major Silt traps	5
Minor Silt traps	23

The water quality of the Kandy Lake has been deteriorating due to the grey water (sewer and house waste) entering the lake and due to high silting. Algal blooms and sudden fish kills have also been reported a number of times due to eutrophication. The management responsibility of the Kandy Lake was under the purview of KMC from year 1970 to 1997 and was vested with the Department of Irrigation (DI) in 1997. According to the DI, some of the major current challenges with the management of the lake are; excessive erosion at the earthen banks of lake, encroachments into the reservations, dilapidated condition of pavements along the perimeter of the lake, spreading of water weeds in the water spread area, condition of the “WalakuluBamma” at the verge of collapse, formation of algae in the water body, sudden algal bloom and eutrophication, heavy siltation at the tank bed as well as at silt traps and litter around the surrounding areas, polluting the lake.



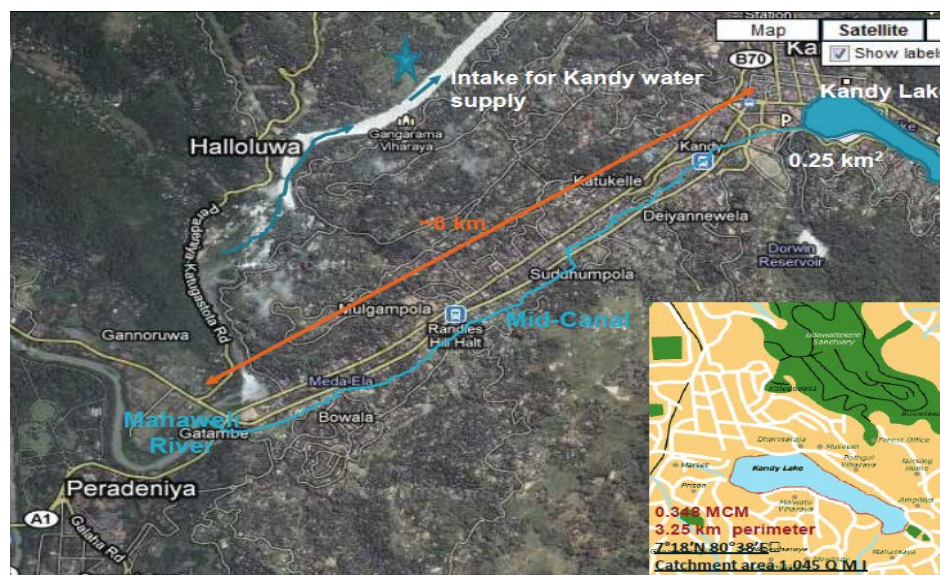


## Dulumadalawa and Rosneth Reservoirs

Dunumadalawa (stone dam) and Rosneth (earthen dam) natural water reservoirs of capacity 74,000 m<sup>3</sup> and 6,000 m<sup>3</sup> respectively, are situated in the **Hantana** forest sanctuary and was built about 130 years ago. Since then the reservoirs have not been renovated and currently water leaks can be observed. The reservoirs provide 10% of the city's drinking water. Both reservoirs and owned and managed by the Irrigation Department. The Dulumadalawa Forest Reserve and Hantana forest form the main catchment for the two reservoirs and ensure that the tanks have a continuous supply of water throughout the dry season as well. Spill water from the Dulumadalawa reservoir spills in to the MedaEla Canal.

## MedaEla

The MedaEla is a stream that carries spill water from the Kandy Lake to the Mahaweli River. It flows across an urbanized sub-catchment that covers substantial part of Kandy city. Commercial establishments, residential areas and hospitals along its pathway have direct sewerage outlets connected to the stream. It also receives waste water directly and indirectly from tourist hotels, schools, the central market and other establishments in the catchment area. A network of wastewater canals draining from various parts of Kandy city are connected with MedaEla while it flows towards Mahaweli. In addition, it is fed by a number of perennial and seasonal streams draining from the adjacent hilly terrain. The uppermost branch streams of the canal are used by local residents for bathing, washing and other household purposes. The canal is heavily polluted by both liquid and solid waste as well as waste water and poses a number of environmental concerns to the residents that live along the canal as well as to the Mahaweli River where it drains in to. Studies, conducted by the University of Peradeniya in 2011, have shown that there is a reduction of dissolved oxygen (DO) in correlation with the depth of water within the canal and mass mortality of fish has also been recorded at rates of 150 fish per day due to high levels of pollution. Apart from this general physical condition of the canal has been dilapidated due to encroachments and poor management.



### 3.1.3 Ecologically Important/Sensitive Habitats

#### 3.1.3.1 UdawatteKelle Sanctuary

Designated as a forest reserve in 1856 and then a Sanctuary from 1938, the UdawatteKelle Sanctuary is a historic forest reserve situated on a hill ridge stretching between the Dalada Maligawa and the uplands of the Aruppola suburbs over 103 hectares. The highest point of the ridge, Kodimale peak,

is recorded at an elevation of 635 meters above sea level and 115 meters above the Kandy Lake. Sites of cultural importance such as a small tank, located in the center of the sanctuary, the Senkada Cave, a number of key forest Hermitages (Forest hermitage, SenanayakaAramaya, Tapovana temple, Keerthi Sri PothgulViharayaSiriwardanaramaya and the ancient GangaramaViharaya are the five famous temples found within the demarcation of the Udawatterkelle Sanctuary. The British Garrison cemetery, in Udawattakele is also considered a site of historic significant as it houses the tombs of many colonial officials that governed the city during that era.

The vegetation in the Sanctuary comprises of fairly dense forest, predominantly secondary and plantation formation. Up to 460 species of plants, of which 135 are tree species and 11 are liana species, of which 9 are endemic, have been recorded at the Sanctuary. The floristic composition of Udawattakele is dominated by Mahogany (*Swieteniamacrophylla*), Magnoliaceae(*Micheliachampaca*), Ceylon Ironwood (*ferrea*) and Peru Balsam (*Myroxylonbalsamum*). Peru Palsam is an exotic introduced species that has later become invasive and is currently threatening the biodiversity of the forest. A very rare endemic orchid species, commonly known as the Wesak Orchid (*Dendrobium mac-carthiae*) is also found within UdawatteKelle. Massive climbers, locally called 'Pus Wel' is a unique feature of the Sanctuary. These massive climbers are endemic to Sri Lanka and have pods that are over 5 feet long. The Sanctuary is home to a Giant Puswella (*Entadapusaetha*) is recorded to be over 300 years old and is located near the Kodimale peak.

The UdawatteKelle sanctuary is well known as a haven for avian species. Over 80 avifaunal species have been recorded at the Sanctuary. These include endemic bird species such as the Layard's Parakeet (*Psittaculacalthropae*), Yellow-fronted Barbet (*Megalaimaflavifrons*), and Brown-capped Babbler (*Pellorneumfuscocapillus*). The rare Three-toed Kingfisher *Ceyxerythacus* has also been observed occasionally within the Sanctuary. The Sri Lanka Myna, Golden-fronted Leaf bird, Blue-winged Leaf bird, Spotted Dove, Emerald Dove, Tickell's Blue Flycatcher, Crimson-fronted Barbet, Brown-headed Barbet and Black-backed Kingfisher are common dwellers. Among Nationallythreatened avifaunal species the Red-faced Malkoha and Kashmir Flycatcher are found within the Sanctuary, these have been recorded in the IUCN Red List for 2013 as well as the National Red List for 2013.

The Sanctuary is also home to array of mammals, reptile and amphibian species. Many of these are nocturnal species are found in the dense centers. Common mammals that inhabit the sanctuary include the endemic Pale-fronted Toque Macaque (*Macacasinicaaurifrons*), Mouse deer (*Moschiolameminna*), Porcupine (*Hysterixindica*), Indian Muntjac, Wild Boar, Asian Palm Civet, Golden Palm Civet, Small Indian Civet, Ruddy Mongoose, Indian Giant Flying Squirrel, Greater Bandicoot Rat, Dusky Palm Squirrel, Indian Pangolin, Greater False Vampire Bat, Slender loris and Indian Flying-fox. Species of snakes such as the common hump-nosed pit viper (*Hypnalehypnale*), Green vine snake (*Ahaetullanasuta*), Green pit viper (*Trimeresurustrigonocephalus*), Banded kukri (*Oligodonarnensis*), Boie's rough-sided snake (*Aspidurabrachyorrhos*) Sri Lanka Cat Snake (*Boigaceylonensis*), Oriental Ratsnake (*Ptyasmucosus*) and Spectacled cobra (*Najanaja*). Lizards that can be seen include the Green Forest Lizard (*Calotescalotes*), Sri Lanka Kangaroo-lizard (*Otocryptiswiegmanni*) and the Whistling lizard (*Calotesliolepis*). There are also several species of skinks, geckos, frogs and toads and a wide variety of insects as well as some species of butterflies that inhabit the wet zone of the Island.

Heavy encroachment by squatters and land grabbing by surrounding land owners have reduced the size of the sanctuary over the last few decades. Serious initiatives to both protect and manage the

sanctuary have not been taken by the Forest Department nor the KMC. Significant threat to the forest ecosystem is posed by invasive and introduced plant species that are rapidly crowding away native tree and plant species found within the sanctuary, thereby threatening the faunal species that inhabit it. Species such as Peru balsam, Devils Ivy (*Epipremnum aureum*), Mahaogony, Glow Vine (*Saraiataemagnifica*), and Philippine Evergreen (*Aglaoneamacommunatum*) are among the most common species that pose a high threat to the Sanctuary's native biodiversity. Severely degraded forest areas are situated between the Temple of the Tooth, the forest department office at the western entrance, and the slopes northeast of the royal pond. A few patches of unspoiled forest, with mostly native species of trees and shrubs, are remaining on the northern and eastern sides of the forest. There is also a patch of native forest on the southeastern side, near the forest department office at the southeastern entrance. Over the last decade there has also been a recorded increase in the population of wild boar and endemic Pale-fronted T toque Macaque monkeys within the Sanctuary due to the absence of sufficient numbers of predators to control population outbursts. This has also led to reported cases of human-animal conflict in areas along the perimeter of the sanctuary with animals often venturing in to urban areas in search of food.

### **3.1.3.2 Dulumadalawa Forest Reserve and the Hantana Range**

The Dulumadalawa forest reserve, was formally known as the Walker Estate (or "Wakara-watte"), consisting of the Dorwin and Roseneath estates, this area was released from plantation type and subsequently been allowed to naturally regenerate with some plant species being reforested within the last 5 years. Dulumadalawa was designated a forest reserve and spans across 480 hectares. The reserve is made up of secondary growth forest, having once been the site of coffee, tea and cocoa plantations.

Its immediate borders are Pinus plantations to the southeast at Matinapatana which then run into home-garden villages and a small, private tea estate; the Tea Research Institute and Hantane tea estate to the west which is the beginning of extensive tea cultivation leading to Heeresagala, Bowalwatte and the Hantane hills in the southwest; Kandy town to the north; and Ampitiya town and other villages on the east. It appears to be the northern terminus of what could be a vitally important corridor of forest and agricultural estate land that runs via the Hantane range south through Galaha to the Piduratalagala reserve and beyond via Hakgala all the way to Horton Plains, the Boga valley and Peak Wilderness. This fragile, contiguous corridor is potentially of vital importance as it encompasses a major portion of the central hill country inclusive of representative low, middle and high altitude wilderness areas.

It is characterized by high canopy mixed forest dominated by several species including Albizzia and Jak remaining from the estate days. The abundant Jak appears to provide an important continuous food source for the toque macaques (*Macacasinicaaurifrons*), barking deer (*Cervusmuntjak*, a decreasing species), and wild boar (*Susscrofa*) that inhabit the forest. Large-leaf mahogany (*Sweiti niamacrophylla*), Ceylon almond (*Canariumzeylanicum*) and various Ficus species are also conspicuous. Tea, coffee and cocoa plants grow wild and in some places as well. Dulumadalawa has been noted over the last decade as a key habitat for the Sri Lankan montane zone leopard (*Pantheraparduskotiya*) and the fishing cats (*Prionailurusviverrinus*), both decreasing species as per the National and IUCN Red Lists for 2013, golden palm civets (*Paradoxuruszeylonensis*), common ring-tailed civets (*Viverriculaindica*) and mouse deer (*Moschiolameminna*). It has become one of the main sites for the Leopard Project, aiming to conserve the leopard and big cat populations on the Island, run by the Wilderness and Wildlife Conservation Trust, Sri Lanka, since 2003

### **3.1.3.3 Kandy Lake and Surrounding Catchment**

The area around the Kandy Lake and the lake itself is also a habitat for a number of avian and amphibian species. A variety of trees that include, Nuga, Palm, Sal, Mara and fruit trees have been planted along the lake. Many of them are almost 100 years old according to the KMC, who maintains these trees. These large trees also offer nesting and roosting space for migratory birds during the winter months. There is a resident population of Monitor lizards, tortoises and frogs as well as birds such as the Indian Cormorant, White Egret Crane, Wood Stork and Pelican among the most commonly seen.

### **3.1.4 Built Environment**

The cities built environment has been developed around an elongated square, referred to as the grid city and the quadrangular Kandy Lake. The northern edge of the grid city is where the administrative buildings of the old capital are located, including the Municipal council. On the north shore of the Kandy Lake are the city's main buildings of cultural and religious importance, The Dalada Maligawa which encompasses of the Temple of the Tooth and the Royal Place Complex. A number of Buddhist monasteries also dot the outskirts of the main city.

The city stretched out from the east to the residential and commercial areas of Tennekumburua, Kundasala and Gurudeniya from the west to Peradeniya and from the South to the Hantana area. The Northern access to the city continues on towards Katugastota. Commercial areas are housed along the main access roads in these areas and built in a densely packed manner. Residential areas have spread towards the hilly areas, with access roads and buildings built in to the contours of the terrain

The Grid city area is Kandy's main commercial hub. A densely populated area along a grid of streets, houses mainly commercial buildings, of which many are, designated historic buildings. Historically the grid city area was where the Ministers and courtiers of the Kandyan kingdom resided and it was also an active hub during the colonial times. Many of the streets and structures including storm water drainage structures were built during the colonial times and are still used today.

### **3.1.5 Historical and Cultural Importance of Kandy**

Kandy has become the foremost cultural city of Sri Lanka due to a rich heritage of living monument. Not only is it home to a multitude of Buddhist religious monuments, but it plays center stage for over 600 years of recorded local history. According to historical records the city of Kandy was first established, under the name "Senkadagalapura," by King Wicramabahu the III during his reign, amid 1357-1374 AD. The present name of the city, "Kandy" originated during the Colonial Era. Three generations of kings ruled the kingdom from Kandy there on forth. It was under the reign of King Wimaladarmasuriyathe I, which the Sacred Tooth Relic of the Lord Buddha was bought to Kandy and was enshrined at the royal palace complex, which subsequently developed into the Sri Dalada Maligawa. The countries most important Buddhist monasteries, Asgiriya and Malwatta, were also established in Kandy in 1753. From 1592 onwards Kandy, was the last remaining independent kingdom in the Island since the coastal regions has been conquered by the Portuguese. In 1815 the Kandyan Convention was signed between the British and Kandyan aristocrats, this convention recognized the King of England as the ruler of the Kingdom and Kandy became part of the British Empire. The last known King of Sri Lanka, Sri WickramaRajasighe ruled from Kandy and who was exiled to South India by the British during the Colonial Era and the capital was moved to Colombo.

### **Archeologically and Culturally significant sights**

Kandy city has been declared by UNESCO as a Living World Heritage Site. Thirty two buildings in the city have been identified as heritage buildings and the UNESCO symbol has been displayed on the walls of these buildings, demarcating them as key physical cultural resources. Kandy is also designated as a sacred city by the Urban Development Authority of Sri Lanka. There are an innumerable number of landmarks and buildings from the time of the Kandyan Kings as well as the colonial era. Many of these have been converted to be used for modern day purposes but their historical value is preserved. Temple complexes, such as the Dalada Maligawa, the Asgiriya and Malwatta Monastic complexes, a series of smaller temples and monasteries, churches, Hindu temples and mosques dot the city and are visited by pilgrims and tourists regularly. The KMC is currently in the process of preparing a detailed map of all demarcated culturally and archeologically significant sites within the city. Descriptions of the main sites are provided in **Annex 4**.

### **3.1.6 Other Areas of Environmental Concern**

#### **3.1.6.1 Solid Waste Management**

The KMC currently collects about 120 tons of solid waste daily throughout its municipal area and disposes in a temporary dump site at Gohagoda, located 7 km from the town Centre and about 100 m from the Mahaweli River. This open dump has been used by the KMC for the last 30 years and is estimated to carry about 250,000 tons of waste. The landfill is likely only to have a useful life of another 2-3 years and is a huge environmental and public health concern. The Central Environment Agency (CEA), through its National Solid Waste Management Program, has planned to construct a Regional Waste Management Facility (RWMF) in Udunuwara, 26 km away from the Kandy city Centre, for the utilization of the KMC and 10 other Local Authorities (LA) in the region. The KMC has expressed interest to join the regional waste management program but is challenged with capacity constraints in long-distance waste haulage and the associated costs.

#### **3.1.6.2 Traffic Congestion**

Due to its positioning as a gateway to the central highlands and being the main commercial and administrative hub, Kandy sees a large influx of traffic into the city. Traffic congestion within the grid city area has become a major problem. Due to many of the major roads being located on hilly areas, they are steep and narrow in nature leading to major traffic congestion, especially in areas around the lake, grid city and Peradeniya areas during morning and afternoon rush hours.

### **3.2 Galle**

The city of Galle is the administrative capital of the Southern Province and the district capital of the Galle district. A major coastal city situated on the Island's Southwestern tip, Galle is a 120Km drive away from Colombo. It is the administrative and commercial hub for the Southern regions of the island, with major schools hospitals and administrative units being located within the city. The Greater Galle region includes the coastal cities of Hikkaduwa, Unawatuna as well. Historically a port city, it is also a Heritage city with the Galle fort area being demarcated a Living UNESCO World Heritage Site. The city has a rich vibrant history and culture, unique to itself, having lived through both a Portuguese and Dutch Colonial period. Today, Galle is a bustling city and undergoing rapid urban development in order to meet the demands

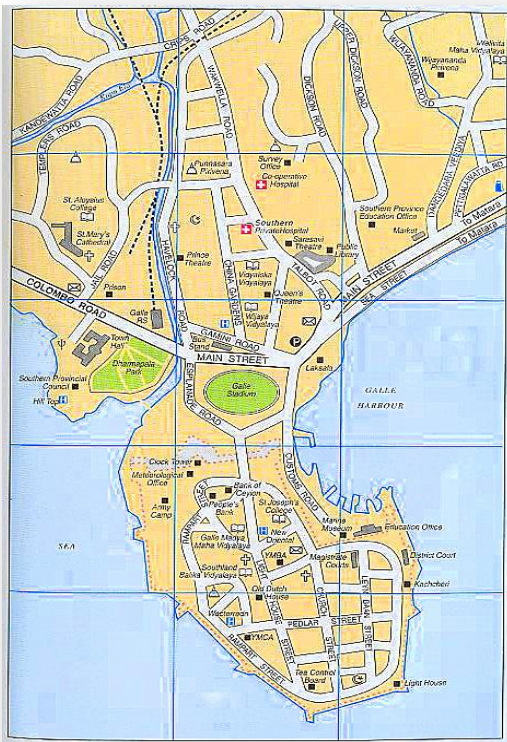
#### **3.2.1 Urban Morphology**

Located between the major tourist destinations of Hikkaduwa and Unawatuna the city is built along the southern coastal belt that opens to the Indian Ocean. The Greater Galle area, including Unawatuna to the South and Hikkaduwa to the North, the city is accessible via the Southern

highway and the Southern expressway as well as via rail. Regional sub offices of main governmental Departments and higher order social facilities such as schools, commercial units, banks and hospitals are also located within Galle. The teaching Hospitals at Mahamodara and Karapitiya are two major hospitals that are located in Galle that attract a large influx of people who seek medical facilities. A hub for regional economic activities, Galle is also a popular tourism destination. Agricultural lands are found along the hinterlands of greater Galle while fishery is also a major activity in the coastal belt.

The Galle Municipal Council area covers an extent of 1742.4 hectares, and consists of 15 wards, whose locations and areas which in turn are subdivided into 43 Grama Niladari Divisions. The city is divided into the new town area and the fort area. The fort is a residential and commercial area, with a number of shops, restaurants, museums and galleries and has a unique urban morphology of its own, which attracts local and foreign tourists. The city's main residential, economic and commercial areas are located in the new town. According to the Department of Census and Statistics, the recorded resident population in Galle was 96,836 individuals and its population density was noted as 56 persons/hectare.

On 26 December 2004 the city was devastated by the massive Boxing Day Tsunami caused by the 2004 Indian Ocean earthquake that occurred off the coast of Indonesia. Thousands were killed in the city alone and much of the city's physical infrastructure, including the fort, was damaged. Over the last 9 years much of it has been rehabilitated and the city has seen rapid urban development.



