PROJECT:  FREETOWN WATER SUPPLY REHABILITATION PROJECT  
COUNTRY:  SIERRA LEONE  

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) SUMMARY  
23rd JULY 2018  

<table>
<thead>
<tr>
<th>Appraisal Team</th>
<th>R. LUBUNGA, Principal Water and Sanitation Engineer</th>
<th>RDGW2/COSL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TEAM MEMBERS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. SOUMARE, Principal Climate and Green Growth Officer,</td>
<td>PECG.2</td>
</tr>
<tr>
<td></td>
<td>A. HAMZA, Principal Gender Officer,</td>
<td>RGDN.2</td>
</tr>
<tr>
<td></td>
<td>C.R. MHANGO, Environmental Officer</td>
<td>SNSC</td>
</tr>
<tr>
<td></td>
<td>A. DEFRAYE, Nutrition Officer</td>
<td>AHHD.2</td>
</tr>
<tr>
<td></td>
<td>S. MOMOH, Senior Procurement Officer</td>
<td>SNFL.1/COSL</td>
</tr>
<tr>
<td></td>
<td>S. JAMBAWAI, Social Sector Expert</td>
<td>RGDW.2/COSL</td>
</tr>
<tr>
<td></td>
<td>A. YEANAY, Senior Social Protection Officer</td>
<td>COLR</td>
</tr>
<tr>
<td></td>
<td>F.K. KOROMA, Financial Management Specialist</td>
<td>SNFL.2/COSL</td>
</tr>
<tr>
<td>Sector Manager</td>
<td>M. TARHOUNI, OIC</td>
<td>RDGW.2</td>
</tr>
<tr>
<td>Country Manager</td>
<td>P. KARIUKI</td>
<td>COSL</td>
</tr>
<tr>
<td>Sector Director</td>
<td>G. GICHURI</td>
<td>AHWS.0</td>
</tr>
<tr>
<td>Director General</td>
<td>M. AKIN-OLUGBADE</td>
<td>RDGW.0</td>
</tr>
</tbody>
</table>
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) SUMMARY

1. INTRODUCTION

The Bank Group has been supporting the water sector in Sierra Leone since 1968, and to-date the total Bank Group assistance to the water sector amounts to UA 32.66 million in six (6) operations of which four (4) were completed, viz: Freetown Sewerage study (1978-1980); Freetown water supply (1978-1982); Extension of Water Supply Network (1969-1973); and the Water Supply and Sanitation Study (2004-2009) that resulted in the on-going Three Towns Water Supply and Sanitation project which was approved in October 2010, and the Rural Water Supply and Sanitation Project which was approved in September 2013. Supplementary financing to enhance the impact of the TTWSSP was approved by the Bank in March 2017. In addition the Bank approved, in December 2017, African Water Facility (AWF) financing for the Freetown Water Supply and Sanitation Master Plan and Investment Studies. The outputs of the AWF operation will form the key inputs of the proposed Freetown WASH & Aquatic Environment Revamping Project. The four on-going operations are co-financed by OFID, DFID, GEF and Develop2Build (D2B) program of the Netherlands Enterprise Agency. The operations are in line with Government priorities expressed in the PRSP III-Agenda for Prosperity, and the Bank’s extended CSP 2013-2019.

The Bank is considering financing of the proposed Freetown WASH and Aquaculture Revamping Project. Water and sanitation infrastructure investment in Freetown is required to maximise and sustain the benefits of the ongoing interventions, supported by DFID and MCC, including rehabilitation of critical water production and transmission infrastructure and institutional/water utility reforms. Whereas DFID has supported the studies for extensive rehabilitation of the existing water supply infrastructure, their infrastructure financing provision will not cover all the prescribed infrastructure revamping needs. Moreover, there is need to undertake the further expansion of the water supply infrastructure, besides the insufficiently addressed need to improve the poor sanitation condition and services. The rather impromptu approach to liquid and solid waste management in the capital city offers temporary solutions for crisis management during the rainy seasons. In addition, all potential development partners are looking upon the Bank to complete the studies so that they can join hands with the Bank in financing the needed infrastructure investments. The proposed project is intended to provide the necessary complementarity and maximise the impact of DFID’s early effort which is limited to rehabilitation of some of the key elements of the dilapidated Freetown water supply infrastructure. The project will also complement the institutional reforms supported through the MCC Threshold Program which is focused on improving the
performance and sustainability of the water utility, the Guma Valley Water Company (GVWC). GVWC holds the mandate for water supply services in the Freetown.

The Freetown Water Supply Rehabilitation Project is a Subcomponent of the proposed larger Free Town WASH and Aquaculture Revamping Project whose objectives are to: (i) increase sustainable access to safe water and basic sanitation in Greater Freetown area; (ii) enhance service delivery capacity; and (iii) create opportunities for improved nutrition and livelihoods, including youth employment, through Social and Behavior Change Communication (SBCC) for hygiene and nutrition, and community based integrated water resources management that includes forestry resources/water-shed management.

The Project is has been categorised as a Category A by the EPA and Category 1 based on AfDB Environmental and Social Procedures therefore require Full ESIA studies with a detailed ESMP and a RAP due to resettlement impacts and a standalone. The ESHIA report and standalone detailed ESMP has been prepared for the Freetown Water Supply Project by IMC Worldwide, Njala Consultants and Guma Valley Water Company (GVWC) based on the Environmental Protection Agency Act of 2008 and the Environmental Protection Agency (Environmental Impact Assessment License) Regulations 2010 of the Environmental Protection Agency of Sierra Leone; IFC Performance standards and the AfDB ISS requirement standards. The RAP for the project is being prepared by Mott MacDonalds. Prior to award of the EIA license for the Rehabilitation of Freetown Water Supply project prior authorisation was sort to start some of the construction works that have already been funded and EPA has granted the permission provided the proposed mitigation measures are implemented. The list of work items allowed to start before the EIA licence is granted includes: Scour Valve and Guard Valve Refurbishment; Intake Tower Concrete Sealing; Intake Tower Ladders and Platforms Rehabilitation; Repair Leaking Structures around the Water Treatment Plant; installation of Flowmeters; Rehabilitation of Cross Connections; Repair to Reservoirs; and Bulk Flow metering.

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The ESHIA for the proposed project will be conducted within the policy, legal and institutional framework of the Sierra Leone, EPA, IFC standards, AfDB ISS requirement Standards and relevant international environmental conventions to which the Government of Sierra Leone is a signatory. The Sierra Leone Environmental Protection Agency (EPA) is the environmental regulatory authority in charge of issuing environmental guidelines and reviewing the Environmental Impact Assessment Studies and Enforcement of compliance during implementation.

2.1 National Legislation and Policy

Legislation governing environmental issues are found as Acts and regulations of the various government line ministries or institutions. Such legislation includes:
- Environmental Protection Agency Act, 2008
- Environmental Protection Agency (Amendment) Act, 2010
- The Forest Act, 1988
- Forest Regulations, 1989
- The Factory Act, 1974
- Wildlife protection Act, 1972
- Public Health Act, 1960
- Sierra Leone Electricity and Water regulation Commission Act 2011
- Sierra Leone Water Company Act, 2001

3
2.1.1 **Environmental Protection Agency Act of 2008**

The Environmental Protection Agency of Sierra Leone was established by The Environment Protection Agency Act, 2008 and contained in Vol.CXXXIX No. 44 dated 11th September 2008. It gives the EPA overall responsibility for the effective protection of the environment (i.e. land, air, water and all flora, fauna and human beings living therein and the interrelationship). However, several Ministries, Departments and Agencies also collaborate with the EPA to varying degrees. These include the Ministry of Finance (fiscal and tax matters), the Ministry of Lands, Country Planning and the Environment, the Ministry of Local Government and Community Development (communal lands) and the Ministry of Works, Housing and Technical Maintenance.

2.1.2 **Environmental Protection Agency (Environmental Impact Assessment License) Regulations 2010**

The Environmental Protection Agency Regulations 2010 augmented the Environmental Protection Agency Act 2008, detailing how the application for a license is undertaken and the requirements to mitigate, monitor and manage the impacts identified in the assessment. In addition the stipulate the structure and contents of the ESIA report.