### 3.2.2 Physical Environment

#### 3.2.2.1 Topography

The city of Galle is situated in the South West coastal plains where most of the land is flat, except for a few hillocks such as the Rumasala area. The area is formed by two shallow ridges extending North South and sloping towards the East and West. Some parts of the central area are almost at mean sea level. Coral reefs, wet lands & lagoons with mangrove patches are observed as geographical formation along the coastal zone.

#### 3.2.2.2 Climate

Galle, receives sufficient rainfall from the South West Monsoon and heavy rainfall is typically recorded in the months between May and September annually. Due to its positioning by the coast, rainfalls due to convectional cyclones are also common. Annual rainfall is recorded at 2000 mm. The driest period is between January to March. Day temperatures range from 28°C to

31°C and night temperatures 24°C to 26°C. The Relative Humidity is around 80 to 88 percent.

#### 3.2.2.3 Main Water bodies and flow regimes

To the North West of the city one of the country's main rivers, the GinGanga flows out to sea at Gintota. It is the main source of water supply to the town. At the Eastern end, a major stream the MoragodaEla runs across the town and discharges at Magalle. There are also a few other water bodies, the largest being Mahamodera Lake fed by BopeEla. The main drainage of the town is discharged to the sea through the MorgaodaEla and three other canals namely the UnawatunaEla, KepuEla and ModaraEla. These take the outflow from roadside drains in to the sea are not in good condition. The water flowing in these canals are polluted with wastewater, solid and liquid waste coming in from the city center and residential areas. The water supply to the GMC is obtained from three sources, the rain fed reservoir at Hiyare and the other is Gin Ganga river intake. Both sources feed the 1.0 million gallon (4550 M<sup>3</sup>) reservoir at Beeke.

### **3.2.3 Biological Environment**

#### **3.2.3.1 Ecologically Important/Sensitive Habitats**

##### **Rummasala Hill**

The Rumassala area is a 20 hectare forest range that outcrops to the Indian Ocean from Galle. The mountain is famous as folk laws often connect it to the mythical tales of the Hindu epic the Ramayan. Many species of flora that are commonly found in the Himalayan region of India have been recorded in Rumassala. In addition to luxuriant vegetation of Rummasala it is also the primary habitat for a variety of avifaunal species such as the white-breasted kingfishers, black-capped and white-browed bulbuls, spotted doves, common mynahs, Brahminy kites and tailorbirds. Butterflies like the glassy tiger, blue mormon, common Jezebel, crimson rose and tawny coasters are also commonly seen, in addition to reptiles like green garden lizards and land monitors. Mammals such purple faced leaf monkeys, mouse deer and other small mammals also inhabit the forest of Rumassala.

##### **Coral Reefs of Hikkaduwa**

The coral reef in Hikkaduwa is a designated National Park. A fringing reef with a high biodiversity the reef was declared a wildlife sanctuary on May 18, 1979 and upgraded to a nature reserve with extended land area on August 14, 1988. However major boosts in tourism over the last two decades led to major degradation of reef and its habitat. Thus in order to strengthen the initiatives to ensure its protection, the reef was declared a national park in September 2002. Located off the coastal strip of Hikkaduwa the reef overlooks major hotels and guest houses densely built and has a high rate of annual visitation. The reef has suffered high degradation due to both natural and human activities. The live coral cover was decreased from 47 percent to 13 percent in a coral bleaching event in 1998, induced by the 1998 El Niño. Much of the reef is dead, except for a few patches, yet studies have shown that regeneration is slowly taking place.

The main species of coral that dominates this reef is Folioseous Montipora, Faviidae and Poritidae corals are contained in the inshore areas of the reef in massive colonies. Staghorn, elkhorn, cabbage, brain, table and star corals are all present in the reef. Over 60 species of coral belonging to 31 genera have been recorded in Hikkaduwa of which *Poritesdesilveri* is an endemic coral species of Sri Lanka which is an endangered species as per the IUCN Red List for 2013.

The reef also recorded over 170 species of reef fish belonging to 76 genera. Seagrass and marine algae belonging to genera Halimeda and Caulerpa also inhabit the sea bed areas of depths ranging from 5-10 m. These seagrass beds provide the perfect habitat for. Eight species of ornamental fishes also inhabit the reef, along with many vertebrates and invertebrates including crabs, prawns, shrimps, oysters and sea worms. *Chlorurusrhakoura* and *Pomacentrusproteus* are two reef fish species confined to Sri Lanka. Blacktip reef sharks (*Carcharhinusmelanopterus*), a near threatened

species, are found along the outer slope of the reef. The Hawksbill Turtle (*Eretmochelys imbricate*), a critically endangered species, Green Sea turtles (*Cheloniemydas*), an endangered species, Olive Ridley Turtles (*Lepidochelys olivacea*) a rapidly decreasing species have been recorded from the Hikkaduwa reef as well.

Studies indicate that at least 30-40 percent of coral reef should be restored in order for it to be capable of sustaining itself. Despite being designated as a protected area, the coral reef has been subject to constant exploitation including removal of breeding ornamental fish for the commercial market.

### **Coral Reefs of Bouena Vista**

Located along the Rumassala hill the Bouenavista coral reef is one of the Islands richest coral reefs. Smaller in size compared to those in Hikkaduwa and Kalpitiya, Bouenavista has as many 490 species of fish in its reef and has the richest diversity recorded. In earlier times coral coverage ranged at 70%, however due to anthropogenic activities along the coast and the impacts of the Tsunami, currently only about 40% of the live coral coverage remains.

Studies conducted, by the University of Ruhuna in 2009, have shown that the Bouena-vista reef boasts the highest diversity of life recorded from any marine habitat in Sri Lanka. This reef know to be home to over 490 species of reef fishes, hundreds of species of Marine in vertebrates including Corals belonging to over 34 genera, Leatherback Turtles (*Dermochelys coriacea*), a critically endangered species and Green Sea Turtles, a threatened species, and many seabird. The reef fauna includes one out of 5 species of fish and 39 out of the 83 species of invertebrates declared as protected species under the Fauna and flora protection law in Sri Lanka. The studies also indicate that the reef is currently regenerating at a steady and successful pace, yet recovers stringent protection measures in order to ensure the regeneration is sustainable.

### **Mangrove Patches**

A number of mangrove patches can be found along the coastal belt from Hikkaduwa to Weligama and close to the Galle Area. The Attaragoda mangrove wetland situated 3Km from Galle is good condition. However many of these fragmented patched face immense pressure due to anthropogenic activities and need to be protected by the local authorities. Diversity and distribution of mangrove species varies in each patch based on the levels of salinity. Studies have shown that these patches are rich in avifauna and marine life and require to be protected formally as well. Studies conducted in 2011 by the University of Sri Jayewardenepura in Attarangoda recorded 35 species of avifauna, of which, 20 were wetland species. There were nine species of migratory birds including one scarce winter visitor- Malayan Night Heron, indicating that Attaragoda wetland is an important destination for migratory birds. The MahaModera Ganga which is a tributary of the Gin Oya also has some inland wetlands areasthat are home to a variety of species.

### **3.2.4 Built Environment**

The city is divided in to the fort and the new town, which built around the fort area. The fort consists of a network of streets lines with colonial buildings which have been converted for modern day purposes, it provides recreational, residential and commercial facilities to locals and tourists alike. The Galle International Cricket stadium is located opposite the Galle fort. The new town area, consists of large, newly built commercial complex and market as well the main administrative buildings and commercial areas that are densely built along the A2 highway the connects Galle and Matara. Across the Galle Bay is the main harbor, opposite to the Galle fort.



### **3.2.5 Historical and Cultural Importance of Galle**

Historically Galle was an ancient port city and was colonized by the Portuguese, Dutch and the British and ruled by the Sri Lankan monarchs prior to 1587. The Portuguese rule lasted for 150 and the city was known as Point De Galle. The city was fortified by the Portuguese and the Dutch, for the primary purpose of protection. This colonial rule has given the city unique urban morphology. In 1640, the Dutch succeeded in wresting Galle and the rest of Sri Lanka away from Portuguese hold to establish a colonial rule that lasted for almost 150 years. During the Dutch colonial period Galle reached the height of its development and became the country's main port and the center of trade and commerce among Persians, Arabians, Greeks, Romans, Malays and Indians. In 1796, when the British took over Galle from the Dutch, they did very little to alter or renovate any of the Dutch structures. British rule lasted until 1947 when Sri Lanka declared its independence from Britain.

#### **Archeologically and Culturally significant sites**

Built by the Portuguese in 1620, the Galle Fort was fortified by the Dutch in 1667. The fort has a number of Bastions and huge granite walls. Ancient monuments within this historical complex included the Lighthouse, the clock tower, and the first Dutch Reformed and Anglican churches, the Meera Mosque, the Buddhist Temple, and the Commander's Residence. Worthy of mention is the Dutch Reformed Church with its baroque facade and the usual double scroll moldings on its gables which testify to indigenous influence. The military architecture of the Fort is European in design. The unique Galle Fort is still the best preserved fortified city in South Asia and a designated UNESCO World Heritage site. The cobbled streets are lined with colonial buildings converted to shops, restaurants, guest houses and homes. The fort is well preserved yet some of the Bastions and buildings still need to be maintained in order to ensure they are preserved fully.

Among other key sites of cultural and archeological interest include The Dutch Museum which is housed in a restored Dutch mansion of the time, contains paintings, prints, documents, furniture and ceramics from the Dutch colonial era. The Dutch Reformed Church, built by a Dutch Army officer at the site of a previous Portuguese church and completed in 1754 the church is situated close to the new entrance to the fort. The church contains record of marriages since 1748 and baptism from 1678. The major highlight of the building is there are no pillars inside the building and the weight of the roof is supported by the walls.

Other prominent sites in Galle include the city's natural harbor, the National Maritime Museum, St. Mary's Cathedral founded by Jesuit priests, one of the main Shiva temples on the island, and Amangalla and Cloisenberg which are both historic hotel. Galle is also home to an International Stadium which is considered to be one of the most picturesque cricket grounds in the world.

### **3.2.6 Other Areas of Environmental Concern**

Galle produces up to 50-60 tons of solid waste daily. Although disposal through land filing was carried out some time ago, it is not practiced now and open dumping is taking place, in environmentally sensitive areas such as river banks, paddy fields and wetlands. A proper solution for final disposal of waste is absolutely necessary as the city grows.

Localized flooding and lack of a proper sewerage system also poses many environmental impacts within the city. As a proper Sewerage System is not available, almost all households (80%) use water sealed latrines and around 10% pit latrines, most of which are found among the low-income settlements. Due to the increase in densities of the resident population, the ground water is polluted. Well water is not generally used for drinking due to its unpalatable taste fortunately for the community. Houses in low-lying lands experience failure of the sanitary system due to rise in the water table resulting in poor soakage of the effluent. Low-income settlements close to canals

and waterways discharge waste water directly into these water bodies and pollute them, thus the levels of pollution in the canals that drain in to the Sea is very high.

## **Chapter 4 : Assessment of Environmental Impacts and Impact Management Framework**

### **4.1 Preliminary assessment of environmental impacts of SCDP**

With the preliminary assessment of impacts all types of impacts triggered by SCDP could be generalized under (i) typical generic construction impacts which can be mitigated with good construction practices and (ii) specific impacts that can arise due to engineering interventions proposed for some sub-projects and hence require careful planning.

In general following is the list of broad positive and negative impacts that are very likely to arise from the sub-projects funded by the SCDP.

#### **Overall positive impacts of the project**

- Reduced flood risk and flood damages
- Prevention of encroachments on canal reservations
- Reduction in public health hazards due to improved flow/WQ in canals/lake, proper management of solid waste and increased availability of drinking water supplies.
- Reduced air pollution and traffic congestions
- Increased potential and facilities for local and foreign tourism
- Increased aesthetics and attractiveness of the cities
- Protection and conservation of cultural resources

#### **Negative impacts of the project**

- Impacts on water quality due to canal bank protection and dredging
- Impacts of dredge material disposal
- Soil erosion and siltation
- Impacts on air quality from use of machinery and construction activities
- Impacts (off-site) of material extraction (earth, rocks, turf)
- Impacts on traffic flow caused by construction activity and vehicles transporting materials to the site etc
- Impacts of noise from construction activity
- Occupational hazards and impacts to public safety
- Impacts of vibration on structural safety of buildings adjacent to construction sites
- Impacts on forest ecosystems and bio-diversity
- Increased risk of landslides when working on mountain slopes (in Kandy)
- Resettlement, land acquisition and other socio-economic impacts

These impacts though occurring in most of the sub-projects will vary in extent and significance **hence individual assessment is of utmost importance**. However for ease of presentation and reference typical construction impacts related to the project have been discussed under the following thematic categories in both cities.

#### **Greater Kandy Interventions**

- i. Rehabilitation of underground storm-water tunnels: Work proposed includes lining the underground tunnel, reconstruction failed areas, removal of bottlenecks in the canals, improvement of the outflow capacity and construction of canal bank protection
- ii. Rehabilitation and augmentation of municipal drinking water supply: Work proposed includes improvements to the intake (weir and pumps) and treatment plant (sedimentation tanks, storage reservoirs, filters, and pumps) at Gatambe; improvements to the intake and filtration systems at the Dunumadalawa and Rosneth reservoirs, increasing reservoir capacity, improvements to access road and inter-connection/overflow streams; improvements to the distribution network amounting to 40kms within the KMC area
- iii. Rehabilitation of roads/side drainage and traffic improvements: Widening/resurfacing of city roads and by-pass roads, establishment of new bus terminals and parking areas, rehabilitation of existing main bus terminals, revisions to bus networks and services, reorganization of internal bus service in the city, establishment of new off-street car parking areas, traffic management and traffic calming interventions.
- iv. Kandy lake water quality improvement: Improving upstream canals with embankment protection to mitigate erosion, redesigning and constructing silt traps with better facilities for de-silting, construction of a siphon system at the spillway, diverting overflows from Dunumadalawa reservoir and provision of laboratory testing facilities.
- v. Urban landscaping for recreation and city beautification: Improvements to streetscape to improve pedestrian walkability, creation of recreational spaces and public recreational walkways, public land re-development
- vi. Conservation of historic/archaeological buildings: Restoration of historic buildings to preserve cultural heritage and to promote local/foreign tourism
- vii. Solid waste management: Construction of regional transfer stations, provision of plant and equipment etc to support regional waste management program of the government

#### **Greater Galle Interventions**

- i. Rehabilitation of primary/secondary canals and cross drains: Work proposed includes dredging and desilting, clearing of reservations, embankment protection, widening of bridges in the canal system and pumping station if confirmed by modeling results. This may require land acquisition and resettlement.
- ii. Coastal urban development: Securing public beach access with facilities for resting and car parking, erosion control, studies and development plans to regulate coastal town expansion
- iii. Urban landscaping for recreation and city beautification: Improvements to streetscape to improve pedestrian walkability, junction improvement to ease vehicle/pedestrian conflicts, creation of recreational spaces and public recreational walkways
- iv. Conservation of historic/archaeological buildings: Restoration of historic buildings to preserve cultural heritage and to promote local/foreign tourism
- v. Solid waste management: Construction of regional transfer stations, provision of plant and equipment etc to support regional waste management program of the government

The following section lists out the probable impacts under each separate investment category.

**4.1.2 General construction related impacts**

<b>Investment categories under SCDP</b>	
<b>Greater Kandy</b>	
<b>1. Rehabilitation of underground storm-water tunnels:</b>	
<b>Key project activities</b>	<b>Related Impacts</b>
Site Surveying, Testing & Data Collection	Obstructions to vehicular movement
Land clearing along road side	Disposal of spoilage; Disturbance to existing flora and fauna; Generation of cleared vegetation stockpiles; Potential for the spread of weeds
Traffic diversion/Generation of additional traffic due to construction and temporary parking lots	Obstruction to vehicular movements; Disturbances to residents due to traffic diversions and restricted entry to by-roads; Increased traffic on alternate roads
Excavation of trenches and shoring	Closure of roads for traffic; Disturbance to pedestrian movement and safety issues due to deep excavations and material piles; Emission of dust and air pollutants from equipment and machinery; Generation of high levels of noise and vibration; Slope failures; Loosen soil structure and weaken soil stability; Subsurface soil layers susceptible to collapse and fail under outward seepage flow
Dewatering and site drainage	Reductions of pore pressure build up; slope instability and transport of fines. Local surface ponding
Transportation and stockpiling of material	Emission of dust, noise and vibration; Erosion of material during rains; Stock piling of soil, debris and other material may block surface drainage; localized flooding
Construction of structures such as gullies, manholes, catch pits etc.	Emission of dust; noise and vibration
Compaction & Soil Stabilization	High noise and vibration level; Uneven settlements: cracks and eventual failure of anchorages and pipelines.

Spoilage disposal	Blockage and contamination of surface runoff
Maintenance of drainage pipes, catch pits, manholes, gullies etc. and removal of material and disposal	Emanation of foul odor; Collection of floating matter and blocking catch pits, gullies and manholes; Contamination of water due to improper disposal of debris and sediments
Operational Phase	Maintenance desilting and cleaning will generate sediment and debris that needs to be properly disposed.
<b>2. Rehabilitation and augmentation of municipal drinking water supply:</b>	
<b>Key project activities</b>	<b>Related Impacts</b>
Site survey and land clearing	Possible obstructions to vehicular/pedestrian movement
Excavation of trenches to lay distribution lines	Closure of roads for traffic; disturbance to pedestrian movement and safety issues due to deep excavations and material piles; emission of dust and air pollutants from equipment and machinery; generation of noise and vibration; loosened soil structure and slope failures leading to landslide risks; subsurface soil layers susceptible to collapse and fail under outward seepage flow
Improvement to filters and installation of new pumps at water intakes	Generation of spoil for disposal; emission of dust and air pollutants from equipment and machinery; generation of noise and vibration; temporary blockages to drainage lines
Transport and stockpiling of construction material	Emission of dust and air pollutants from equipment and machinery; generation of noise and vibration; disturbance to forest wildlife
Compaction, soil stabilization and pavement reinstatement	High noise and vibration level; uneven settlements: cracks and eventual failure of anchorages and pipelines
Reinstatements of overflow streams from the reservoirs	Removal of trees and vegetation clearance, soil erosion, noise, debris disposal, disturbance to animals
Spoilage disposal	Blockage and contamination of surface runoff
Operational phase	The main operational impact will be increased extraction of water from the river. Other operational impacts are low risk and related to maintenance.

<b>3. Rehabilitation of roads/side drainage and traffic improvements:</b>	
<b>Key project activities</b>	<b>Related Impacts</b>
Transport and stockpiling of material	Emission of dust and air pollutants from equipment and machinery; generation of noise and vibration; disturbance to residents and road users
Traffic diversion	Obstruction to vehicular/pedestrian movements; Disturbances to residents due to traffic diversions and restricted entry to by-roads; Increased traffic on alternate roads
Pavement Demolition	Disturbance to pedestrian movement and safety issues due to uneven surface, material/debris piles; Emission of dust, noise and air pollutants
Excavation of trenches, shoring and dewatering if necessary	Closure of roads for traffic; disturbance to pedestrian movement and safety issues due to deep excavations and material piles; emission of dust and air pollutants from equipment and machinery; generation of noise and vibration; loosened soil structure and slope failures leading to landslide risks; subsurface soil layers susceptible to collapse and fail under outward seepage flow
Drainage diversions during construction;	Temporary drainage blockages, Surface ponding of water;
Provision of permanent drainage, construction of man holes and catch pits, compaction & soil stabilization, road filling and resurfacing/overlay	Obstruction to vehicular movements on roads under construction and increased traffic on alternate roads; Disturbances to day-to-day activities of residents, road-users due to traffic diversions and restricted entry to by-roads; Inconveniences to residents and other road users, especially commercial establishments for their delivery vehicles; Disturbance to pedestrian movement and safety issues due to excavations and material piles; Interruption of livelihoods of pavement vendors, hawkers, middlemen etc. and their inability to night parking of carts; Erosion of material during rains; Air pollution due to dust and volatile material emanated from bituminous material, paints, solvents; High levels of noise and vibration; Stock piling of soil, debris and other material may block surface drainage paths; Degradation of water quality
Establishment of material storage yards temporary parking bays for project machinery and vehicles	Reduction of on road parking; Obstruction to vehicular movements; Disturbances to residents; Increased traffic on alternate roads; Disturbance to pedestrian movement and safety issues; Interruption of livelihoods of pavement vendors, hawkers, middlemen etc. causing localized flooding during constructional and operational periods; Establishment of

	weed species in the project area due to introduction through imported raw material; Erosion and siltation; Contamination of surface runoff; Stagnation of water
Operational Phase	During operations there will be more traffic on the roads which will be mainly used as city by-pass roads and consequently increase in noise, vibration and air pollution. It is difficult to say how significant this impact will be as even now the roads are heavily used. The overall improved traffic arrangements within Kandy will lead to less noise, vibration and air pollution of the core city areas.
<b>4. Kandy lake water quality improvement:</b>	
<b>Key project activities</b>	<b>Related Impacts</b>
Site surveys and data collection	None
Transport and stockpiling of material	Emission of dust and air pollutants from transport vehicles; generation of noise and vibration; disturbance to residents and road users
Desilting of silt traps	Disposal of large quantities of silt; noise and air pollution from construction vehicles and equipment; traffic congestion and inconvenience to lake round walkway.
Construction/improvement to silt traps and gabion walls	Off-site impacts of quarrying; noise and air pollution from construction vehicles and equipment; traffic congestion
Drainage diversions during construction	Temporary blockage and short-term increased siltation in the lake
Construction of siphon system at the spillway	Short-term water quality impairment; noise and air pollution from construction vehicles and equipment; traffic congestion
Operational Phase	In the long-term this will have many positive impacts with anticipated improvements in the quality of water in the lake. Silt collected in traps will need to be disposed and these may be large quantities and may have a secondary use in the construction industry.
<b>5. Urban landscaping for recreation and city beautification:</b>	
<b>Key project activities</b>	<b>Related Impacts</b>



Demolition/dismantling of existing pavements and structures	Disturbance to pedestrian movement and safety issues due to uneven surface, material/debris piles; Emission of dust, noise and air pollutants
Excavation of trenches to re-orient or lay new service lines (telecom, power, water and drainage);	Closure of roads for traffic; disturbance to pedestrian movement and safety issues due to deep excavations and material piles; emission of dust and air pollutants from equipment and machinery; generation of noise and vibration; loosened soil structure and slope failures leading to landslide risks; subsurface soil layers susceptible to collapse and fail under outward seepage flow
Construction of new foot walks and paved areas; installation of street furniture, lighting etc	High noise and vibration level; uneven settlements: cracks and eventual failure of anchorages and pipelines
Material transportation and storage	Emission of dust and air pollutants from equipment and machinery; generation of noise and vibration; traffic congestion; public safety
Provision of temporary drainage and traffic diversion	Obstruction to vehicular movements; Disturbances to residents due to traffic diversions and restricted entry to by-roads; Increased traffic on alternate roads; Temporary drainage blockages, Surface ponding of water;
Filling and re-surfacing/overlay	Off-site impacts of burrowing; traffic, noise, vibration from construction vehicles; dust emission; Increased flows due to altered land use types with less permeable paving surfaces;
Spoilage disposal	Blocking of existing drainage paths; erosion of material during rains
Turfing and tree planting	Introduction of invasives and selection of improper tree species
Operational Phase	Increased pedestrian traffic and visitors mean more solid waste and higher maintenance during the operational stage.
<b>6. Conservation of historic/archaeological buildings: Restoration of historic buildings to preserve cultural heritage and to promote local/foreign tourism</b>	
<b>Key project activities</b>	<b>Related Impacts</b>
Site survey and evaluation of structural	None

stability	
Structural/Aesthetical restoration	Use of wrong construction material, use of inexperienced contractors leading to damage or over-restoration
Operational Phase	Increased visitors mean more solid waste and higher maintenance during the operational stage.
<b>Greater Galle</b>	
<b>1. Rehabilitation of primary/secondary canals and cross drains:</b>	
<b>Key project activities</b>	<b>Related Impacts</b>
Site survey and preparation including provision of access roads, material storage yards	Emission of dust; Disturbance to pedestrian movement, problems of accessibility to houses.
Dredging, dewatering and disposal of bottom sediments	Degradation of water quality; Reduce pore pressure build up, slope instability and transport of fines; Surface ponding of removed water; Stock piling of dredged material, soil, debris; Blocking of surface drainage paths causing localized flooding; Odour problems; Smothering of benthic fauna
Removal of temporary structures, debris, demolition waste and other solid waste along the banks	Emission of dust and noise; Disturbances to traffic and pedestrians during storage of material and debris; Inconvenience to present residents and pedestrians.
Excavation for the gabion wall construction and coffer damming	Collapse of vertical soil faces; Increased susceptibility to erosion; Liquefaction leading to bank failures; Excessive noise and vibration; Inconvenience to present residents and pedestrians; Temporary distraction of fish
Material transport and storage	Emission of dust and noise due to transport of material; Inconvenience to people in the area
Construction of gabion walls	Diversion of flows, erosion of soil embankments, loosening bank support and weakening of the interlocking of rubble used causing immature failure of gabion structure;

	Inconvenience to present residents and pedestrians, if any.
Reinstatement of storm water drainage connections through protection walls.	Erosion of soil embankments, loosening bank support and weakening of the interlocking of rubble used causing immature failure of gabion structure; Blockage due to accumulation of fines due to cross drainage flows
Backfilling of banks behind the gabions, turfing and replanting of trees	Differential settlements causing the gabion walls to misalign and fail; Inconvenience to present residents and pedestrians and potential accidents
Reinstatement of maintenance roads and construction of road side drain and cross drainage	Localized ponding; weakening of soil sub-base
Operational phase	During the operational phase maintenance dredging would be required which will also require careful disposal of material.
<b>2. Coastal urban development:</b>	
<b>Key project activities</b>	<b>Related Impacts</b>
Site Surveying & data collection	None
Site preparation including provision of access roads, removal of temporary structures (if any), debris and other solid waste along the beach	Emission of dust; disturbance to beach users, inconvenience to present residents and pedestrians, disposal of collected debris.
Construction of beach facilities	Emission of dust and noise due to transport of material and construction, inconvenience to beach users and people in the area, wastewater from car parks, toilets and restaurants
Construction of erosion control structures	Off-site impacts of quarrying, emission of dust and noise due to transport of material and construction, inconvenience to road users and people in the area
<b>3. Urban landscaping for recreation and city beautification:</b>	

<b>Key project activities</b>	<b>Related Impacts</b>
Site Surveying & data collection	None
Site preparation including provision of access roads, removal of temporary structures (if any), debris and other solid waste along the beach	Emission of dust; disturbance to beach users, inconvenience to present residents and pedestrians, disposal of collected debris.
Construction of beach facilities	Emission of dust and noise due to transport of material and construction, inconvenience to beach users and people in the area, wastewater from car parks, toilets and restaurants
Construction of erosion control structures	Off-site impacts of quarrying, emission of dust and noise due to transport of material and construction, inconvenience to road users and people in the area
Operational Phase	Increased pedestrian traffic and visitors mean more solid waste and higher maintenance during the operational stage.
<b>4. Conservation of historic/archaeological buildings:</b>	
<b>Key project activities</b>	<b>Related Impacts</b>
Site Surveying & data collection	None
Site preparation including provision of access roads, removal of temporary structures (if any), debris and other solid waste along the beach	Emission of dust; disturbance to beach users, inconvenience to present residents and pedestrians, disposal of collected debris.
Construction of beach facilities	Emission of dust and noise due to transport of material and construction, inconvenience to beach users and people in the area, wastewater from car parks, toilets and restaurants
Construction of erosion control structures	Off-site impacts of quarrying, emission of dust and noise due to transport of material and construction, inconvenience to road users and people in the area
Operational Phase	Increased visitors mean more solid waste and higher maintenance during the operational stage.

#### **4.1.3 Potential issues that require specific guidelines**

In some of the sub-projects specific issues that are apart from typical construction related impacts may arise. Such issues have to be addressed with specific guidelines so that the real impacts could be evaluated successfully and mitigation measures proposed accordingly. Two such issues have been identified;

##### **4.13.1 Dredging and dredged material disposal**

Themes such as the improvement of main canals and rehabilitation of secondary and tertiary canal in Galle may involve dredging that could lead to potentially serious environmental impacts if sediments of the canals dredged are contaminated with hazardous material. If that is the case, disposal of dredged material should be handled and planned carefully, especially in view of limited options available in the country for disposing contaminated dredged material, in order to ensure that risks to the environment, public and the workers are mitigated and managed well. The extent of impact of dredging will depend on the quantity of material, method of mobilization of machinery and the degree of contamination etc. As such, for sub-project that involve substantial dredging generating significant volumes of dredge material specific guidelines need to be used. Since the GoSL does not have specific environmental guidelines for dredging and dredge material disposal, guidelines developed by the United States Environmental Protection Agency (USEPA), given below, can be used as useful references.

- Evaluation of dredged material proposed for discharge in Waters of the U. S. – Testing Manual, Feb. 1998, EPA-823-B-98-004 (can be downloaded from [www.epa.gov](http://www.epa.gov))
- Evaluating environmental effects of dredged material management alternatives – A technical framework, revised in May 2004, EPA842-B-92-008 (can be downloaded from [www.epa.gov](http://www.epa.gov))

These two guidelines should be adopted in the context of the SCDP and as such it will provide the necessary information as to how dredging and dredged material disposal be handled in an environmental safe manner under the project.

##### **4.1.3.2 Construction in landslide hazard zone**

Landslides constitute a major natural disaster in the Kandy district. Within the Kandy city limits itself various landslide events have taken place in the past causing damage to life and property and are recurring, posing a major challenge to all stakeholders to mitigate such impacts when development work is undertaken. Landslides are caused when mountain slopes are rendered unstable. While this can occur naturally, human induced features such as bad land use practices in steep slopes, poor drainage, improper construction techniques, overloading of slopes, vibration from heavy traffic and displacement of rocks aggravate the situation and raise the landslide risk significantly. In order to guide future land-use and economic activity in hilly areas the National Building Research Organization (NBRO), which is the government authority for landslide disaster management, has prepared Landslide Hazard Zonation (LHZ) maps for vulnerable areas including the Kandy city. The LHZ maps assign risk levels to areas depending on susceptibility for landsliding and accordingly within the Kandy city 10% of the areas has been identified as having a high risk while 30% and 60% respectively has been identified as having a moderate and low risk.

It is important for SCDP to use the LHZ for Kandy city as a basis for planning project work and to consult the NBRO for site specific remedial measures when infrastructure development is undertaken in risky areas.

#### **4.1.3.3 Impacts on physical cultural resources**

Kandy and Galle are cities rich in cultural heritage and requires particular attention to mitigate any negative impacts on PCRs that can take place either directly or indirectly during project implementation. As highlighted in the preceding chapter, PCRs in both cities are dominated by built PCRs such as historic buildings, monuments, temples and monastic complexes. For both cities, cultural heritage buildings and property have been inventoried and mapped by both the Department of Archaeology and the Central Environmental Authority and a strict historic building code is in practice which requires historic buildings to adhere to conservation guidelines when any change is implemented. The project is not expected to lead to changes in demographic or settlement patterns that can lead to neglect of old areas containing historic centers, nor will it undertake construction of major urban facilities or major resettlement with potential to significantly alter existing scenic townscapes. Most of the project interventions will be rehabilitating, improving and building on existing infrastructure and could potentially trigger some of the typical impacts highlighted below;

- Direct physical damage during construction work and construction accidents
- Physical damage due to vibration, air, soil and water pollution caused by construction traffic, use of heavy construction equipment and possible use of explosives in road improvement work
- Indiscriminate dumping of waste that could cover and lead to aesthetic damages
- Temporary or permanent access restrictions
- Soil compaction during road and water supply and drainage work leading to burial and damage to buried material
- Quarrying for construction material leading to damage and destruction of PCRs and changing of aesthetic quality of landscapes
- Establishment of worker camps leading to unregulated access to PCR sites, looting of valuable artifacts, accidental damage and vandalism

The project will also have a cultural heritage restoration component to restore heritage buildings and re-use for tourism purposes. While this is expected to have positive outcomes, care should be taken to employ the right expertise, use sympathetic construction material and techniques and not to over-restore resulting in negative impacts on the townscape. Also, reuse of restored heritage buildings should take into consideration impacts of increased visitation and the resultant wear and tear.

### **4.2 Impact management framework**

#### **4.2.1 Environmental screening of sub-projects**

Environmental screening is reckoned to be a useful tool in identifying environmental safeguard issues in large investment programs consisting of many sub-projects that cover multiple sectors. As such, all sub-projects under SCDP will be subjected to an environmental screening using the form provided in **Annex 5**. In addition to the list of sub-projects indicated in the previous chapters, any resettlement site that will be used by the project to relocate families from underserved settlements to enable certain sub-projects to be implemented will be subjected to the same screening process. The main objective of Environmental Screening of sub-projects will be to (a) determine the anticipated environmental impacts, risks and opportunities of the sub-project (ii) determine if the anticipated impacts and public concern warrant further environmental analysis, and if so to recommend the appropriate type and extent of Environmental Assessment needed. Screening should go hand in hand with project concept development. This way environmental opportunities and risks can be appropriately and easily integrated into subsequent design stages, rather than

being brought in at the last minute. The environmental screening report should be prepared by an environmental expert/s with field visits and available data and information (*implementation arrangements are given in the subsequent chapter*). Once the report is ready it will be made available to the project implementing agency to take necessary actions particularly in relation to the recommendation given in the report.

#### **4.2.2 Sub-project criteria for screening**

In the case of developing criteria for screening and assessing anticipated impacts all sub-projects are categorized into generic themes based on the nature of work proposed, as presented in the preceding section. The following table provides a template of a typical screening (anticipated outcomes based on potential environmental risks/impacts involved) and classifying all sub-projects in the pipeline in accordance with (a) safeguard categories of OP 4.01 and (b) recommended type of environmental analysis and/or feasibility studies to be undertaken for each type of investment commensurate with the magnitude of potential impacts and risks. According to this table it is evident that most of the sub-projects belong to safeguard Category B and do not need rigorous environmental studies to be undertaken and only the screening report with a site specific EMP would be adequate. Hence project proponents are requested to refer to the EAMF to be informed on the level of environmental studies that would typically be necessary to be undertaken prior to commencement of the project.

It is extremely important to note that this table has been prepared as a **broad guidance** to the PMU and the implementing agencies as possible screening outcomes commensurate with typical environmental risks/impacts associated with each investment category and **should be re-evaluated** at the time of actual screening. The final decision will be based on the actual screening that will be undertaken for each project along with appropriate site investigations.

**Anticipated Screening Outcomes for Proposed Sub Projects**

**1 – SEA; 2 - Feasibility/Analytical study (mainly sediment quality analysis); 3 – EIA; 4 – EA; 5 – EMP only**

**Recommended Environmental Analysis - √; Safeguard Category of sub-project: A – Impacts are significant and irreversible; B – Significance of impacts vary, mitigatable and not irreversible; C – no impact**

Project component and implementing agency	Sub-project type	Potential adverse environmental issues (refer preceding section for a more detail account of potential impacts)	Safeguard Category According to OP 4.01	Type of recommended environmental analysis				
				1	2	3	4	5
<b>Component 1</b>	<b>Greater Kandy Improvement</b>							
	<b>Kandy Basic Services Improvement</b>							
	Augmentation and rehabilitation of the municipal water supply system. <ul style="list-style-type: none"> <li>• Augmentation of Getambe, Dunumadalawa, and Rosneth treatment plants, and construction of storage tanks.</li> <li>• Rehab of the distribution network</li> </ul>	Mostly construction related impacts of dust, noise, traffic, soil erosion, water stagnation, road closure, inconvenience to public and residents, tree removal, debris disposal, short-term lake water quality impairment. The main operational impact will be increased extraction of water from the river. Other operational impacts are low risk and related to maintenance.	B					√
	Kandy Lake water quality improvement <ul style="list-style-type: none"> <li>• Overflow stream restoration from Dunumadalawa Reservoir to Kandy Lake</li> <li>• Protection to embankment of upper stream canals to Kandy Lake and construction</li> </ul>	Removal of trees, disposal of silt, dust, noise, air pollution and traffic congestions, inconvenience to public and residents, introduction on invasive species, short-term lake water quality impairment. In the long-term this will have many positive impacts with anticipated improvements in the quality of water in the lake.	B					√



	<p>of new silt traps</p> <ul style="list-style-type: none"> <li>• Lake shore protection and Lake around walkway</li> <li>• Establishment of lab facilities and purchase of equipment</li> </ul>							
	Rehab of the Underground storm water drainage tunnel and surface drainage	<p>Generation of noise and vibration; Slope failures; Loosen soil structure and weaken soil stability; Subsurface soil layers susceptible to collapse and fail under outward seepage flow, dust, noise, traffic, public safety.</p> <p>During operations, cleaning would generate debris that need to be safely disposed.</p>	B					√
	Rehab of surface canal (MedaEla) and rehab of overflow from <i>Dunumadalawa</i>	<p>Bank failures; Loosen soil structure and weaken soil stability; short-term canal water quality impairment dust, noise, traffic, public safety.</p> <p>During operations cleaning of the canals will generate soil and debris which needs to be disposed properly.</p>	B					√
<b>Kandy Traffic Improvement</b>								
	Roads improvement (critical by pass roads and downtown main roads)	<p>Landslide hazard, dust, noise, traffic, public safety, access restriction, soil erosion and water stagnation, air pollution from bituminous material.</p> <p>During operations there will be more traffic on the roads which will be mainly used as city by-pass roads and consequently increase in noise, vibration and air pollution. It is difficult to say how significant this impact will be as even now the roads are heavily used. The overall improved traffic arrangements within Kandy will lead to less noise, vibration and air pollution of the core city areas.</p>	B					√

	Public transport and traffic management	Same as above	B						√
<b>Kandy Downtown Upgrading</b>									
	Streetscape improvement in Grid City Lake Around Walkability Public space reconfiguration in front of Prison Land Restoration of heritage buildings	Public safety, traffic, dust, noise, introduction of invasive species.  Increased pedestrian traffic and visitors mean more solid waste and higher maintenance during the operational stage.	B						√
<b>Institutional Strengthening and Capacity Building</b>									
	Preparation of city development master plan		C	√					
<b>Greater Galle Improvements</b>									
<b>Flood and Drainage Management</b>									
	Rehabilitation of primary/secondary canals and cross drains:	Dredging, dredge material disposal. During the operational phase maintenance dredging would be required which will also require careful disposal of material.	B		√				√
	Coastal urban development: Beach Access Urban design for Weligama		B		√				√

	Urban landscaping for recreation and city beautification: Walkability improvement Streetscaping Restoration of heritage buildings	Public safety, traffic, dust, noise, introduction of invasive species; use of wrong raw material for heritage conservation. Increased pedestrian traffic and visitors mean more solid waste and higher maintenance during the operational stage.	B					√
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**Annex 6** provides a description of the different EA tools used in the table above

### **4.2.3 Screening Method**

Preparation of the screening reports will be conducted in four distinct stages, namely (i) field visits, data collection and stakeholder consultation; (ii) data analysis and interpretation; (iii) impact identification; and (iv) filling the screening including recommendations for next steps. The methodologies for each of these steps are explained briefly below. The proposed screening report format is given in Annex 1.

#### **Data collection and stakeholder consultations**

Data for this study will be primarily collected through field visits, discussion with stakeholder agencies and literature reviews. In addition, supportive tools such as GIS based mapping using GPS coordinates covering the sub project sites, where ever possible is encouraged.

Literature Survey will broadly cover the following aspects and attributes necessary for environmental screening:

- Project details/ Reports/ Maps/ documents including design details available with the implementing agencies
- Literature on flora/ fauna/ biodiversity/land use/soil/geology/ hydrology/ climate /socio economic profiles and environmental planning collected from GOSL agencies
- Hydrological/ rainfall/ drainage datasets

#### **Field Visits:**

Each sub-project sites will be visited by the expert/s filling the screening form together with representatives from the implementing agency to assess the existing environment (physical, biological and socio economic environment) and gather information with regard to the proposed sites and scale of the proposed sub projects and any prevalent issues. During these visits rapid reconnaissance surveys will be conducted in order to record the faunal, floral diversity, where necessary, to verify and support information gathered through the literature survey.

#### **Focus Group Discussions/ Meetings:**

Focus group discussions will be carried out with other stakeholder agencies (as the expert will represent the project proponent sub-project related technical discussions are expected to take place internally) and local authorities to discuss pertinent issues. In addition, the public will be consulted (at least 5 such consultations in each site) to record their views and opinions about the proposed SCDP and the given site-specific investments.

#### **Data Analysis and Interpretation**

Data collected from field visits and stakeholder discussions will be analyzed by the expert and discussed with the technical team of the project proponent for feedback.

#### **Impact identification**

This will be carried out by the project proponent's expert through discussion with the technical team.

#### **Filling screening reports**

The screening report will be filled with details on the proposed project intervention, physical/ecological baseline conditions of the site, assessment of potential impacts, feedback from public consultations and recommendations for the type of environmental assessment required. If the findings confirm that anticipated impacts are not significant enough for a stand-alone EA and that an EMP would suffice to mitigate the likely impacts, the screening exercise would be completed with the preparation of a site specific EMP. If the likely impacts are significant and would require greater environmental analysis, the screening report would recommend the appropriate assessment type for the implementation agency to carry out before designs are finalized. **Annex 3** provides guidelines for EMP preparation.

### 4.3 Mitigation of potential environmental impacts

As highlighted above, environmental impacts from majority of sub-projects under SCDP will be associated with general construction related activities which can be effectively mitigated with good construction planning, site management, debris disposal and public safety practices. For such impacts, environmental best practices (relevant to the sub-project) as highlighted in the table below would be sufficient where impacts of a particular activity are minor and easily arrested. As for, specific impacts such as those that could potentially arise from dredging, dredge material disposal and construction on landside sensitive zones will need specific guidelines to plan mitigation. For specific impacts of dredging, the subsequent section presents a technical framework for planning dredging and dredge material disposal for sites proven to be contaminated.