2.1.3 **The National Protected Areas Act of 2012**

This Act sets up the National Protection Area Authority (NPAA) and sets out its requirement to manage and maintain the National Protected Areas. Under the Act no activities that conflict with the objectives of the Act are allowed within the protected area without the approval of NPAA and compliance with the conditions it specifies.

2.1.4 **The Wildlife Conservation Act of 1972**

The Wildlife Conservation Act provides for the protection of wildlife and conservation management and includes the establishment and operation of National Parks. Relevant requirements to this project are included below:

- Activities within the National Protected Areas that would disturb or injure the flora and fauna or cause destruction or damage to the habitat is forbidden;
- Section 20, concerning the prohibition of cutting trees applies to the period between publishing the intention to create a NP and its creation. Article 7 (c), (l) & (m) particularly apply though and are prohibited, unless authorised.

2.1.5 **The National Water and Sanitation Policy, 2010**

The National Water and Sanitation Policy aims to: improve the financing, management, and delivery of sustainable water services; and enable communities to adopt safe hygiene and sanitation practices and consume safe water. The Policy has five key themes that include: (i) Water Resources Management including equal access and use of water resources, effective water resource use; promotion of water management and quality and sustainable procedures and plans for the resource development; (ii) Urban Water Supply and Sewerage that aims to improve urban water supply coverage to 74% by 2015, improve sanitation coverage, prevent wasteful water use, improve participation, capacity and accountability (iii) Rural Water Supply – to improve health and alleviate poverty of the rural population through improved access safe water, community participation, investment and other activities (iv) Hygiene and Sanitation – to improve the health of communities and ensure that the majority of the population (66%) has access to sanitation services by 2015 (v) Institutional, Legal and Regulatory Framework to ensure sustainable water resources management.
2.1.6 Conservation and Wildlife Policy, 2010

The policy aim is to achieve an “integrated wildlife sector that achieves sustainable, rights-based management of wildlife resources for biodiversity conservation inside and outside wildlife conservation areas which benefits present and future generations of Sierra Leone and humankind in general”.

2.1.7 Draft Resettlement Act of 2011

A draft Bill was drawn up in October 2011 to legislate resettlement. This is known as ‘The Resettlement Act 2011’ and was supported by a draft Resettlement Policy for Sierra Leone. Neither the Resettlement Act nor the draft Resettlement Policy have been adopted as of the date of writing this report. The intention behind the Bill and supporting Policy is to present an integrated legal mechanism that will describe how resettlement shall be undertaken. The bill is guided by the World Bank Operational Procedures 4.12 and the IFC PS 5. Although not stated explicitly, it is understood that the Bill is a response to what is seen as fragmented and ad hoc approaches by entities in the extractive sector regarding resettlement. When it is enacted the Bill will make the Ministry of Lands, Country Planning and Environment the central government authority responsible for oversight of resettlement. The policy refers to the fact that the Bill was intended to apply to the mining sector only, but it was subsequently revised to be more inclusive of all business (private sector) activities that will result in resettlement. It is not clear if public sector developments will be required to conform with the intentions of the Policy or the requirements of the Bill when promulgated.

2.2 International Policies and Standards

2.2.1 AfDB Policies and Requirement Standards

The consultant has taken into account the International environmental and social requirements of the project financing institutions; these include the African Development Bank policies. The Social and Environmental assessment of the project was therefore carried in accordance with the AfDB policies and guidelines as follows: Policy on Environment (2004); Involuntary Resettlement Policy (2003); Policy for Integrated Water Resources Management (2000); Handbook on Stakeholder Consultation and Participation (2001); and the AfDB Bank Group Policy on Disclosure and Access to Information (May2011).

The AfDB’s Integrated Safeguard System sets out the five Operational Safeguard requirements that AfDB projects have to comply with; OS1 on Environmental and Social Assessment; OS 2 on Involuntary Resettlement; OS3 on Biodiversity and Ecosystem Services; OS4 on Pollution Prevention and Control, Greenhouse gases, Hazardous Materials, and Resource Efficiency; and OS5 on Labour Conditions. The project triggers the four operational safeguards as outlined below.