#### 4.3.1 Environmental best practices for constructional impacts

Type of Impact	Mitigation measures	Standards applied
Dust	<ul style="list-style-type: none"> <li>Regular watering of roads for dust suppression in urban, residential areas and in areas with sensitive receptors</li> <li>Covering of excavated soil temporarily stored on site</li> <li>Daily cleaning of tires of vehicles</li> <li>covering up any vehicle transporting materials and spoil to and from construction sites</li> <li>Daily cleaning of streets and pathways in vicinity of construction site that are affected by soil and dust</li> <li>Imposing speed controls for construction vehicles</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1
Air pollution	<ul style="list-style-type: none"> <li>Employ construction machines with low emissions to reduce pollution, arranging sources of emission far from people's houses and public places</li> <li>All construction machines and vehicles should meet the standard on emissions and have passed the emission test</li> <li>No burning of wastes on site</li> <li>Limit traffic congestion through proper planning and operating of traffic diversions</li> <li>Do not let machines idle when not necessary</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3; CEA Air quality standards;
Noise and Vibration	<ul style="list-style-type: none"> <li>Apply appropriate schedule to avoid any works that may cause noise and vibration during 10 pm – 6 am. Any nighttime activities should be done using noise reducing means or low-noise technologies</li> <li>Use vehicles and equipment that meet standards for noise and vibration in Sri Lanka.</li> <li>Publishing and registering working time of construction machines with local authorities and strictly compliance therewith.</li> <li>Restricting use of noisy machines near sensitive receptors such as schools and hospitals, use noise-reducing means for construction machines, if required.</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3; CEA noise & vibration standards
Solid waste (demolition, construction and excavation)	<ul style="list-style-type: none"> <li>Work sites should be cleared of residual solid waste and wastewater before work commences</li> <li>Temporary storage of solid wastes shall be done with appropriate containment to avoid spreading of waste, odor and avoid dust</li> <li>Temporary storage of solid waste should be done to avoid interfering with traffic obstacles and aesthetics</li> <li>Sites for collecting solid waste in each sub-project area</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3; CEA guidelines on Solid Wastes

Type of Impact	Mitigation measures	Standards applied
	<p>should be determined prior to commencement of construction. These sites must be suitable with the transport, in order not to obstruct the activities of human beings and the waste must be transported during the day</p> <ul style="list-style-type: none"> <li>• Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety in urban areas</li> <li>• All waste should be collected and disposed in compliance with the local and national laws, in sites identified by the respective LA</li> <li>• Excavated soil, if suitable, should be used for leveling and backfilling</li> <li>• No solid waste can be burned at the site</li> <li>• Clean the construction site of solid wastes, wastewater etc. before its closing</li> </ul>	
Domestic waste	<ul style="list-style-type: none"> <li>• Construction camps should be sited appropriately with consent from the necessary public authority or the implementing agency,</li> <li>• Labour camps shall be provided with adequate and appropriate facilities for disposal of sewage and solid waste</li> <li>• Domestic solid waste shall be collected and disposed of daily at the LA designated site or given for collection by the LA</li> <li>• Discharge and disposal domestic waste from worker camps into water sources should be strictly avoided</li> <li>• Burying and burning domestic waste in the project site should also be strictly avoided</li> <li>• Avoid construction workers staying overnight in the construction sites</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3; CEA guidelines on Solid Wastes, Code of practices by SLSI
Dredge material disposal	<ul style="list-style-type: none"> <li>• Dredge material identified as contaminated will need special handling, transportation and disposal. For contaminated sites, confirmed by the on-going sediment quality analysis, a dredge material disposal plan will need to be prepared.</li> <li>• The contractor should be trained and made aware of the requirements prior to commencement of the sub-project. Special guidelines for handling of contaminated dredge material should be prepared and published by the PMU.</li> <li>• Dredge material that are uncontaminated should be either dumped on-site for canal/lake bank stabilization or removed to landfill/dumpsite designated by the LA/CEA as appropriately.</li> </ul>	ICTAD Publications: SCA/3/3; EPA guidelines on dredged material
Oil and lubricant waste	<ul style="list-style-type: none"> <li>• Oil and lubricant waste should not be buried or burnt in the project site, but collected and stored in proper oil-cans and disposed for re-use or LA approved designated sites.</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3
Soil erosion	<ul style="list-style-type: none"> <li>• Earthwork should be carried out during dry weather periods and all exposed surfaces should be covered with suitable grass species (turf) to prevent siltation in canal/lake beds</li> <li>• Stockpiling of earth should be done a safe distance away</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1; SCA/7

Type of Impact	Mitigation measures	Standards applied
	<p>from waterways</p> <ul style="list-style-type: none"> <li>• Other construction materials containing small/ fine particles shall be stored in a place not subjected to flooding and in such a manner that these materials will not be washed away by runoff.</li> <li>• If necessary, silt/sedimentation traps should be used to prevent soil particles from getting into drains and canals</li> </ul>	
Extraction of earth and quarry	<ul style="list-style-type: none"> <li>• All quarry/burrow sites operated by the contractor should be licensed with the LA/CEA/GSMB, as appropriate.</li> <li>• All burrow pits /areas shall be rehabilitated at the end of their use by the contractor in accordance with the requirement of the EMP or as instructed by the Engineer of the IA</li> <li>• Establishment of burrow pits/areas and its operational activities should not endanger properties and cause a health hazard to the people.</li> <li>• At contract closing, all burrow/quarry sites should be fully rehabilitated</li> <li>• If contractor would procure earth/quarry material, he should do so from sources that are operating with the required licenses</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1;; SCA/3/3, GSMB guidelines
Traffic Congestion	<ul style="list-style-type: none"> <li>• All sub-project should have a traffic management plan</li> <li>• Temporary home and business accesses should be provided where necessary and transport along main roads during rush hours should be avoided where possible.</li> <li>• Temporary access roads should be identified before construction begins and upgraded if necessary.</li> <li>• All roads and access sites must be restored to their original state as soon as possible</li> <li>• Speed limits and operating times for the construction vehicles should be imposed</li> <li>• Travel route for construction vehicles should be designed to avoid areas of congestion.</li> <li>• If project works occur after dark, a lighting system should be maintained such that vehicles and pedestrians can clearly see the construction area.</li> <li>• One-way flow of traffic should be promoted whenever practical</li> <li>• Contractor should supply traffic co-coordinators to manage traffic flow in areas that are subject to congestion.</li> <li>• Project should maintain fences throughout construction areas. These fences should define clearly the construction boundary that does not occupy the remaining road and ensure traffic flow in residential areas</li> <li>• Awareness programs can be conducted on safety and proper traffic behavior in densely populated areas near the construction sites.</li> </ul>	ICTAD Publications: SCA/5
Access roads	<ul style="list-style-type: none"> <li>• Before construction, the pre-project state of site access roads should be recorded by the project/contractor</li> <li>• During construction, site access roads should be inspected regularly and repairs made as required</li> <li>• After construction, site access roads used by the Project</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3

Type of Impact	Mitigation measures	Standards applied
	<p>should be inspected and compared to records taken during Pre-construction.</p> <ul style="list-style-type: none"> <li>If notable road quality differences exist, the road should be repaired to its original condition</li> </ul>	
Health and Safety	SEE SEPARATE SECTION ON HEALTH AND SAFETY BELOW	<p>ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3, Guidelines of Department of Labour IFC General Environmental, Health and Safety Guidelines</p>
Impacts on flora and fauna	<ul style="list-style-type: none"> <li>A compensatory tree planting program should be developed to replant native species wherever available space beside the proposed project.</li> <li>Workers should be instructed to protect flora and fauna including aquatic life as well as their habitats.</li> <li>Hunting and poaching should be strictly prohibited.</li> <li>Washing, maintenance and service of vehicles and machinery should not be done closer to the freshwater habitats.</li> <li>Solid waste, construction debris should not be dump into wetlands.</li> </ul>	<p>ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3; SCA/7, CEA, Department of Wildlife and IUCN guidelines</p>
Impacts on Mangrove Ecosystems	<ul style="list-style-type: none"> <li>Direct loss of mangrove habitats due to construction activity should be avoided as much as possible by considering alternative designs and construction traces.</li> <li>If the selected construction ROW includes conversion of mangrove areas, re-planting and restoration of degraded mangrove areas in the vicinity as a compensatory measure should be considered. If so, restoration should be done according to a proper scientifically prepared plan.</li> <li>There should be no diking/impounding/flooding of mangrove areas that will permanently cut off tidal circulation or submerge its roots causing trees to die.</li> <li>Sedimentation and slippage of earth fills near mangrove areas should be strictly controlled as impacts can lead to burial of its breathing roots.</li> </ul> <p>Burning of vegetation debris cleared from the construction ROW should not be done near mangrove habitats</p>	
Impact on water resources	<ul style="list-style-type: none"> <li>Identification of the reliable water resources and obtain necessary approvals from the relevant authorities to extract water prior to commencement of construction work.</li> <li>Contractor should not obstruct or prevent water flow when working closer to water bodies.</li> <li>Silt traps and erosion control measures should be used where the construction carry out closer proximity to the water bodies to avoid entering of construction materials</li> </ul>	<p>ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3, Mahaweli, Irrigation Department</p>



Type of Impact	Mitigation measures	Standards applied
	which cause turbidity and sediments. <ul style="list-style-type: none"> <li>• Construction material and stock piles should be covered to avoid wash off to water bodies.</li> </ul>	guidelines
Worker camps	<ul style="list-style-type: none"> <li>• Mobilizing maximum capacity of skilled and unskilled labour force from the surrounding project area</li> <li>• Identify location of camps with consultation of LA.</li> <li>• Camps should not be located near water ways, human settlements or near drinking water intakes.</li> </ul>	ICTAD Publications: SCA/5; SCA/3/1; SCA/3/2; SCA/3/3 Code of practices by SLSI

#### 4.3.2 Health and Safety Guidelines

Health and safety of workers and the public should be designed into constructions, before and during and after the building phase. It is cheaper and easier to control risks in construction to workers as well as the public before work starts on site by proper planning, training, site induction, worker consultation and incorporating strict safety procedures in construction plans. The proposed project interventions will mostly involve small to medium scale construction sites. As such, extreme dangers posed by working in environments such as great heights, deep water and involving dangerous chemicals and radioactive material will not be present. Potential dangers associated with SCDP sites will include falling from moderate heights, vehicle/pedestrian accidents, falling into trenches, being buried in tunnels/excavations, breathing dust and other air pollutants, back aches caused by handling heavy material, suffering hearing loss from noise etc and can be mitigated with following safety guidelines.

EA for each site should mandatorily include a risk assessment as to what are the hazards involved in the work site, who might be harmed and how seriously, how likely this harm might happen and what actions are required to eliminate or reduce the risk and incorporate such measures in the EMP and clearly set out in the tender documents. All sub-projects must observe health and safety regulations, hence during implementation it is important to check if these control measures are put in place and are meeting the legal requirement.

#### Training

- Ensure constructors carry out suitable training programs on occupational health and safety for workers prior to commencement of construction.
- Ensure only experienced and well trained workers are used for the handling of machinery, equipment and material processing plants
- Ensure all persons, including managers, are trained and able to carry out their work without risk to the safety or health of themselves, other workers or the public

#### Personal Protective Equipment

- Ensure appropriate safety equipment, tools and protective clothing are provided to workers and that safe working methods are applied. A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored.
  - Any person who works or operates in an area where there is a risk of flying objects, such as splinters, should wear safety goggles at all time. These should be securely fitted to the face. Welders should protect the entire face from hot sparks and bright rays by using a welding mask.
  - Any person exposed to high levels of dust or hazardous gases (when working in tunnels) should wear respiratory protection in the form of disposal masks or respiratory masks which fit more snugly around the nose and mouth.

- Any person working in an area where there is the risk of being struck on the head by a falling or flying object should wear a hard hat at all times. These should be well maintained in order to be fully effective, and any helmets or hard hats that are damaged or cracked should immediately be replaced.
- All workers will be required to wear shoes or strong boots to prevent sharp objects from penetrating or crushing the foot. Those working in muddy conditions and in canals with polluted water should avoid hand/foot contact with water and should never wear slippers.
- Road workers should wear reflective vests to avoid being hit by moving vehicular traffic.

#### **Site Delineation and Warning Signs**

- Ensure delineation devices such as cones, lights, tubular markers, orange and white strips and barricades are erected to inform oncoming vehicular traffic and pedestrians in the area about work zones.
- Ensure all digging and installing work items that are not accomplished are isolated and warned of by signposts and flash lamps in nighttime.
- Ensure dangerous warning signs are raised to inform public of particular dangers and to keep the public away from such hazards.
- Ensure rehabilitation of trenches progressively once work is completed.
- The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned, if they are easily identifiable and whether they are reflective.

#### **Equipment safety**

- Work zone workers use tools, equipment and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used, so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts and mechanical or electrical problems.

#### **Traffic management**

- Ensure traffic control plans and procedures are in place when work zone is set up and how to handle full or partial road closure, blocked intersections, sidewalk closure etc
- Ensure installation of transport signs and lighting systems in conspicuous places to assure transport safety. Transport signs should be installed at places where accidents may be easily happened (populated centers, schools, hospitals, commercial areas etc )

#### **Material management**

- Ensure easily flammable materials are not be stored in construction site and that they are transported out of project site

#### **Emergency Procedures**

- Ensure an emergency aid service is in place in the work zone.
- Ensure all site staff is properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble for a head count. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site.

#### **Construction camps**

- Ensure installation of adequate construction camps and sanitation facilities for construction workers to control of transmission of infectious diseases.

#### **Information management**

- Develop and establish contractor's own procedure for receiving, documenting and addressing complaints that is easily accessible, culturally appropriate and understandable to affected communities.

- Provide advance notice to local communities by way of information boards about the schedule of construction activities.

#### **Worker consultation**

- Consulting the workforce on health and safety measures is not only a legal requirement, it is an effective way to ensure that workers are committed to health and safety procedures and improvements. Employees should be consulted on health and safety measures and before the introduction of new technology or products.

#### **4.3.4 Mitigation of environmental impacts caused by the disposal of dredge material**

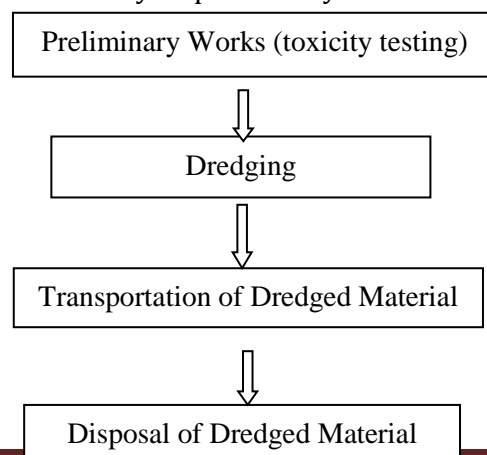
The potential environmental effects of dredging are generally two-fold, firstly as a result of the dredging process itself and secondly as a result of the disposal of the dredged material. During the dredging process impacts may arise due to the excavation of sediments at the bed, loss of material during transport to the surface, whilst loading and during transport to the designated location and will include removal of benthic communities, short-term changes in the water quality with increased turbidity and the possible release of organic matter, nutrients and or contaminants (depending upon the nature of the material in the dredging area), smothering of fish and other fauna by settling suspended matter etc.

The second is the impact of dredged material disposal which largely depends on the nature of the dredged material (inorganic, organically enriched, acidic, contaminated) and the characteristics of the disposal area (geology of the land, accumulative or dispersive areas in the case of open sea dumping). Dredging would generate large volumes of sediments and sludge, the quality of which would determine how and where it can be disposed to. Haphazard disposal of contaminated dredge material can lead to many adverse environmental and public health risks, and as such the project must adopt a cautious approach and undertake adequate assessments, as highlighted in the guidelines given below.

In considering the environmental effects of dredging and disposal, the potential benefits of these operations should not be overlooked. Dredging helps clear clogged waterways which is causing flooding and poor drainage and remove nutrient rich and/or contaminated sediments. The result is improved flow, lower nutrient concentrations, less algae production, prevention of eutrophication in the water bodies leading to an overall improvement in drainage and water flow quality.

The canals and urban drains in the city of Galle, which are proposed to be dredged to improve depth and water flow and thus lower the risk of inundation, are heavily polluted with sewage directed to them from the catchment area. The primary use of these canals is drainage and given the current state they do not score much on eco-system and aesthetic value. Also, it is considered unlikely that the dredged sediments would be hazardous but this can be verified only through sampling and analysis.

The process of dredging has several key steps and they are outlined below



## Key steps in a Dredging Operation

### Preliminary Work

#### (i) Cleaning

Dredging has to be preceded by few preliminary works to clean up the water body enabling the machinery to be used safely. The first such work would be to remove the floating and sunken debris from canals identified for dredging. These need to be removed to have a smooth operation and a self-propelled grab digger is usually used for such cleaning. The other activity is the removal of the sunken barges from the water body, however, this is not expected in the canals under consideration.

#### (ii) Evaluation of Sediment Quality

Since there is inadequate sediment quality data the project would be required to develop a Sediment Sampling and Analysis Plan (SAP) for the canals within Galle city to determine the environmental acceptability of dredged sediments to be disposed off-site. The SAP would provide the technical framework for sampling and analysis for each identified location and would determine the presence/absence of potential toxic chemicals. In the case of a negative determination the project can commence dredging activity any time as there would be no specific restriction on the disposal of dredged material. A TOR for SAP is presented under Chapter 7 of the EAMF.

As such, it is required that the implementing agency, which is the Provincial Irrigation Department (PID) for Southern Province, conducts the necessary field sampling and laboratory testing through a competent authority hired in order to perform this exercise. The test data should be reviewed together with the World Bank and regulatory agencies such as the CEA and/or CCD, as the need be, and the method of disposal should be discussed.

### Evaluation of dredge material management and disposal alternatives

Depending on the degree of toxicity, disposal options could be decided. In the case of a positive determination, disposal would be carefully planned and the project would need to prepare a Dredge Material Disposal Plan (DMDP). Classification of the sediment according to the level of contamination detected and quantification of the dredged material would be pre-requisites to preparing this plan. This is important to check the suitability of the sediments for different alternative disposal/use options. While Sri Lanka does not have any standards for sediment quality or regulations to control disposal of such material, several countries have developed useful guidelines/references. Under the World Bank funded Metro Colombo Urban Development Project (MCUDP), a similar process was carried out and after a careful review of available sediment quality standards internationally, the project selected (together with the CEA and World Bank) the Australian/New Zealand Interim Sediment Quality Standard for comparison of its sediment test data (see Annex 10). The SCDP could use MCUDP as a reference to follow the same.

As such, establishing sediment quality is of paramount importance and the project will have to determine the most suitable disposal alternative based on the results from the SAP prior to dredging and disposal. For contaminated sediments, some of the commonly used alternative options are;

- **Open Sea Disposal**

The open-water disposal is the placement of dredged material in rivers, lakes, estuaries or oceans via pipelines or release from hopper dredges or barges. Here the potential for environmental impacts is affected by the physical behavior of the open-water discharge, most importantly including the hydrodynamics of the disposal site. While this method has been used to dump dredged material from Beira and the Port of Colombo (and most likely Galle harbor, open sea disposal would be too complex and costly for the kind of canal dredging envisaged to take place under SCDP.

- **Incineration**

In the case of thermal destruction only Geocycle, a subsidiary of the Holcim Cement group, is capable of incinerating toxic or hazardous material under licensed approval from the CEA. They could collect such dredged material and transport to Puttlum, Palavi to mix them with their fuel (coal) to burn in their cement kiln. The kiln maintains a temperature of 1400°C which is high enough to degrade all toxic material present in the dredged material. Even the bottom ash that remains can be mixed as an inert material with cement without any leaching out of toxic metals. However when the dredged material contains high levels of Mercury or Arsenic it may not be possible to go for thermal destruction as they become volatiles and may cause air pollution. However, this too is not a suitable solution for SCDP given the long-distance transport and the associated costs.

- **Confined Disposal**

Confined disposal is the placement of dredged material within a confined disposal facility (CDF). The CDFs may be constructed particularly for the purpose of depositing contaminated dredged material which can be later covered and converted to a different land-use.

- **Disposal at an engineered sanitary landfill sites**

Sri Lanka has two small semi-engineered landfills in Nuwara Eliya and Mawanella operated by the Nuwera Eliya Urban Council and the Mawanella Pardheshiya Sabha respectively and a newly constructed fully-engineered landfill in Dompe. These are located considerable distances away from Galle and may not be practical options. A regional engineered landfill which has been planned by the CEA for the Southern Province is planned to be constructed in 2015 in Rathgama which is only about 15 Km from Galle city. The site has been acquired with considerable investments to construct an access road and a large composting facility. The design for the engineered landfill is underway and is expected to be completed in 2014. If the dredged sediments from the canals require careful disposal, the excess sediments (aft using onsite as much as possible for backfilling) could be kept in a confined area in the present dumping site used by the Galle Municipal Council (GMC) until final disposal can be made at the regional landfill once it is commissioned. This option would need to be carefully considered.