- **OS 1: Environmental and Social Assessment:** since the project requires Environmental and Social Assessment of anticipated impacts, including on cultural heritage and vulnerable groups and requires public consultation, grievance procedures. The project has prepared Detailed ESIA studies and a standalone ESMP and RAP that include Stakeholder Engagement and Grievance Redress Mechanism.

- **OS 2: Involuntary Resettlement:** Land Acquisition, Population Displacement and Compensation: the project will have physical and economic displacement and a RAP has been prepared by the project to avoid and minimise impacts and compensate for the impacts that will mainly arise from the water supply distribution network.

- **OS3: Biodiversity and Ecosystem Services:** This OS has been triggered by the project because some of the biodiversity recorded at some work sites which may be impacted
by the project have international conservation significance and a Biodiversity Management Plan will be developed.

- OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency: the ESMP includes measures for avoiding and preventing pollution and ensuring water and energy efficiency during construction and operation. Although the main mitigation measure is to leave AC pipes underground, unexpected circumstances may require the removal of AC pipes involving cutting and breaking pipes which can release asbestos fibres into the air, posing risks to public health. As such OS5 will be triggered by the project

- OS 5: Labor Conditions, Health and Safety: the ESMP includes mitigation of occupational health and safety impacts and contractor management.

### 2.2.2 IFC Performance Standards

International Finance Corporation (IFC) Performance Standards (PS), are the global environmental and social standards used by the multilateral development banks and others to ensure best environmental and social practice, including resettlement. They comprise:

**PS1 Environmental and Social Assessment and Management**

The need to conduct an impact assessment of a new project and to establish and maintain an Environmental and Social Management System (ESMS). This involves effective stakeholder engagement and the development of a good management system, appropriate to the size and nature of the activity, to promote sound and sustainable environmental and social performance as well as lead to improved financial outcomes.

**PS2 Labour and Working Conditions**

Workers should be protected against potential accidents and provided with a safe and healthy work environment, together with equitable terms and conditions and the right to form workers’ organizations.

**PS3 Resource Efficiency and Pollution Prevention**

Maximise use of renewable energy and minimise air, water and land pollution risks.

**PS4 Community Health, Safety and Security**

Risk to the community or community natural resources that arise from the activities, workers, materials or waste should be managed and impacts minimised.

**PS5 Land Acquisition and Involuntary Resettlement**

Any land acquisition or land restrictions that may cause physical or economic displacement should be avoided where possible. Where is it not possible to avoid displacement, fair compensatory measures need to be considered.

**PS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources**

Protect and conserve biodiversity, sustainably manage living natural resources and maintain ecosystem benefits.

**PS7 Indigenous Peoples**

Indigenous peoples, social groups that are distinct from other national societies and often marginalised, need to be protected from impacts that could arise. No Project-related impact on indigenous peoples is expected.

**PS8 Cultural Heritage**
Cultural assets, including tangible, moveable and immovable objects, natural features that are revered and cultural knowledge of the past are all elements which need to be protected and safeguarded when major new development is proposed. No Project-related impact on cultural heritage is expected.

2.2.3 Other International Conventions, Treaties and Protocols

Sierra Leone is party to several international conventions and protocols, such as:

- Convention on International Trade of Endangered Species, 1995
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat:
  - (Ramsar Convention), 1999
- United Nations Framework Convention on Climate Change, 1994
- Convention on Biological Diversity, 1994