### **Environmental Monitoring Program**

Dredging and the process of bringing the dredge material to the surface of the canal, loading, transporting and unloading all can lead to various water/air/land contamination which would ideally require monitoring. However, the canals and urban drains under consideration are heavily organically polluted (which violates water quality standards for any use), not used for anything other than urban drainage and do not have much of an ecological value. As such, close environmental monitoring during the post-dredging period is not considered necessary. However, DMDP could assess if there is any need to conduct environmental monitoring in the post-dredging period and if so specify the requirement.

### **(iv) The Regulatory Process**

Under National Environmental Protection and Quality regulation (Scheduled Waste Management Guidelines) any project that involves the disposal of hazardous waste that belongs to the prescribed categories should obtain CEA clearance. Dredged material is not a separately prescribed category and as such during consultations for MCUDP it was determined that the CEA clearance is not required for disposal of dredged material.

### **(v) Project planning and Information management**

The SAP and the DMDP should be closely linked to the project work plan and effectively communicated to key stakeholders directly involved, so that proper sequencing and scheduling of activities as well as implementation and monitoring of control measures can take place effectively. The Dredging Proponent together with the PMU should ensure this.

#### 4.4 Landslide hazard mitigation

The LHZ map prepared by the NBRO for Kandycity classifies land into following 5 zones

1. Known danger of landslides where there is a perennial threat to life and property
2. Landslides most likely to occur where danger exists
3. Landslides to be expected where a moderate danger exists
4. Modest level of landslide danger exists where a slight danger exists
5. Landslides not likely to occur where there is no visible sign of slope instability

In zones 1 and 2 the landslide risks are high and as such new constructions and changes to land use are recommended to be restricted. In zones 3 and 4 new constructions and additions are recommended to be regulated while in zone 5 no blanket limitations are proposed.

For SCDP intervention areas;

- b. existing landslide hazard should be assessed using the LHZ map
- c. where risk is moderate to high, NBRO should be consulted early in the design phase
- d. selection of site specific mitigation measures must be discussed and all technical designs should be vetted by the NBRO
- e. NBRO recommendations should be incorporated into the final technical designs
- f. NBRO's supervision during project implementation must be obtained

**Examples of site specific remedial measures:** As landslides are very localized phenomena, site specific mitigation measures are needed for slope stabilisation such as geotechnical structural measures that include soil reinforcement, soil nailing, rock bolting, surface protection, slope modification, retaining walls, gabion walls, breast walls, soil removal works, steel pile works, etc. In selecting appropriate landslide stabilization measures, three dominant factors need to be considered: cost, constructability, and factor of safety. Ideally, through simulation and advanced modeling, the effect of slope stabilization methods needs to be assessed prior to implementation.

Reduction of pore water pressure by draining out water from strata or soil column is also considered as an important mitigation strategy to stabilize unstable slopes. Water infiltration in the over burden during heavy rains and consequent increase in pore pressure within the overburden, reduces the strength of the material and causes sliding of the landmass. This can be minimized by reducing infiltration and by providing an adequate drainage network.

#### 4.5 Guidelines for mitigating and minimizing anticipated adverse impacts on Physical Cultural Resources

##### (i) Infrastructure Development

The initial impact assessment on PCRs from infrastructure development interventions under the project will be undertaken as part of the environmental screening. This would involve a site inspection and reference to maps of heritage building, property and landscapes prepared by the DoA and the CEA. The goal of environmental screening is to (i) determine the presence or absence of PCR sites within the project boundary and its area of influence (ii) if yes, to describe the extent, character and ownership of the PCR and investigate the significance of it (iii) evaluate the scope for impacts on each site in the event of project proceeding and document them. During the screening stage, the team will also assess the need to carry out a full scale Archaeological Impact Assessment (AIA) under the local law and make its recommendations (refer **Annex 7** for project categories requiring AIA) to the project proponent. Depending on the significance of impacts to PCRs identified through the screening either an AIA (under the Antiquities Act) or an EMP that incorporates measures to avoid, minimize and mitigate the identified impacts will need to be prepared. Depending on the significance of the PCR, its ownership and location (ex within or outside UNESCO site boundary), EMPs may need to be reviewed and cleared by the DoA or the UNESCO Heritage Committee for the city.

In determining the scope and significance of the impact, following aspects are important to be considered.

- **Magnitude:** The amount of physical alteration or destruction that can be expected. Resultant loss of archaeological value is measured either in amount or degree of disturbance.
- **Severity:** The irreversibility of an impact. Adverse impacts, which result in a totally irreversible and irretrievable loss of archaeological value, are of the highest severity.
- **Duration:** The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or more persistent, long-term effects.
- **Range:** The spatial distribution, whether widespread or localised, of an adverse effect.
- **Frequency:** The number of times an impact can be expected.
- **Diversity:** The number of different kinds of project-related actions expected to affect a site.
- **Cumulative effect:** A progressive alteration or destruction owing to the repetitive nature of impacts.

The best outcome is the avoidance of any impact on archaeological values. Mitigation is required only in situations where unavoidable conflicts are identified between PCRs and a proposed development. It is recommended that highly significant sites are avoided by re-routing the construction trace. For other sites where impacts are unavoidable it will be important to record the condition of the PCR and then use a combination of strategies such as protection using barriers, salvation and relocation of removed cultural resources using relevant expertise, increasing cultural awareness and setting standards of behavior for project personnel to prevent illegal acquisition and exporting of material etc to name a few can be used. When recommending suitable strategies it is important to involve cultural heritage specialists in the assessment team and to consult the DoA, as necessary.

#### **(ii) Conservation of heritage sites**

The SCDP will also undertake restoration of heritage buildings that would most likely include re-painting of interior/exterior, roof restoration, re-tiling and re-paving, floor restoration, conservation of foundations, windows and doors, landscaping, adding public conveniences, access improvement, installation of displays etc. All the structures identified hitherto are owned by the DoA, hence design and implementation will be carried out by or under close supervision by the Department according to a restoration plan approved by the UNESCO heritage committee established for each city. A Conservation Master Plan has been already developed for the Galle Fort World Heritage Site and any work within it would need to conform to the master plan and approved by the Galle heritage committee chaired by the GMC. Such a plan however does not exist for the Kandy World Heritage Site, however, necessary approvals will need to be obtained.

#### **(iii) Chance finds procedures**

Contracts for civil works involving earth moving and excavation activities, especially in known archaeological and heritage areas, should normally incorporate procedures for dealing with situations in which buried PCRs are unexpectedly exposed.

**Recognition of unknown PCRs** – This is the most difficult aspect to cover, especially if the contractor is not full-time accompanied by a specialist. For SCDP contracts, an initial consultation with the Department of Archaeology should be held before work commencement to identify the likelihood of such material being uncovered, especially where trenching work is expected for pipe laying etc.

**Upon discovery of such material** during execution of work, the contractor should carry out the following;

- Immediately stop construction activities.
- With the approval of the resident engineer delineate the discovered site area.

- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over.
- Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours.
- Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented.
- Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out.
- An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve on-site, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days.
- Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed.



## Chapter 5 :Institutional Framework for Safeguards Management

In order to ensure environmental and PCR safeguard requirements of the SCDP are satisfactorily complied with, it is necessary to have a well-defined institutional and implementation mechanism for identifying, appraising, managing and monitoring safeguards at all level. The focus of this chapter is to lay out the roles, responsibilities of various parties and the due diligence process that will need to take place from the preparation of an investment through implementation completion.

### 5.1 Overall project implementation arrangements

The project will be implemented and managed by a self-standing and ring-fenced Project Management Unit (PMU) which is being established under the Ministry of Defence and Urban Development (MoDUD). The PMU will operate under the oversight of a Steering Committee, chaired by MoDUD's Secretary and composed by UDA, CCD, KMC, GMC, the Ministry of Local Authorities and Provincial Councils, the Ministry of Irrigation, Ministry of Highways and Roads. Other ministries and agencies will be identified as stand-by members, to join the steering committee when relevant issues need to be dealt with (e.g. Central Environmental Authority).

The PMU will be responsible towards the Bank for the overall fiduciary and safeguard aspects of the project, for monitoring the agencies' compliance with the project's environmental and social safeguards and for overall project monitoring and evaluation (M&E) against results indicators. It will play a critical role in coordinating all the numerous agencies involved in project implementation, ensuring overall quality and timeliness of investments and providing administrative services to the various agencies involved in the project. In order to be more effective at local level and closer to project implementation at city level, **Local PMU offices** will be established both in Kandy and Galle, headed by Project Managers and staffed with core fiduciary, safeguards and technical specialists.

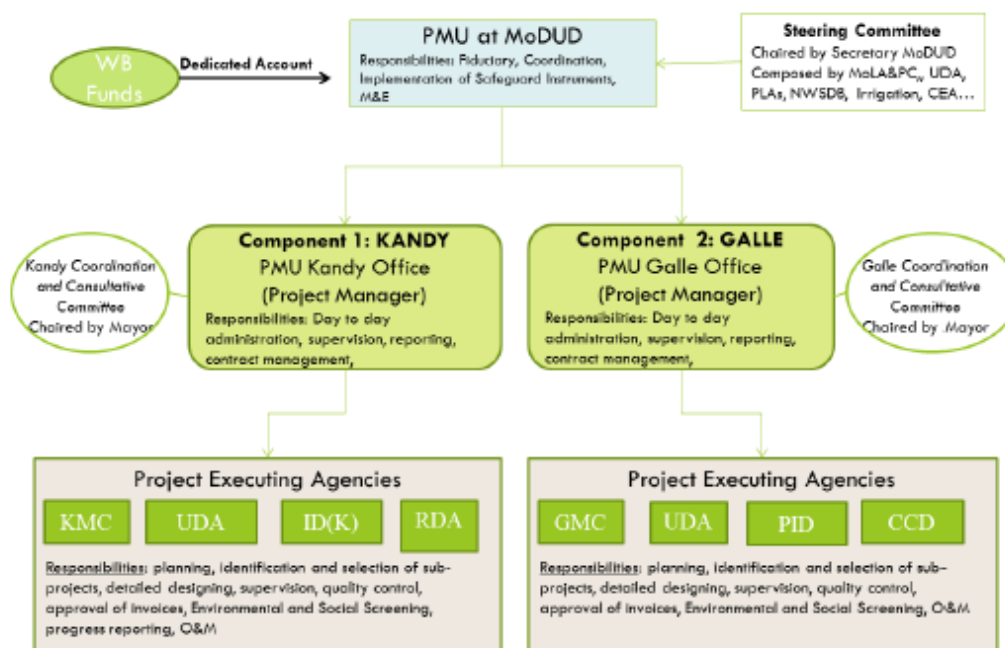
Implementation responsibilities will be assigned to the **Project Execution Agencies (PEAs)**, assisted when needed by consultants for detailed designs and construction supervision. The key responsibilities of the project agencies are as follows:

- Select subprojects, prepare implementation plans and carry out detailed designs of the subprojects. When the PEAs have no capacity for design and supervision, the project will make available Design and Supervision consultants to work with the PEAs to carry out these tasks.
- Supervise implementation of subprojects and report to the PMU on progress and quality.
- Ensure compliance with the project's environmental and social safeguards.
- Commit for future operation and maintenance (O&M) of delivered infrastructures.
- Carry out M&E activities.

A project **Coordination and Consultative Committee** will be established both in Kandy and Galle, chaired by the respective Mayors, with the aim of ensuring effective coordination between the PMU, PEAs and other key stakeholders at local level (including, without being limited to, other government line agencies, private sector, civil society, other donors active at city level).

The proposed implementation arrangements reflect discussion and agreement with the GoSL, who expressed preference for an implementation model that ensures delegation and assignment of all critical implementation responsibilities to the PEAs, while centralizing the administrative/fiduciary functions in a PMU. The following flowchart summarizes the implementation arrangements.

## Implementation Arrangements



(Ref: AM, October 2013)

### 5.2 Implementation arrangements for environmental safeguards and PCR

Planning, implementation and supervision of environmental safeguards will take place at three levels;

- MoDUD (through main PMU)** - The overall responsibility of ensuring compliance with environmental and other safeguards requirements of the project will be borne by the main PMU. It will be supported by a full-time environmental specialist who is suitably qualified and experienced in managing urban environmental issues and a physical cultural resources specialist, both directly reporting to the Project Director. Among its key tasks, the PMU will be responsible for providing the overall policy direction, technical assistance, review and endorsement of screening reports, environmental assessment and management plans, capacity building for effective safeguards management to the implementing agencies, monitoring of environmental compliance and progress reporting to the World Bank. In addition, they will support technical components of the project such as SWM, natural area management and heritage conservation.
- Project Execution Agencies (through the local PMUs)** - The responsibility of day to day planning, implementation and supervision of environmental safeguards specific to sub-projects will be borne by the PEAs. Given the workload of each PEA, it is not practical for each PEA to have its own environmental officer, hence the local PMU office will recruit an environmental specialist for each city who will ensure timely and sound application of the EAMF to the planned investments. The PEAs will draw on his/her expertise during the design/implementation stages to complete safeguards work. He/she will work under and report to the PMU.
- Contractor** - Implementation of EMPs will largely be the contractor's responsibility (apart from those provisions relating to technical designs and other specified tasks indicated in the EMPs)

and for this the contractor will nominate a site engineer as the focal person who will be directly responsible for ensuring compliance with the EMP during construction.

### 5.3 Illustration of the environmental safeguards due diligence process (screening, review and approval) at the sub-project level

	Key steps in a sub-project cycle (in chronological order)	Responsibility			
		PMU	PEA	Contractor	WB
1	Identification of sub-project ; Application preparation and its submission to PMU		X		
2	Review of sub-project application; Endorsement/rejection	X			
3	Completion of environmental screening		X		
4	Review and endorsement of screening report and decision Category B and C type Category A type	X			X
5	EA/EMP financing and preparation (if determined by screening outcome)	X Finance consultant, if needed	X preparation		
6	Review and clearance of EA/EMP	X In prescribed projects the PMU will submit documents to CEA and obtain approval			
7	Obtain clearances from local environmental/regulatory authorities and Department of Archaeology	X			
8	Implement sub-project in line with EMP		X	X	
9	Monitor environmental compliance based on EMP	X sample basis	X	X	
10	Reports to PEAs on EMP compliance			X	
11	Reports to PMU on EMP compliance		X		
12	Maintaining records of safeguards documents for all sub-projects		X		

### 5.4 Key roles and responsibilities of various parties involved in environmental management safeguards

Environmental Specialist - Project Management Unit / Ministry of Defense and Urban Development
<ul style="list-style-type: none"> <li>• Provide overall policy and technical direction for environmental safeguards management under the SCDP (as defined by this framework).</li> <li>• Ensure suitably qualified and experienced personnel are in place in the local PMUs for Kandy and Galle.</li> <li>• Co-ordinate closely with the Environmental Officers in the local PMUs in planning and managing the EA cycle in relation to the project implementation schedule; and provide necessary technical assistance to facilitate the implementation, management and monitoring of environmental safeguards</li> </ul>

- Review and endorse environmental screening reports, site specific environmental assessment and management plans prepared for each Category B and C sub-project ; Obtain concurrence from the environmental safeguards specialist in the World Bank team for Category A type of sub-projects
- Ensure that applicable measures in the EMP are included in the design, and condition on compliance with EMP is included in the bidding documents
- Develop, organize and deliver environmental training programs and workshops for the staff of PEAs, contractors, field supervision staff and other implementing agency officials (responsible for the supervision of Maintenance works), as needed, on safeguard requirements and their management
- Develop programs to build long-term capacity in the PEAs for improved urban environmental management, heritage conservation etc and monitoring
- Prepare additional technical guidelines, if necessary, to support the EAMF in order to strengthen the implementation of environmental safeguards
- Obtain clearances from local environmental//archaeological/otherregulatory authorities, where applicable.
- Report to WB and MoDUD on the overall environmental performance of the project as part of PMU's periodic progress reporting.
- Maintain close cooperation with PEAs to monitor the O&M during the operation of the project;
- Hold regular review meetings with the environmental officers of the local PMUs and visit selected construction sites to monitor implementation of the EMP by the Contractors
- Promote community participation in the process of planning, management and monitoring of environmental impacts of sub-projects; provide guidelines on community participation in environmental monitoring to the PEAs
- Support technical components of the project such as SWM, natural area management and conservation and draft TORs for technical studies and consultancies, if the need arises.

**Physical Cultural Resources Specialist - Project Management Unit / Ministry of Defense and Urban Development**

- Provide overall policy and technical direction for PCR management under the SCDP (as defined by this framework).
- Work closely with the Environmental Officers in the local PMUs and provide technical support in identifying PCRs in the project area, assessing impacts and proposing mitigation measures in the EA process.
- Review and endorse PCR components in the environmental screening reports, site specific environmental assessment and management plans prepared for each sub-project
- Ensure that relevant PCR mitigation measures in the EMP are included in the design, and condition on compliance with EMP is included in the bidding documents
- Prepare additional technical guidelines, if necessary, to support the EAMF in order to strengthen the protection and conservation of PCRs from impacts during construction.
- Obtain necessary clearances from local authority, DoA, heritage committees where applicable.
- Report to WB and MoDUD on the overall performance of the project in mitigating PCR impacts as part of PMU's periodic progress reporting.
- Maintain close cooperation with PEAs to monitor the O&M during the operation of the project;
- Hold regular review meetings with the environmental officers of the local PMUs and visit selected construction sites to monitor implementation of the PCR components of the EMP by the Contractors

- Draft necessary TORs for various technical components of the project in the environmental sector
- Support technical components of the project such as conservation of heritage assets in both cities and draft TORs for technical studies and consultancies, if the need arises.

#### **Environmental Officers - Local PMU offices**

- Ensure environmental screening is carried out for each sub-project as soon as conceptual technical design and scope have been defined; Closely co-ordinate with the PMU for review and endorsement of the screening decision and recommendation
- Ensure timely preparation of Environmental Assessments/Management Plans for sub-projects, as necessary (depending on screening outcome); co-ordinate with PMU for hiring technical assistance, where necessary, and for review and endorsement of these safeguard documents
- Ensure consistency of safeguard documents with national environmental regulations; work with the PMU to obtain necessary clearances from local environmental/archaeological regulatory authorities for sub-projects, where applicable.
- Ensure relevant EMP provisions are included in the design; and EMPs are included in the bid documents; and condition on compliance with EMP is included in the contractor's agreement.
- Ensure compliance with EMPs during the construction period and maintain close co-ordination with the site engineer of the implementing agency and the Environmental focal point of the contractor.
- Co-ordinate with PMU for planning and delivering short training programs and workshops for the contractors and field supervision staff on the project's safeguards requirements and procedures
- Prepare and submit regular environmental monitoring and implementation progress reports to the PMU
- Ensure adequate public consultation during environmental screening and EA/EMP preparation; encourage community participation in sub-project planning, management and monitoring
- Ensure public complaints relating to nuisance and inconvenience caused by sub-project implementation are addressed with corrective action and adequately documented

#### **Environmental Focal Point - Contractor**

- Ensure implementation of relevant provisions of the EMP during sub-project implementation; prepare contractor's plan for implementing the EMP
- Ensure close co-ordination with the Environmental Officer from the Local PMU offices and report progress on compliance on a regular basis

#### **World Bank**

- Provide close supervision and necessary implementation support in the initial stages of the project in conducting screening, preparation of EAs and EMPs
- Undertake prior review of screening reports, EA/EMPs for all Category A type projects and a sample of Category B type projects (in the initial stages to ensure quality of output and consistency with EAMF guidelines); Subsequently, undertake post review of sub-projects on a sample basis
- Ensure regular missions to review overall safeguards performance and provide further implementation support

- Share knowledge on technologies and best practices
- Provide training support on Bank's safeguard policies and requirements of the project.

#### **Environmental Consultants**

The PMU will hire environmental consultants to provide technical support the PMU where specialized services are required. Some of the consultancies identified include:

- Preparation of EAs/EMPs for category A type projects
- Preparation of the sediment sampling analysis plan; carrying out environmental sampling; preparation of a dredge material disposal plans for sites proven to carry contaminated sediments
- Conducting annual independent environmental audits

### **5.5 Environmental Monitoring**

The SCDP will focus strongly on effective environmental monitoring. As majority of the anticipated environmental impacts from the project are general in nature and related to construction and civil works, site management, worker/public safety etc, monitoring will be largely carried out in the form of compliance monitoring through regular site supervision by the responsible officers. A general monitoring checklist and a specific construction safety monitoring checklist to be used and filled during site supervision is provided in **Annex 8 and 9**. These lists should be updated and expanded to include PCR impacts which are mostly case-specific and other site-specific environmental impacts based on actions agreed in the EMPs.

Monitoring of environmental parameters (such as air, water, salinity, sediment quality, etc.) will be conducted based on the requirements specified in the individual EMPs. However, given the ambient levels of noise and emissions in the city, pollution in the waterways etc no significant impact on the city's environmental quality is anticipated as a result of project activities. As such, the need for regular and systematic measuring of air, noise and water quality to monitor contribution to environmental degradation from the project per se is not considered essential.

The SCDP is essentially environmentally beneficial and it is expected to result in improved flood and drainage management, reduced disaster risk, reduced traffic congestion and improved water quality in waterways crossing the cities and conservation of heritage assets in the two cities. The overall project impacts will be monitored during project implementation through a number of selected indicators which reflect the positive environmental contribution from the project to the city's environment. As such, no additional environmental indicators are proposed.

Most importantly, the project will support independent environmental audits on an annual basis throughout project implementation. The TOR for the proposed annual independent Environmental Audit is included in Chapter 7 of the EAMF.

### **5.6 Progress Reporting**

Progress reporting on safeguards compliance will take place as indicated below.

1. Contractor's environmental compliance reports to the PEAs and local PMU office on a monthly basis
2. Local PMU's environmental progress reports to the PMU on a bi-monthly basis
3. PMU's environmental progress reports to the WB, Steering Committee and the MODUD on a quarterly basis (this will be part of the quarterly project progress report produced by the PMU)

### **5.7 Capacity Development Requirements**

For effective environmental safeguards management, the project agencies will require implementation support in three main areas; (i) dedicated staff and resources (ii) technical

assistance and (ii) training and awareness. While (i) has been addressed above, the following section will specify assistance under (ii) and (iii)

### 5.7.1 Short-term training and awareness programs

In order to ensure safeguard procedures, instruments and monitoring needs of the SCDP are well understood by the PMU and its implementing partners, short-term training and awareness workshops will be conducted targeting primarily project and contractor staff on (i) World Bank's safeguard policies (ii) national environmental regulations and (iii) safeguards planning, management and monitoring requirements of the SCDP as specified in the EAMF.

### 5.7.2 Technical assistance

Where stand alone Environmental Assessments and Environmental Impact Assessments are required as screening outcomes, the PMU will hire independent consultants. In addition, for contracts such as dredging in sites proven to be contaminated and for the subsequent disposal of such dredged material, the PMU will hire specialist services who will prepare disposal plans, carry out additional sampling (if needed) and site monitoring, conduct awareness for implementing agencies and contractors of disposal plan, monitor compliance and ensure control measures are adequately implemented.

### 3.7.3 Long-term capacity building

The project will also explore the possibility of building long-term capacity, within the sector agencies and local authorities in urban environmental planning and management through a well structured and modular training program. Urban environmental management requires both scientific and managerial expertise to plan spatial and other forms of urban intervention within the context of environmental carrying capacities and resources bases. As such it would be critically important for urban development officials, urban environmental planners, engineers in the sector agencies and municipal officials etc to upgrade and update their knowledge and skills in analyzing existing and emerging urban environmental issues as these cities transform into a strategic urban nodes and to learn appropriate strategies to minimize adverse effects caused by rapid urbanization. Some suggested training topics;

- **Urban Environmental Planning and Management**  
Overview of urbanization and associated environmental impacts, good governance and urban environment improvement, land use zoning, city beautification and clean city initiatives.
- **Integrated Urban Waste Management**  
Urban waste control and minimization, solid waste management, wastewater management, technology choices for urban waste management, urban waste minimization measures.
- **Strategic Urban Environmental Management**  
Strategic environmental planning, cross sectoral co-ordination for mainstreaming environmental plans and strategies etc

### 5.8 Operating requirements - Legislative/Regulatory Considerations

Following operating requirements have been identified for investments in the pipeline so far (*Note the final list of investments is still being compiled*) in order to comply with various national regulations. The sub-project proponent with the help of the PMU will ensure that the necessary consultations are made and clearances obtained prior to the commencement of these activities.

Agency	Sub Project	Institutions Responsible For Clearances/Permits
ID	Rosneth and Dunumadalawa reservoir improvement work, reinstatement of natural spillwater drainage paths between the reservoirs and the Kandy lake	Clearance from Forest Department (FD).

RDA	Rehabilitation and widening of DhammashokaMawatha	Clearance from Forest Department (FD) and the CEA. Technical clearance from the NBRO on landslide hazard management
RDA	Rehabilitation of Digana –Katugasthota road	Clearance from Forest Department (FD) and the CEA. Technical clearance from the NBRO on landslide hazard management
UDA	Restoration of heritage buildings	Clearance from Department of Archaeology

### 5.9 Timeframe for planning and carrying out safeguards assessment

Timely planning and execution of environmental screening and follow up assessments/plans for sub-project investments would be crucial in achieving the overall project implementation and completion targets. Any delay in obtaining relevant environmental approvals/clearances would hold back commencement of sub-project activities thus causing project implementation to be delayed. Such delays can be costly in terms of project time as well as resources. Hence, it is extremely important that the PMU initiates sub-project specific screening and follow up assessments as soon as the concept designs become ready. All environmental assessments/plans should be completed by the time of tendering and the EMPs should be a part of the bidding document so that the contractor is made duly aware of his commitments towards environmental safeguards management under each sub-project.

As a guide, the following table provides typical timelines for completing the safeguards cycle for different types of safeguard instruments. This timeline is intended to guide the PMU in planning screening and safeguards assessment ahead and to determine a realistic timeframe to commence the tender process for the sub-project investments. Please note the table below does not include time taken for procurement of consultancy services to conduct the EAs.

Stages in the process	EIA	IEE/ EA	EMP	Remarks
<b>Scenario 1: Sub-project which trigger OP 4.01 only</b>				
Environmental Screening	1 week	1 week	1 week	The need for follow on assessments will be determined by the screening outcome
Scoping and setting of TOR	2 weeks	1 week	1 week	
Report preparation	4 months	2 months	1 month	Length of time will be determined by the complexity of issues involved. What is considered here is an average based on the type of projects.
Report appraisal	2 weeks	1 week	1 week	
Public consultation	1 month	1 month	1 month	
Report Finalization	2weeks	2 weeks	1 week	
Clearance	Clearance will be provided within a week after review comments and public concerns have been adequately addressed in the report.			
Other GOSL clearance (DoA, NBRO, FD)	3 - 4 weeks			
<b>Tentative time for EA cycle (min - max)</b>	8 months	5.25 months	3-4 months	
<b>Scenario 2: Sub-projects which trigger both OP 4.01 and EIA under national regulations.</b>				
<b>NOTE: None of the sub-projects in the pipeline as of now are likely to require EIAs under the</b>				



<b>NEA. However, this section has been included to cover any sub-project that may be added to the pipeline in the future which would require NEA approval.</b>				
Provision of preliminary project information	1 week	1 week	-	
Scoping & determine IEE OR EIA and TOR preparation	1 month	2 weeks	-	WB will review TOR and provide consent/comment
IEE/EIA report preparation	NS*	NS*	-	One report to satisfy both local and WB requirements
Checking adequacy of IEE/EIA report	NS	NA	-	WB will review and submit comments
Provision of additional information if required	NS*	NA	-	
Public consultation	1 month	NA 1 month under OP 4.01	-	If it's a category A project, WB safeguard policies will require a period of 120 days public commenting period
Forwarding Comments to the PP	1 week	NA	-	
Responding to public comments	NS*		-	
Decision	1 month	3 weeks	-	WB clearance will be provided concurrently
Concurrence on the decision				
Appeal against rejection (If rejected)				
Final Decision				
<b>Tentative time for EA cycle</b>	12-15 months approx.	6-8 months approx.		

**Note: The projects that have been prescribed by the DoA as requiring a full AIA are also prescribed by the NEA, hence for these projects AIA can be a part of the EIA process and can take place in parallel.**

### 5.10 Estimation of Environmental Safeguards implementation cost

Activity	Quantity	Unit Rate in US\$	Total in US\$
Environmental Staff			
- PMU Environmental Specialist	1	1,000	60,000
- Kandy PMU Environmental Officer	1	700	42,000
- Galle PMU Environmental Officer	1	700	42,000
<b>Sub-total</b>			<b>144,000</b>
Training and awareness programs (short-term and long-term)			
- Training on urban sector env management issues	1	40,000	40,000
- Training programs on env safeguards, monitoring for project staff, contractors etc	8	1500	12,000
Recruitment of consultants to prepare stand-alone EAs and EMPs			50,000

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Consultancy for annual environmental audit	4	15,000	60,000
Environmental monitoring that includes sampling and laboratory testing	10	1300	13,000
-Sediment samples	10	150	1,500
-Water quality samples			10,000
- Unspecified			
Environmental screening and monitoring by project staff (will be part of transport and O/H budget of the SCDP)			75,000
<b><i>Costs associated with mitigation measures</i></b>			<b><i>Included in the construction costs</i></b>
Contingencies			20,000
<b>Sub-total</b>			<b>425,500</b>

## **Chapter 6 :Strategic Environmental Planning**

### **6.1 Water quality improvement and monitoring in the Kandy lake**

The Kandy lake which lies in the heart of the city is one of its most scenic tourist attraction. Unfortunately, its topographic setting and the unregulated urbanization in lake catchment along with the lack of an adequate waste disposal system has resulted in the disruption of its eco-system balance and pollution of water. The lake is eutrophic and is affected by the proliferation of blue-green algae from time to time resulting in low oxygen levels, fish kills and bad smells. Many research studies focusing on lake water quality studies, hydrodynamic and socio-economic factors that is contributing to pollution has been carried out in the past and made recommendations. While some of these measures have been carried out from time to time including lake dredging but a comprehensive plan to manage and continually improve lake water quality has hitherto not been implemented. At present, the lake receives a large quantity of silt from uphill areas, solid waste, black and grey water from its urbanized catchment and a reduced inflow of freshwater. One of the studies conducted has also identified no-flow areas in the lake bottom which is causing stagnation of polluted water. The ID, which took over management of the lake from the KMC in 1997, has proposed selected measures to improve the lake water quality under the SCDP as indicated in the preceding chapters. While these measures undoubtedly will contribute to water quality improvement, it would be important for such interventions to be part of a long-term strategic Kandy lake water quality management and monitoring plan that builds on the research work that has already been conducted into understanding the multiple facets of the problem. This plan should ideally integrate technology, community outreach, wastewater management, catchment land-use regulation and strong co-ordination among stakeholder agencies. Understand the trends of water quality degradation or improvement over time and how various interventions would help in achieving the desired objectives is an important part, hence, long-term water quality monitoring is essential.

### **6.2 Strategic Kandy/Galle City Development Strategy and Subsequent Integrated Master Plans**

The SCDP will support improved city planning and development by financing a Strategic Development and Growth Plan and subsequently an integrated Master Plan for Greater Kandy and Greater Galle. This will be a major output and the road map for development of the two cities. It is recommended that **Strategic Environmental Assessments** are carried out to enhance the city development master plan with elements of sustainability and green city planning based on natural assets/ecology and carrying capacities to the. The role the SEA can play in lessening environmental risk and enhancing its outlook while facilitating economic development in future city development will be an important one.

### **6.3 Conservation of urban forest and wetland areas in the cities**

As highlighted in chapter 3 Kandy city has 3 important urban forest patches, Udawattakale, Hantana and the Dunumadalwa range. Although protected or proposed to be protected as reserve forests, the urban sprawl that has been taking shape around these areas over the years has taken its toll on the extent and quality of these important green patches. Encroachment along and into the forests, dominance of invasive species and human-wildlife conflicts that has now become a problem bear testimony to the kind of anthropogenic pressure exerted on these forests, aggravated by poor enforcement of laws and policies. Given the economic importance of the environmental services these forest areas render to the Kandy city, it will be important to recognize proper management of these forests habitats and the services they provide in improving the livability of the city.

## **Chapter7 – Stakeholder Consultation and Information Disclosure**

For all types of environmental analyses conducted under the SCDP (including screening), communities in the project sites should be consulted within a structured and culturally appropriate manner. Further, environmental assessment documentation and EMPs should be made available to the public (in accordance with the World Bank's policy on Access to Information) by the PMU prior to tendering of works contracts through the website of the project and notices through media, as appropriate. In addition, it may be necessary to conduct discussions with the regulatory agencies (such as the CEA, CCD on relevant issues) and other implementing agencies who would have a stake in the project due to various reasons. Consultation will enable the project implementing agency to understand the stakeholder's requirements and for the stakeholders to develop an understanding of the project so that potential conflicts could be eliminated or minimized.

The process of consultation should be documented and account taken of the results of consultation, including any actions agreed resulting from the consultation. Public disclosure of the relevant safeguards documentation will be a pre-requisite for tendering civil works contracts. The contract documents for each contract package will mandatorily include the relevant environmental mitigation provisions stipulated in the EMPs (which would have community concerns reflected, if any) for the given sub-projects in order to ensure contractor compliance with safeguards requirements.

Given below is a brief framework for planning consultation under SCDP. It has to be noted that only the appropriate consultation method will be applied to sub-projects during implementation and the responsibility of consultation lie primarily with the PEAs.

### **6.1 Objectives of stakeholder consultations**

The prime objectives of stakeholder consultation are;

- Provide the stakeholders an opportunity to inform and influence the decision making process.
- partner with the stakeholders so as to make the project widely accepted and to lower the potential impacts

### **6.2 Elements of Effective Stakeholder Consultations**

Some of the most concerned elements of effective consultations are as follows;

- well targeted
- early enough so as to make sure to get the stakeholder views adequately reflected in the project decisions
- transparent – provide all the information without hiding anything
- make the consultation process very simple and understandable so that clear answers and comments can be obtained
- ensure gender equity
- documentation of consultation
- based on the principle of "Two way Process"
- focus the consultation on Risks, impacts, mitigation measures and opportunities.

### **6.3 Suggested Methods**

Participatory workshops, focus group meetings and face to face and informal individual interviews are the three most commonly adopted methods of stakeholder consultations and a mix of these can be employed under SCDP, as determined by the requirement.

#### **6.3.1 Participatory workshops**

Participatory workshops are effective when a large number of stakeholders with different interests and specializations get involved. Conducting effective participatory consultation workshops should consist of following elements;

- (i) Orient the workshop towards a clear destination. In this connection it is necessary for the evaluator to present a very good project brief and the purpose of the consultation.
- (ii) The evaluator should be able to build bridges and consensus among stakeholders.
- (iii) Divide the participants into sub groups to represent adequate mixture of different interest groups and allow the sub groups to brainstorm among the group members and submit their views and comments as those of not individuals but of the sub groups.

This method is recommended for technical assistance sub-projects such the formulation of a city development strategy and integrated master plan for the two cities where mostly professionals (Town Planners, Architects, Engineers, Landscape Architects, and Environmental Planners), infrastructure provision institutions, NGOs and business people can get involved in.

### **6.3.2 Focus groups discussions**

The focus group consultation meetings are relevant when the stakeholders have similar interest thus their objectives are focused towards one common objective. This kind of consultation meetings are recommended for projects that involve relocation of families or protection of natural resources etc.

#### **Stakeholder group meetings**

Stakeholder consultations are extremely useful in creating the right kind of understanding about the project among those it will likely affect or interest, and to learn how these external parties view the project and its attendant risks, impacts, opportunities and mitigation measures. During SCDP preparation, listening to stakeholder concerns and feedback can be a valuable source of information that can help improve project design and outcomes and help the project control external risks. The first round of stakeholder consultations have been carried out by the PMU so far, one in Galle and the other in Kandy, where the project team met with the city's political, religious, business and administrative leadership and discussed proposed interventions.

### **6.3.3 Individual - face to face interviews**

When the stakeholders are not large in number and represent specialised areas of interest face to face interviews which are informal are very effective. This system is very flexible, permits in depth discussions to understand the issues and is low cost. However individual stakeholder consultations should be well planned as if not it may lead to "heavy focus on individual issues and interest". This method is recommended for the kind of consultation envisaged as part of sub-project screening as the sub-projects under SCDP as they are relatively small in size, potential impacts are very specific, and stakeholders are small in numbers.

The stakeholder consultation process should be continuous. However since practical difficulties exists for continued consultation, at least consultation needs to be carried out at three stages; project preparatory / design stage, project implementation stage and project end stage so as to make sure that stakeholder concerns, interest, comments are adequately built into the whole project management process.

## Chapter 8 :Sample Terms of References

### 7.1 Terms of Reference for an Environmental Management Plan for a typical sub-project

The EMP should address the following sections in detail.

1. Introduction

2. Project concept and detailed designs as approved by the PMU and PEAs

*(The activities of the sub-project must be approved by the PMU for funding. Activities that need further studies should not be included into the EMP as it may mislead the outcomes. As the EMP would need to identify impacts and mitigation measures specific to the site and proposed interventions, detailed designs are of utmost importance to have been finalized at the time of EMP preparation)*

3. Project Implementation Schedule

*(It is indeed necessary to understand at what time the proposed measures are to be implemented. Hence implementation schedule is of paramount.)*

4. Significant Impacts and mitigation Measures

*(Identification of impacts and their mitigation measures must be highlighted.)*

5. Organization Chart, Responsibilities & Implementation Budget

*(Management commitment in accordance to organization chart is mandatory and also the allocated funds must be mentioned for each intervention so that it is the responsibility of the management to spend it as planned. Such costing particularly for mitigation activities must be highlighted)*

6. Operating Requirements

*(Application of related standard and regulations stipulated under the NEA and other legislation pertaining to environmental management should be highlighted. All the approvals needed for the project to go forward must be obtained with the EMP with copies of any written approval or permission by different authorities)*

7. Requirements of environmental monitoring and its frequency

*(It is obvious that proper monitoring requirements are worked out in order to realize the monitoring needs for the sub-project planned; including if necessary Baseline studies for air, water, noise, vibration, soil flora and fauna etc. as needed. The frequency of producing monitoring reports and its contents should be mentioned.)*

8. Frequency and type of training related to special issues

*(Training needs must be highlighted that will enable proper management of environment in which the sub-project is implemented.)*

9. Estimated budget for implementing the Environmental Management Plan.

*(Total cost of EMP must be worked out so that the amount mentioned can be kept aside without spending for main activities.)*

10. Conclusion and recommendations

*(Concrete conclusions and recommendations must be worked out so that they can be technically feasible and economically viable solutions for implementation.)*

Annex

- Name of those involved in the EMP preparation
- Any analytical reports
- Recommended name of a certified laboratory to analyze and complete monitoring report for the monitoring requirement

NOTE:

All the stakeholders should agree on the proposed interventions so that common goals could be achieved without much difficulty. Stakeholder consultation process is therefore an important integral step through which this goal is realized. If some stakeholders are not in agreement it is necessary to change the goals so that all are in agreement. EMP will therefore propose measures that are agreeable to all parties

EMP preparation guidelines are provided in the Annex 2

## **7.2 Terms of Reference for the Development of Sediment Sampling and Analysis Plan for Galle canals and urban drainage network**

### **1. Project Background**

To be filled

**2. Environmental risks** – The proposed project interventions are expected to generate many positive environmental and public health impacts through improved flood/drainage management and local services in the selected cities. However, achieving the desired outcomes and sustaining them in the long-term would also critically depend upon how the project will address environmental risks and challenges when planning and implementing sub-projects. One of the key environmental concerns associated with project interventions in Galle is the disposal of dredged material from canals and urban drains where sediment quality could be a concern that options for disposal would need to be carefully planned. The project has proposed the deepening of canals such as the Moragoda Ela along its entire length and other blocked secondary canals/drains to improve depth and flow so that the city can be safe from frequent flooding during rain. Currently there is no available data on sediment quality to use as a reference and it is considered necessary to assess the presence of potentially toxic chemicals in canal bottoms, where dredging is proposed to be carried out, which would require special disposal methods.

**4. Purpose of TOR and Scope of Work-** The purpose of this TOR is to design and develop a sediment sampling and analysis plan to assess the potential hazardousness of canal sediments in selected locations within the Galle drainage basin and to assess the possible environmental risks of disposing dredged matter in disposal areas.

The consultant shall submit a proposal consisting of a method statement for the development of a sediment sampling and analysis plan in order to achieve the objectives set out in section 4 above. It shall cover the following.

1. Specify the overall sampling strategy for the proposed project area that includes phasing, if any, spatially and temporally.
2. Identify sampling locations, in line with the proposed sampling strategy, within the Galle city drainage basin with the rationale for such selection explained in terms of site history, current site use, sources of contamination, industrial processes at or near the site (and hazardous substances used/generated), location of storm/wastewater drainage, proposed dredging locations under the SCDP etc. The locations should be marked on a map of the basin.

3. Specify sampling and analytical requirements for the selected locations in terms of sample type, number and frequency, sampling methodology, physical and chemical laboratory testing including grain-size analysis, organic/inorganic parameters to be tested, analysis methods, quality assurance requirements and other field measurements. Indicate testing laboratory and compliance of it with accreditation requirements.
4. Indicate the reference standards to be used for different sample types and any hazard level categorization for analyzed sediments.
5. Indicate a tentative time outline for the sampling, analysis, data evaluation and reporting for each phase. The first phase of the assignment should not be more than 2 months.
6. Identify potential risks based on test results and recommend practical and economically feasible disposal options to the PEA.

**5. Team** - The consultant shall specify the personnel involved with the assignment and their respective responsibilities.