3. PROJECT DESCRIPTION AND JUSTIFICATION

3.1 Description of the Project

<table>
<thead>
<tr>
<th>Work Packages</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP 1 Guma Dam and WTP</td>
<td>Rehabilitation of the dam scour system and repairs and safety works at the intake tower at the Guma Valley Dam, Refurbishment and replacement of leaking structures, valves, filter beds, electrical, control and disinfection systems at the Water Treatment Works (WTP). For the purposes of this report, this package also includes the Mile 13 laydown area.</td>
</tr>
<tr>
<td>WP 3 Rehabilitate the Transmission System</td>
<td>Replacement of the transmission pipes and construction two service reservoirs and supporting infrastructure.</td>
</tr>
<tr>
<td>WP 5 Distribution Improvements</td>
<td>New networks or improvements to the distribution networks in the east and west of the city, with works to commission an existing bulk transfer system.</td>
</tr>
<tr>
<td>WP 6 Orugu Sources to Allen Town</td>
<td>Construction of two weirs on the Orugu Sources (Mortem and Mongegba), with new pipelines to feed this water to the Charlotte Town Water Treatment Plan. Rehabilitation works to the Charlotte Town Water Treatment plant and distribution mains from that site.</td>
</tr>
<tr>
<td>WP 9 Pumping Schemes to Wilberforce and other communities</td>
<td>Rehabilitation of the Spur Road pumping station</td>
</tr>
</tbody>
</table>
3.2 Justification for the project

Guma Valley Water Corporation (GVWC) is a national entity responsible for water supply in Freetown. 90% of Freetown’s water originates from the Guma Valley Dam. Guma Dam is in the hills to the south east of Freetown. From there the treated water piped under gravity flow westwards into the city and then onto the eastern side of the Freetown Peninsula. The dam and the associated WTP was built in 1961 to supply about 800,000 people per day but now serves approximately 2 million. The dam is recharged annually during the rainy season approximately from June to December. GVWC ration the amount of water served to the community to carefully use the water throughout the year. Reservoir ‘Control Rules’ dictate how much water can be abstracted depending upon the water level on any particular day. Over-abstraction or low rainfall creates a real risk to the water supply to Freetown, as occurred in 2006. The current annual cycle sees the water level in May and June, just before the rainy season, low, with associated severe water shortages across the city.

The demand for water in Freetown is higher than the current supply, so little water reaches the east of the city. This is a growing problem as the city’s population is expanding. The supply suffers from uncontrolled leakages from the system, limited investment or maintenance and human encroachment into existing secondary water catchments and new potential catchments, especially in the Orugu valley. Extensive use of long individual ‘spaghetti’ connections has occurred due to the lack of formal water mains, and losses from such pipes are inevitably high given that these pipes are vulnerable to damage and vandalism. Altogether this is resulting in losses as high as 50% of the water produced. The inadequate water supply is forcing parts of
the population to seek informal sources, seriously increasing the hazards to health and the risk of disease.

The rehabilitation and improvements will lead to more water staying within the system and improving the water availability. The network will also be extended into new areas. It will link the new rehabilitated water supply to poorly served communities. The Project will contribute to Sierra Leone’s progress towards the National Water Policy and the Sustainable Development Goals (SDG) by increasing the coverage of the water supply and improving access. Water supply has been shown to highly influence other important quality of life aspects such as health, gender and education.

4. DESCRIPTION OF THE ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 Location and topography
Freetown is situated at the northern end of the Western Peninsula, the centre of which comprises the Western Area National Park (NP), a densely forested upland area, which was formerly a Forest Reserve. The NP is surrounded by a buffer zone, the width of which now varies. This is because of historic and recent encroachments as the city has grown to the south and the west. Administratively the coastal areas and the adjacent hills comprise the City of Freetown. The areas to the centre south and south east are in the Western Area District Council. The total project area comprises many parts of the City of Freetown, developed areas in Western Area District Council, and adjacent parts of the NP and its buffer zone.

4.1.2 Hydrology
The hydrological system of the project area is characterized by rocky streams and river, some intermittent, and flows that vary considerably during the year, peaking in the rainy season. Some WPs include pipe laying over or alongside rivers and streams, especially the Orugu valley sources and Allen Town.

4.1.3 Geology/Soils
Typically soil types and their susceptibility to damage or various kinds, erosion and sedimentation vary by location, vegetation or other ground cover, and/or topography. Studies will be conducted to clearly identify soil types per location, the Project’s possible impacts on them, and mitigation and management measures to be taken.