**6. Deliverable** – The consultant shall deliver a full report on sediment characterization with data computed, evaluated and findings fully interpreted. The report shall also carry detail information on sampling strategy and methodology used, explained in its entirety, and recommendations on the suitability of the dredge material to be disposed on land or whether it would require special disposal methods based on risks identified.

### **7.3 Terms of Reference for the Annual Environmental Audit**

#### **1. Introduction to the project**

To be filled

#### **2. The Need for Environmental Assessment**

All sub-projects financed under SCDP are required to comply with World Bank Operational and Safeguard Policies triggered, in addition to conformity with the environmental legislation of GOSL. Thus all sub-projects are required to conform to:

- (a) the Environmental Assessment and Management Framework (EAMF) adopted by GOSL and accepted by the World Bank, and
- (b) the terms of the Central Environmental Authority (CEA) as mandated by the National Environmental Act (NEA) of Sri Lanka, **where it is applicable**.

According to the EAMF, each sub-projects needs to be subjected to an environmental screening using the recommended template. Based on the screening information and concerns of the public the need to pursue further stand-alone assessments and if so the type of assessment is determined. All screening forms are filled by environmental officers supporting the PEAs and reviewed and cleared by the PMU. For sub-projects with Category A type impacts a prior review of the screening is carried out by the World Bank. When stand alone assessments and management plans are considered necessary, the project proponent is responsible for carrying them out while the PMU reviews and clears them.

According to CEA procedures, all sub-project requiring NEA approval need to fill in a Basic Environmental Information Questionnaire (BEIQ). Upon reviewing the BEIQ, the CEA will determine whether no further environmental analysis is required or whether the proponent is required to prepare an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA).

### **3. Objectives**



The primary objective of this assignment is for the Consultant to carry out an environmental audit for SCDP. The consultant will review the application of the EAMF to the SCDP. In particular, the consultant will review a sample of (i) the screening forms prepared by each PEA (ii) stand alone environmental assessments/management plans (iii) application of the NEA and its clearance procedures followed by the project, as the case be, and based on site visits ensure conformity with conditions, guidelines and comments stipulated in these and other related documents. The Consultant is expected to be familiar with the EAMF, the applicable safeguard policies of the WB, NEA and the approval procedure of the CEA.

#### **4. Tasks of the Consultant**

- Obtain the required information from the sub-project proponent, Local PMU offices and the main PMU, on the sub-project under implementation as well as under preparation of the SCDP. This may include, but not be limited to, relevant plans, drawings, screening reports, social analysis, stand alone EA/EMP (if it has been necessary), comments of the World Bank.
- Review the above documents, discuss with the sub-project proponent as well as the surrounding community and visit the location and environs of the sub-project.
- Check for conformity of the sub-project in relation to the guidelines, conditions and comments stipulated in the item above.
- Examine monitoring reports and whether standards, procedures and controls are in place to respond to safeguards requirements stipulated in EAMF.
- Examine significant new risks and propose remedial actions
- Highlight any deviations from the guidelines, conditions and comments stipulated in the aforesaid documents and assist the sub-project proponent to improve the safeguard documents incorporating the necessary mitigatory measures.
- Document any adverse environmental impacts that were not anticipated in the screening and follow up assessments that may have occurred during project construction and implementation.
- Examine procedures of corrective action if monitoring parameters are out of monitoring limits and if such incidents are actually reported, investigated and followed up

Document and submit the environmental audit report which should include (i) an Executive Summary, (ii) Overall audit opinion on the level of compliance, (iii) for each sub-project reviewed (a) a description of the sub-project, (b) the list of documents reviewed and persons interviewed, (c) observations made at the site, (d) conformity and/or deviations to guidelines (CEA and EAMF), clearance conditions (World Bank and GOSL) and plans, (e) status of progress reporting and actions taken to address issues (f) actions need to be taken to respond to negative deviations, (g) new risks and recommendations to address the risks (mitigation actions), (h) any other relevant information to support the findings.

#### **5. Application Procedure**

Qualified consultants may apply for the assignment listed above. Applications should be submitted using the format below:

- Title of assignment
- Name and address of the consultant/firm
- Name, designation and telephone number of contact person
- Brief consultant/company profile
- Key staff members of the firm (giving priority to assignment-specific staff; for each staff member provide name, position in the team, number of years in the firm, relevant qualifications and assignment-specific experience and proficiency in languages – read, write and speak)

- Relevant experience of the consultant/firm (Details of assignment-specific tasks undertaken during the past 10 years with client references)

Expressions of interest should focus on aspects relevant to the particular assignment, and reach the PMU by [Date].

## **ANNEXES**

**Annex 1 – Summary of Environmental and Urban Development Legislation in Sri Lanka**

No.	Act/ Ordinance	Responsible Agency	Mandate
1.	<p><b>Marine Resources</b></p> <p>a. CoastConservationActNo.57 of1981amendedbyAct No.64 of 1988</p> <p>b. MarinePollutionPreventionAct No. 59 of 1981</p> <p>c. MaritimeZonesLawNo.22of 1976</p>	<p>CoastConservation Department</p> <p>Marine Pollution Prevention Authority</p> <p>Marine Pollution Prevention Authority</p>	<p>Responsible forpreventionof Coastalerosion&amp;management of the coastalzone</p> <p>Oversee the managementof marine fisheries resources</p> <p>Prevention ofmarine pollution</p>
2	<p><b>FreshWaterResources</b></p> <p>a. Irrigation Ordinance Chapter 453</p> <p>b. National Water Supply &amp;Drainage BoardAct No. 02 of 1974</p> <p>c. WaterResourcesBoardActNo. 29 of 1964</p>	<p>Irrigation Department</p> <p>National Water Supply &amp; Drainage Board</p> <p>Water Resources Board</p>	<p>Responsibleforthedevelopment &amp;maintenanceofminor&amp; major irrigation tanks, canals and schemes</p> <p>SupplyofWaterforDrinking&amp; industrial use</p> <p>Responsibleforthe assessment, protection&amp; developmentof waterresources</p>
3	<p><b>Fauna &amp; Flora (Forest &amp; Wildlife)</b></p> <p>a. Fauna &amp;Flora protection Ordinance Chapter 469as amendedbyActNo.49of1993 and Act No. 22 of 2009</p>	<p>Department of Wildlife Conservation</p>	<p>Protectionoftheprotectedareas and management of the same.</p>

<b>Land Resources</b>		
a. Land Acquisition Act No. 9 of 1979	Land Commissioners Department District & Divisional Secretaries	Acquisition of lands for development projects and programmes Development of underdeveloped lands
b. Land Development Ordinance Chapter 464	Land Commissioners Department District & Divisional Secretaries	Development of land for better purposes Settlement of peasants under village expansion and other development projects
c. State Lands Ordinance (Chapter 269) No. 8 of 1947	Land Commissioners Department District & Divisional Secretaries	To make provisions for the grant and disposition of state lands in Sri Lanka for the management and control of such lands and the foreshore and to regulate the use of water of lakes and public streams.  Responsible for the development of urban areas in a planned manner.
d. Urban Development Authority Act No. 41 of 1978 as amended from time to time	Urban Development Authority	

No.	Act/ Ordinance	Responsible Agency	Mandate
5	<b>Air</b> a. MotorTrafficActNo.14of1951 as amended from time to time	Motor Traffic Department, Department of Police	Monitor& controlthevehicular emissions;prosecutionof the violators of the law
6	<b>Cultural Heritage</b> a. Antiquities Ordinance Chapter 188 b. Cultural property Act of 1988	Department of Archeology -Do-	Preservation of historically and archeologically important sites -Do-
8	<b>Hazardous &amp; Other Substances</b> a. CosmeticDevices&DrugsAct No. 27 of 1980 b. Poisons,OpiumandDangerous DrugsOrdinanceChapter218	Department of Health Services Department of Health Services	Regulate&monitortherelease and use of drugs etc. Control &monitor the release and use of dangerous drugs.
9	<b>OverallEnvironment</b> a. ConstitutionofTheDemocratic Socialist Republic of Sri Lanka b. NationalEnvironmentalActNo. 47of1980asamendedbyAct No.56of1988,ActNo.53of 2000 and ActNo. 53 of 2000 c. Local Authorities Act (MunicipalCouncils ActNo.19 of 1987,Urban Councils Act No. 18 of 1987)	The Government, Citizens of Sri Lanka Ministry of Environment, Central Environmental Authority Local Authorities	Constitutional provisions for Conservationof Environment The protection, management & enhancement oftheenvironment forthe regulation,maintenance and control of thequalityofthe environment for the preservation, abatement & control of pollution Provide the institutional opportunity for mobilizingall sectionsofthelocalcommunity toaddressissues ofenvironment affectingthemdirectly.

## **Annex 2 – EIA/IEE Process in Sri Lanka**

### **The EIA Procedure**

In the event that an EIA is required, the PAA in consultation with CEA, is responsible for subjecting the preliminary information to environmental scoping, in order to set the Terms of Reference (TOR) for the EIA. The TOR is prepared by a Technical Committee (TC) comprising experts in the relevant field, appointed by the PAA. In developing the TOR, the regulations provide for the PAA to consider the views of state agencies and the public.

Upon submission of the EIA by the proponent, the PAA is required to determine whether issues referred to in the TOR have been addressed and notify the proponent of any inadequacies within 14 days. In the event any inadequacies are identified, the proponent is required to make necessary amendments and resubmit the report. Once accepted, in addition to the EIA being forwarded to the CEA by the PAA, notice is also placed in the Government Gazette and in a national newspaper published daily in Sinhala, Tamil and English languages inviting the public to make written comments, if any, to the PAA within 30 days from the date of first appearance of the notice. According to the legislation, public consultation is mandatory only at this stage of the EA process. Informal consultation with NGOs, interested groups and civil society may occur during early stages of the EA as determined by the PAA depending on the type of project and public interest in the project. The notification would specify the times and places at which the EIA would be available to the public. As a minimum the report would be available at the CEA, PAA and in a GOSL agency in the locality (Colombo and outstation) of the proposed project. The environmental regulations have provisions for public hearings on the project although it is not mandatory. The PAA can use its discretion and hold a public hearing if it would be in the interest of the public. The PAA is required to forward all comments, either written or raised during any public hearing, to the project proponent for review and response within 6 days of completion of the public comment period. The proponent is required to respond to all such comments in writing to the PAA.

The TC appointed by the PAA would then evaluate the EIA and require the project proponent to respond to any queries raised by the TC. The TC would also evaluate the adequacy of the proponent's response to any comments raised during the public comments period. Upon completion of the evaluation of the TC, the PAA with the concurrence of the CEA, would grant approval for the implementation of the proposed project subject to specified conditions or refuse approval for implementation of the project, with reasons for doing so. The notification must be made within 30 days of the receipt of responses from the proponent. The PAA is required to specify a period within which the approved project should be completed. In the event the proponent is unable to complete the project within the specified period, written permission for an extension has to be obtained from the PAA, 30 days prior to the expiration date.

The PAA is responsible for forwarding a report which contains a plan for monitoring the implementation of the approved project, to the CEA, within 30 days from granting approval. It is also the responsibility of the PAA to publish in the Government Gazette and in one national newspaper published in Sinhala, Tamil and English languages, granting approval for the project. It is mandatory that the project proponent inform the PAA of any alterations to the project as approved and/or the abandonment of the project. The PAA shall, where necessary, obtain fresh approval in respect of any such alterations that are intended to be made to the approved project. The PAA in consultations with the CEA, would also determine the scope and the format of the supplemental report required to be submitted for such alterations.

## **The IEE Procedure**

Upon review of the preliminary information provided by the proponent, if the PAA determines that the project would have no long-term adverse environmental impacts, an initial environmental examination (IEE) would be considered adequate. Under such circumstances, the proponent will be required to submit a detailed IEE for review and approval by the PAA. The IEE will identify potential environmental and social issues and the complexity of possible remedial actions. Upon reviewing the IEE, if the TC identifies any substantial environmental issues that may arise as a result of the proposed project, the proponent will be required to undertake a detailed EIA. In the event the IEE is considered adequate, then the project proponent is requested to prepare an Environmental Management Plan (EMP), to address any potential environmental and social issues as well as incorporate the PAA/CEA's approval conditions. The IEE review process is similar to the EIA review process, except for the level of detail and analysis involved, which is proportionate to the anticipated environmental and social impacts. The CEA has developed a custom made IEE questionnaire for mini hydropower projects. The Environmental Questionnaire for Mini Hydro Projects is more detailed than the general IEE questionnaire and is designed to capture environmental issues specific to mini hydro projects. This questionnaire is used by the CEA/PAA to determine whether the potential project results in long term irreversible or complex environmental and social issues and if so, it warrants an EIA. If no EIA is required, the proponent is required to prepare an EMP which contains remedial measures to address adverse environmental and social issues. The IEE is not required by law to be opened for the public for comments and does not go through the public consultation process required for an EIA.



### **Annex 3 – Guidelines for Preparing EMPs**

Having identified the potential impacts of the relevant sub-component, the next step of the EA process involves the identification and development of measures aimed at eliminating, offsetting and/or reducing impacts to levels that are environmentally acceptable during implementation and operation of the project (EMP). EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EA and implementation and operation activities. World Bank guidelines state that detailed EMP's are essential elements for Category A projects, but for many Category B projects, a simple EMP alone will suffice. While there are no standard formats for EMPs, it is recognized that the format needs to fit the circumstances in which the EMP is being developed and the requirements, which it is, designed to meet. EMPs should be prepared after taking into account comments from both the PAA and IDA as well as any clearance conditions. Annex C of OP 4.01 of the World Bank safeguards outlines the important elements of the EMP and guides its preparation. Given below are the important elements that constitute an EMP.

#### *a. 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 minimise 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 & non structural) and the phase in which it should become operable (design, construction and/or operational).

#### *b. Enhancement plans*

Positive impacts or opportunities arising out of the project need to be identified during the EA process. Some of these opportunities can be further developed to draw environmental and social benefits to the local area. The EMP should identify such opportunities and develop a plan to systematically harness any such benefit.

#### *c. 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

#### *d. 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.

*e. Implementing schedules*

Timing, frequency and duration of mitigation measures with links to overall implementation schedule of the project should be specified.

*f. 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.

*g. 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.

*h. 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.

## Annex 4 - Descriptions of Major Sites of Physical Cultural Importance

### Kandy

#### The Dalada Maligawa Complex

Constructed in the 18th century, the Dalanda Maligawa and its surrounding Palace Complex was built King NarendraSinha and his predecessors. The octagonal Patthirippuwa and moat which connects to the Kandy Lake was added during the reign of Sri VikramaRajasinha. The Dalada Maligawa is a living monument where a ritualistic practice in veneration of the Sacred Tooth Relic of Lord Buddha is conducted even today. This includes the EsalaPerahera festival, which is conducted during the Months of July-August, and consists of a night time procession along the streets of the grid city over a course of ten days. The complex includes the Royal Palace, the royal audience hall and "Mahamaluwa" as well as the four "SatharaDevala" temple complexes. The temple sustained a bombing in 1995, and been fully restored thereafter.



#### The Malwatta and Asgiriya Monastic Complexes

Situated on banks of the Kandy Lake and below RajapihillaMawatha, overlooking the Dalada Maligawa the Malwatta Monastic complex. It consists of two sections, the "UposathaViharaya" (Ordination Hall) on the right, popularly known as "PoyamaluViharaya" and the other "PushparamaViharaya" popularly known as "MalwatuViharaya" which is seen today with a newly built octagon.



AsgiriyaMonastic Complex was built by Commander Siriwardhana of Parakramabahu IV in Kurunegala era (1305-1335 A.D.). Located in Asgiriya, to the west of the grid city, it houses



monasteries where priests from the Asgiri Chapter reside. A number of small temples and historic buildings are found within the complex, which has been in operation for centuries.

All religious rituals throughout the year, expositions of the sacred Tooth Relic and other matters relating to the Dalada Maligawa are conducted under the jurisdiction of the head priests of these two temples. The headpriests reside in the two respective monasteries as well. Over the years, the two

monasteries have grown in stature and significance and both play equal roles in the religions activities of the Dalada Maligawa.

#### Kandy Lake and Surrounding Area

A decorative wall, called Walakulu wall, runs for 2060 feet along the banks of the Kandy Lake. In the middle of the lake is a man-made island housing the Royal Summer House. On the opposite side of the road from the Temple of the Tooth Relic is the Royal Bathhouse, which is used by the king's wives and



concubines as a bathhouse. The British added one more story to the structure to house a library. There are also a number of historic buildings and monuments along the perimeter of the lake, such as the Royal Spout.



### **Peradeniya Botanical Garden**

Extending over 147 acres, the Royal Botanical Gardens was established during colonial times. Situated about 5km west to the city center at Peradeniya, it is a major tourist destination with visitation rates at over 2 million individuals per year and is the largest botanical garden on the island. Over 4000 species of tropical plants are housed at the gardens and it is also home to the National Herbarium.

### **Wales Park**

Wales Park, of the Royal Place Park, is a small park overlooking the Kandy Lake and grid city area located on Rajapihilla road. The park is landscaped in to the hilly contours that connect the lake round area and Rajapihilla road. There are many historic monuments housed within Wales Park of which the Japanese field gun which was captured by the British 14th Army in Burma during World War II and presented to the city of Kandy by Lord Mountbatten, who was the Supreme Allied Commander for the South East Asia Theatre at the time, is one of key importance. This site is visited both by local and foreign tourists daily as it offers unique views of the surrounding locality.

### **University Campus at Peradeniya**

The university is located on the Peradeniya - Galaha Road and was established in 1942. It is noted as the oldest and the most picturesque university campus in the country. Sprawling gardens and tree lined pathways of Peradeniya are well known around the world. All disciplines ranging from Humanities and Arts to the Sciences, Engineering, Medical Science and IT are thought at the University.



**Annex 5 -Format for the questionnaire to be filled for screening sub-projects**

**Environmental Screening Report**

**1. Project Identification**

Project title	
Project Proponent	

**2. Project Location**

Location <i>(relative to the nearest town, highway)</i>	
Definition of Project Area <i>(The geographical extent of the project &amp; areas affected during construction)</i>	
Adjacent land and features	

**3. Project Justification**

Need for the project <i>(What problem is the project going to solve)</i>	
Purpose of the project <i>(what is going to be achieved by carrying out the project)</i>	
Alternatives considered <i>(different ways to meet the project need and achieve the project purpose)</i>	

**4. Project Description**

Proposed start date	
Proposed completion date	
Estimated total cost	
Present land ownership	
Description of the project	

<i>(with supporting material such as maps, drawings etc attached as required)</i>	
Project Management Team	Agency -  Contact person -  Nature of consultation and input received

## 5. Description of the existing environment

### 5.1 Physical features – Ecosystem components

Topography and terrain	
Soil ( <i>type and quality</i> )	
Surface water <i>(sources, distance from the site, local uses and quality)</i>	
Ground water <i>(sources, distance from the site, local uses and quality)</i>	
Flooding	
Air quality <i>(any pollution issues)</i>	
Noise level and vibration <i>(Any anticipated issues)</i>	

### 5.2 Ecological features – Eco-system components

Vegetation <i>(trees, ground cover, aquatic vegetation)</i>	
Presence of wetlands	
Fish and fish habitats	
Birds <i>(waterfowl, migratory birds, others)</i>	
Presence of special habitat areas <i>(special designations)</i>	

<i>and identified sensitive zones)</i>	
<b>5.3 Physical Cultural Resources (PCR)</b>	
PCR resources in the area ( <i>recorded or potential to exist</i> )	
Type of PCR	
Distance from the project site	
Ownership	
Protection status	
National/regional/local significance	
<b>5.4 Other features</b>	
Residential/Sensitive Areas ( <i>Eg, Hospitals, Schools</i> )	
Traditional economic and cultural activities	

### 6. Public Consultation

Public consulted	Consultation method	Date	Details/Issues raised

### 7. Screening for Potential Environmental Impacts

	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
1	Will construction and operation of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in				

	water bodies, etc)				
2	Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?				
3	Will the Project produce solid wastes during construction or operation?				
4	Will the Project release pollutants or any hazardous, toxic or noxious substances to air?				
5	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?				
6	Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater or coastal waters?				
7	Will the project cause localized flooding and poor drainage during construction  Is the project area located in a flooding location?				
8	Will there be any risks and vulnerabilities to public safety due to physical hazards during construction or operation of the Project?				
9	Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project?				
10	Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?				
11	Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?				
12	Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other water bodies, mountains, forests which could be affected by the project?				
13	Is the location within or adjacent to the coastal zone? If so, what is the distance to the coast?				



14	Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, migration, which could be affected by the project?				
15	Are there mangrove, coral reef, sea grass bed, turtle beach habitats etc within close proximity?				
16	Is the project located in a previously undeveloped area where there will be loss of green-field land				
17	Will the project cause the removal of trees in the locality?				
18	Can any of the identified historic or culturally importance sites on or around the location be affected by the project?				
19	Are there existing land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?				
20	Are there any areas on or around the location which are densely populated or built-up, which could be affected by the project?				
21	Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project				
22	Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?				
23	Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?				

**8. Project operating requirements**

		<b>Yes</b>	<b>No</b>
22	Does the project belong to a prescribed category of the National Environmental Act		
22	Does the project need to obtain clearances from the following agencies:		
	a. Department of Archaeology		

	b. National Building Research Organization		
	c. Coast Conservation Department		
	d. Forest Department		
	e. Department of Wildlife Conservation		
	f. Any other: If so, describe		

**9. Environmental Management Plan**

<b>Key project activities</b>	<b>Potential Environmental Effects</b>	<b>Mitigation Measures</b>

**8. Conclusion and Screening Decision**

<b>Project Activity</b>	<b>Safeguard Category based on Environmental impact</b> A – Significant, irreversible and widespread impacts B – Impacts anticipated but less significant than A and can be mitigated with known technology C – No or minimal impacts
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**9. Screening Decision Recommendation (check one):**

<b>Key recommendations</b>	<ul style="list-style-type: none"> <li>• All potentially adverse effects can be classified as general construction related impacts and are mitigatable with known technology. Public concern does not warrant further assessment.</li> <li>• Therefore, a stand-alone Environmental Assessment will not be required; an Environmental Management Plan would be sufficed.</li> <li>• Potential adverse impact are significant, hence, stand-alone Environmental Assessment and Management Plan needed before the project can proceed</li> <li>• Potential adverse impact are significant, hence project cannot be justified</li> </ul>
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**10. Details of Persons Responsible for the Environmental Screening**

<b>Screening report completed by</b>	<b>Date</b>
<i>Name/Designation/Contact information</i>	<i>Signature</i>
<b>Screening report reviewed by</b>	<b>Date</b>
<i>Name/Designation/Contact information</i>	<i>Signature</i>
<b>Approved by</b>	<b>Date</b>
<i>Name/Designation/Contact information</i>	<i>Signature</i>

## **Annex 6 – Summary description of safeguards instruments that will be used in the project**

### **Environmental Management Tools**

The following sections aim to provide a description of the EA tools recommended in table 3.1 which are being extensively used in environmental assessments the world over to evaluate impacts of project interventions. Depending on the magnitude and importance of the resulting impact and the scale and extent of the spread of the impact one or more of these tools are selected.

The Environment Management tools aim to anticipate the environmental impact of decisions at the early stages of planning and decision-making, with respect to selection of environmental mitigation/technologies, identification and characterization of risks to the environment, health and safety, and planning environmental programs for cities and municipalities. Since the SCDP has been categorized as A under the World bank O.P 4.01 during the design stages of investments we need to carefully screen the respective sub projects with regard to the impacts created by the activities.

#### **3.3.1. Environmental Impact Assessment (EIA)**

EIA and IEE are effective tools for evaluating the environmental risks and opportunities of project proposals and improving the quality of outcomes. Ideally the EIA/IEE should be carried out at the end of the preliminary design phase so that the impacts of each planned activity can be evaluated and alternatives can be worked out for activities that have major impacts. The outcomes of the EIA/IEE should then be used to finalize the project design which should ensure that the impacts of the given project are minimal. The importance of this management tool as means of foreseeing potential environmental impacts caused by proposed projects and its use in making projects more suitable to the environment has been highly effective. Since its introduction in 1969 in the US, many countries and international organizations have accepted EIA as an important planning and environmental management tool.

As a decision making tool, EIA has its strengths and weaknesses. It plays a crucial role at the project level decision making. However, in the entire development process application of EIA as a tool to bring in environmental sustainability comes fairly at a late stage. At this point, it may be too late to change certain policy decisions and the choices are limited. With SEA, environmental decisions can be moved further upstream where better alternatives to environmentally unsustainable policies and programs can be sought at a broader strategic level. See the section below for a comparison between SEA and EIA.

#### **3.3.2. Strategic Environment Assessment (SEA)**

Development agencies have years of experience in using environmental impact assessment (EIA) to integrate environmental concerns into their funding programmes. EIA procedures, methods and techniques, used to address environmental impacts of development projects, will continue to be applied. However, EIA has limited utility when applied to the more strategic levels of development assistance such as policies, plans and programmes, as these are also influenced by political bargaining in addition to technical criteria. Further, significant indirect or secondary environmental effects can arise as a result of changes in people's behavior induced by policy reforms. But these changes, and their environmental consequences, are extremely difficult to predict. For these reasons, SEA has been developed and is being increasingly used as a tool to be applied at the level of policies, plans and programs.

**Table 3.3: Comparison between SEA and EIA**

	<b>EIA</b>	<b>SEA</b>
1	Applied to specific and relatively short-term (life-cycle) projects and their specifications	Applied to policies, plans and programmes with a broad and long-term strategic perspective
2	Takes place at early stage of project planning once parameters are set	Ideally, takes place at an early stage in strategic planning
3	Considers limited range of project alternatives.	Considers a broad range of alternative scenarios
4	Usually prepared and/or funded by the project proponents	Conducted independently of any specific project proponent
5	Focus on obtaining project permission, and rarely with feedback to policy, plan or programme consideration	Focus on decision on policy, plan and programme implications for future lower-level decisions
6	Well-defined, linear process with clear beginning and end (e.g. from feasibility to project approval)	Multi-stage, iterative process with feedback loops
7	Preparation of an EIA document with prescribed format and contents is usually mandatory. This document provides a baseline reference for monitoring	May not be formally documented
8	Emphasis on mitigating environmental and social impacts of a specific project, but with identification of some project opportunities, off-sets, etc	Emphasis on meeting balanced environmental, social and economic objectives in policies, plans and programmes. Includes identifying macro-level development outcomes
9	Limited review of cumulative impacts, often limited to phases of a specific project. Does not cover regional scale developments or multiple projects	Inherently incorporates consideration of cumulative impacts

An SEA is not an alternative to EIA and it does not replace the need to do project specific environmental assessment. A good SEA can reduce the scope of EIAs within its geographical scope and make it limited to specific project level issues. The SEA ideally will identify opportunities to minimize the range of environmental issues that will have to be dealt at the project level.

At present SEA is not mandatory in Sri Lanka. However, all Ministries, Departments and Authorities who are responsible for implementing a new policy, plan or programme should carry out a SEA prior to the implementation of the said policy, plan or program and submit a copy of the SEA report to the CEA for review. To facilitate this process a document has been developed by the CEA titled “A Simple Guide to Strategic Environmental Assessment (SEA)” that can be downloaded from the CEA website.

### **3.3.3. Environmental Management Plan (EMP)**

Certain activities will have explicit impacts on the natural environment and thus require a specific plan to institute and monitor mitigation measures and take desired actions as timely as possible. An Environmental Management Plan (EMP) must be kept as simple as possible, clearly describing adverse impacts and mitigation actions that are easy to implement. The scale of the subproject will

determine the length of the EMP. A small-scale subproject's EMP can be elaborated in a few paragraphs or in tabular format, keeping it as simple as possible with concrete mitigation actions, timelines and responsible persons.

The basic elements of an EMP are;

- a. A description of all possible significant adverse impacts that are likely to arise due to the project that the EMP is intending to deal with;
- b. A description of planned mitigation measures, and how and when they will be implemented;
- c. A programme for monitoring with measurable indicators that will allow determining the effectiveness of the mitigation actions
- d. A description of who will be responsible for implementing the EMP
- e. A cost estimate and source of funds

It is essential to involve local communities during the development of the EMP since they are likely to be the most affected parties due to the proposed development. Further, most of the local knowledge is important in identifying, designing and planning the implementation. In addition, the success of the implementation of the EMP will depend on community support and action.

#### **3.3.4. Environment Audits**

Most of the development projects go through the SEA and EIA process and develop EMP's that are not implemented at the end which will render the entire process an exercise in futility. Therefore, monitoring of the project during the construction and implementation phase is a must to ensure environmental compliance of a project. This could be achieved through regular environmental audits.

The purpose of the environmental audit is to;

- Collect, analyze and interpret monitoring results to detect changes related to implementation and operation of specific activities
- To verify the monitoring parameters are in compliance with national set standards
- To compare the predicted impacts with actual impacts and evaluate the accuracy of predictions
- To evaluate the effectiveness of implementation of the EMP
- To identify shortcomings in the EMP if any and incorporate it into the EMP if deemed necessary
- To identify and report if there is noncompliance with the EMP
- The auditors must first develop a structured questionnaire based on the EMP for the purpose of conducting the audit. Then during the site visit data can be collected using this questionnaire through interview surveys of officers responsible for implementation of the EMP and site records, logs etc., The audits can be carried out at regular intervals or on an ad hoc basis or when mitigation is not carried out as defined by the EMP leading to public concern.
- Expected outcomes of the Environment Audit are
- Ensure that EMP is implemented properly
- Ensure that the mitigation measures are effectively minimizing the identified impacts as well as identify new impacts that may have been excluded in the EMP that require mitigation. Then make necessary adaptive changes to the EMP to ensure that the all significant impacts are effectively mitigated.
- Identify non compliance with EMP if any and provide recommendations as to how to deal with such non compliance

#### **3.3.5. Environmental Checklists**

Environmental Checklists are forms containing a series of questions on environmental aspects, designed to screen potential environmental impacts of the proposed project. Environmental checklists can be used for an initial screening of impacts which is to be followed by a more detail analysis or in projects where the level of activity (as in the example of constructing a small to medium scale building in an already built up area) is not meant to cause much harm a checklist only would suffice.

### **3.3.6. Environmental Codes and Best Management Practices**

In addition to the above tools following environmental codes and best practices may be sufficient where impacts of a particular activity are minor and easily arrested.

## **Annex 7 – Projects requiring Archaeological Impact Assessment under the Antiquities Act**

### **Archaeological Impact Assessment**

The law in force in Sri Lanka in relation to Archaeological Impact Assessment Survey Process is as follows.

*(Information in regard to this is found in the orders made by the Minister of Cultural and Religious Affairs under the Section 47 read with Section 43(b) of the Antiquities (Amendment) Act No. 24 of 1998 and published in the gazette No. 1152/14 dated 04.10.2000. These orders are cited as Project Procedure Orders No. 01 o 2000.)*

Accordingly, written permission of the Department of Archaeology should be obtained before implementation of the Development Projects of every type mentioned below.

#### **1.**

(a) For development of transport systems

1. Construction of national and provincial high ways.
2. Construction of Railways
3. Construction and expansion of airports and air craft run-ways.

(b) For development of irrigational projects

1. Construction and reconstruction of tanks
2. Construction or reconstruction of water ways and canals.

(c) Generation and transmission of electricity

(d) Development of agricultural projects

(e) Re-settlement of families

(f) Installation of industrial machinery or development of industries, estates and gardens.

(g) Development of entertainment industry.

(h) Reclamation of lands and wetlands

(i) Clearing of all lands exceeding 2 hectares on extent so that such lands and wet lands will be inundated with water.

#### **2.**

(a) Construction of housing complexes for residence.

(b) Construction of hotels and all types of commercial buildings as decided by the Urban Development Authority established under the Urban Development Authority Act. No. 41 of 1978 passed by the National State Assembly.

(c) Combined multipurpose development activities including housing, industries and commerce infrastructure facilities.

3. Clearing of areas exceeding one hectare in extent.

4. Internal clearing of natural caves, rock caves and caves where the natural land exceeds 25 square meters in extent.

5. Excavations exceeding 500 meters in length for laying pipes and conduits for drainage, water, gas, electricity and telephone facilities.

6. Mining or quarrying for extracting stones, gravels, minerals or soil.



- (a) Discovery of reserve areas exceeding 0.25 hectares on the surface of the ground within the county and mining.
- (b) All mining and mineral extracting activities carried out off share.

7. Clearing of lands and damaging sea bottom for construction or expansion of seaport and harbour.

**Archaeological Impact Assessment Survey Programme is as follows;**

- Investor should inform the Department of Archaeology in writing about the proposed Development Project.
- On receipt of such information a form designed for the Archaeological Impact Assessment Surveys will be sent to the employer (Project Proposer)
- On receipt of the Employer's perfected application to the departments a copy of such application will be sent to the regional office of the department and a preliminary observation report on the place will be obtained.
- If there are no antiquities in the land according to the recommendation and observation report of the Regional Assistant Director, the said land will be released for the project concerned. If the preliminary observation report has proposed to carry out an archaeological impact assessment survey, steps will be taken to conduct the survey.
- Quotations will be invited from the 17 agencies which have registered in the department for conducting the archaeological impact assessment survey on the proposed development project.
- Quotations will be opened in the presence of the Apex Body. The Apex Body comprises the following members.
  1. Director General of Archaeology
  2. Director of Post Graduate Institute of Archaeology
  3. Director General of Central Cultural Funds
  4. President of Association of Archaeologist
- The competent agency for conducting the archaeological impact assessment will be selected by the Apex Body.
- The employer will be requested to deposit the sum quoted by the agency selected by the Apex Body, in favour of the Director General of Archaeology.
- The Department of Archaeology will inform the Agency concerned that its quotation has been selected.
- When the employees deposits the amount in favour of the Director General of Archaeology, that

fact will be intimated to the Agency.

- The agency should submit its archaeological impact assessment survey before expiry of 06 weeks from the date of informing the agency. If otherwise the department has the right to stop payment and take legal action against the agency.
- On receipt of the archaeological impact assessment survey report, to the department will release the money to the agency.
- The next step is to send the archaeological impact assessment survey report to the Minister in charge of the subject for approval. On the recommendation of the Minister in charge of the subject, the Director General of Archaeology will make available his decision to the Project concerned.

**Annex 8 : Environmental Monitoring Checklist for Construction Activities**

**Title of project :**  
**Proponent :**  
**Contractor's Name :**  
**Monitoring Date :**  
**Monitor's Name & :**  
**Designation**

<b>Issue</b>	<b>Proposed mitigation measures (<u>from the EMP</u>)</b>	<b>Implementing Responsibility</b>	<b>Compliance Yes/No</b>	<b>Reason for non compliance</b>	<b>Follow up Action</b>

<b>Date inspection conducted:</b>	<b>Location:</b>
<b>Name(s) of those participating in this inspection:</b>	
<b>INDICATE EITHER:</b>	
<b>A = Acceptable/Yes; U = Unacceptable/No; N/A = Not Applicable</b>	

No.	Safety Title	A	U	N/A	Action Taken
<b>1</b>	<b>PERSONAL PROTECTIVE EQUIPMENT:</b>				
	Foot protection worn as required?				
	Hand protection used/worn as required?				
	Safety glasses and/or goggles available + being used?				
	Hearing protection worn where required?				
	Hard hats worn when falling object hazard is present?				
	Dust masks used when needed?				
	Traffic vests being worn where needed?				
<b>2</b>	<b>EMERGENCY ITEMS:</b>				
	Emergency phone numbers posted and known by all?				
	Emergency eyewash and/or shower units accessible?				
	First aid kit available at work site?				
<b>3</b>	<b>ELECTRICAL SAFTEY ISSUES: if required</b>				
<b>4</b>	<b>CONSTRUCTION SAFETY &amp; HEALTH ISSUES:</b>				
	100% fall protection in place above 6-5... feet in height?				
	Excavation? Protection from cave-ins for >5 feet deep				
	Hand tools are kept in safe				
	Employees instructed in proper use of all power tools? If available				
	Employees below protected from falling objects?				

	Proper access provided for workers and surrounding community?				
	<b><i>Trenches Excavation and Shoring:</i></b>				
	Materials are stored at least two feet from trench?				
	Proper number of workers for each operation?				
5	<b>Job Information/Administrative:</b>				
	First aid kit stocked?				
	First aid kit available?				
	Work areas properly demarcated				
	Work areas properly barricaded?				
6	<b>Housekeeping:</b>				
	Work area neat?				
	Protected from projecting nail points (removed/bent over)?				
	Waste containers provided?				
	Waste containers used?				
7	<b>General:</b>				
	Toilet facilities available?				
	Toilet facilities maintained?				
	Drinking water available?				
	Visitor hard hats available?				
	Visitor hard hats used?				
	Record Maintaine at Site level:				
	Unsafe Acts or Practices Observed:				
	Comments:				
	Signature: _____ Date: _____				

## Annex 10

## APPENDIX 1. ANZECC/ARMCANZ INTERIM SEDIMENT QUALITY GUIDELINES

Table A1. Recommended sediment quality guidelines (ANZECC/ARMCANZ, 2000a)

Contaminant	ISQG-Low (Trigger value)	ISQG-High
<b>METALS (mg/kg dry wt)</b>		
Antimony	2	25
Cadmium	1.5	10
Chromium	80	370
Copper	65	270
Lead	50	220
Mercury	0.15	1
Nickel	21	52
Silver	1	3.7
Zinc	200	410
<b>METALLOIDS (mg/kg dry wt)</b>		
Arsenic	20	70
<b>ORGANOMETALLICS</b>		
Tributyltin ( $\mu\text{g Sn/kg dry wt}$ )	5	70
<b>ORGANICS (<math>\mu\text{g/kg dry wt}</math>)<sup>a</sup></b>		
Acenaphthene	16	500
Acenaphthalene	44	640
Anthracene	85	1100
Fluorene	19	540
Naphthalene	160	2100
Phenanthrene	240	1500
Low Molecular Weight PAHs <sup>b</sup>	552	3160
Benzo(a)anthracene	261	1600
Benzo(a)pyrene	430	1600
Dibenzo(a,h)anthracene	63	260
Chrysene	384	2800
Fluoranthene	600	5100
Pyrene	665	2600
High Molecular Weight PAHs <sup>b</sup>	1700	9600
Total PAHs	4000	45000
Total DDT	1.6	46
p,p'-DDE	2.2	27
o,p'- + p,p'-DDD	2	20
Chlordane	0.5	6
Dieldrin	0.02	8
Endrin	0.02	8
Lindane	0.32	1
Total PCBs	23	-

<sup>a</sup>Normalised to 1% organic carbon; <sup>b</sup>Low molecular weight PAHs are the sum of acenaphthene, acenaphthalene, anthracene, fluorene, 2-methylnaphthalene, naphthalene and phenanthrene; high molecular weight PAHs are the sum of benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene and pyrene

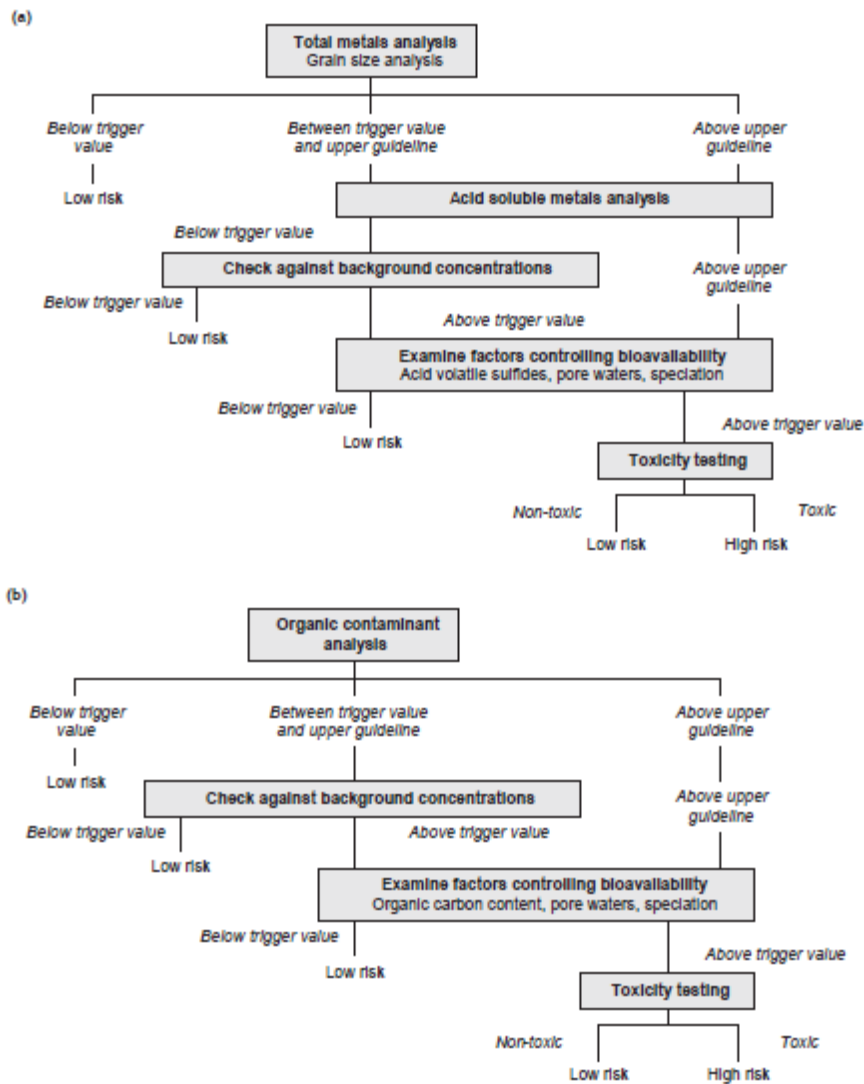


Figure 1. ANZECC/ARMCANZ tiered framework (decision tree) for the assessment of contaminated sediments for (a) metals and (b) organics