4.2 BIOLOGICAL ENVIRONMENT
The project area has the Upper Guinea Forest type of vegetation. The vegetative cover in some parts the study area consists mainly of small-shrubs and herbs. Other parts are highly urbanized. A few are natural or proto-forest. Some ecologies of the study area have witnessed an accelerated change from natural vegetation to agricultural lands mainly induced by increased human pressure (agriculture, urbanisation, etc.). In some cases, local communities have expanded and encroached into GVWC’s right of way areas and some residential units and/or small businesses (in the form of kiosks) are observed to have encroached into the company’s reserved areas.

The Western Area Reserve Forest is the biggest area of biodiversity of the project, two of the work packages sites have always been located in the protected area (WP1 and part of WP6) or in its buffer zone (part of WP6). The Western Area Peninsula National Park (WAPNP) was established in order to protect the catchment area for the Dam. However, most of these are rehabilitation works will be carried out within existing facilities of the GVWC. In these project components impact on Flora is expected to be minimal (where there is laying of new pipes) to none. The biological environments on the project sites are presented below.
4.2.1 Flora in the project impact area
The Mongegba (orugu) axis is a degraded area and has some few forest patches which also harbor few animal species. There will be establishment of new weirs upstream of the existing weir. A total of 81 tree species belonging to 43 families were recorded during the study in the Mogegba work site. Some of these species have been listed as either threatened, vulnerable or endangered by the IUCN. Near Threatened species include: *Daniellia thurifera*, *Millicia excelsa*, *Millicia regia*, *Brachystegia leonensis* and *Cryptosepalum tetraphyllum* and were very common in all three survey sites.

The Guma Valley Dam and Treatment Works area consists of high diversity of Tree and Plant species. The forest on this side is still intact and harbours some true forest species that also include seven species listed as Vulnerable under IUCN red list and one Near Threatened. The following are listed as vulnerable: *Millicia regia*; *Nauclea diderrichii*; *Cryptosepalum tetraphyllum*; *Terminalia ivorensis*; *Brachystegia leonensis*; *Lophira alata*; *Millicia excels*; and *Laphira alata*; and the *Daniellia thurifera* is listed as Near Threatened.

4.2.2 Fauna in the project impact area
The biological surveys carried out in the Mongegba area identified the following fauna:

*Mammals*: 13 species of mammals of which 2 are endangered species on the IUCN Red List (Tree pangolin *Phataginus tricuspis* and the Western red colobus monkey, *Piliocolobus badius*); and 2 Vulnerable species (the Western pied colobus, *Colobus polykomos* and the Sooty mangabey, *Cercocebus atys*). Since only a small section of the forest is going to be used for construction of a weir, the main threat from the project might come indirectly from poaching and encroachment. It is proposed that measures be taken to ensure the protection of these animals when they come out from their places when the work is in progress since the quest for bush meat is high among the locals.

*Reptiles*: Three species of reptiles were identified at the site and there were no reptilian species of conservation significance

*Amphibians*: Eight species of amphibians were recorded at this site, two of which are listed as Nearly Threatened by IUCN, *Phrynobatrachus phyllophilus*; and *Odontobatrachus natator*. Mostly two species of amphibians are abundant in the project impact area: the Sierra Leone water frog, *Odontobatrachus natator*, whose populations at the site are really high within the streams and drainage areas and it was also recorded inside the two miles tunnel; and the *Ptychadena bibroni* which was almost found everywhere in the disturb areas within the survey sites. *Odontobatrachus natator* is confined to the Upper Guinea forest edges where it is found its habitat ranges from rocky stream areas, waterfalls to water catchment areas with moderate to high water current. Given that the construction work will consist of creating water channels, the potential impacts on this species would be low, as would impacts on the majority of the other amphibians.

*Birds*: 31 species of birds were recorded at Mogegba work package area during the survey but none was found to be of conservation concern meaning that construction work in this area will have minimal to no impact on birds. It was also observed that this area is not a migration route for the bird species recorded in the survey.

*Fish*: No fish species were recorded during the surveys however, interviews with some members of the resident community indicate that fish species like Tilapia can be present and these views were confirmed by the appearance of newly hatched unidentifiable fries of this species in stagnant rocky waters.
The biological surveys carried out in the Guma Treatment Works site which is located in a forest vegetation area identified the following fauna. It has to be noted that works at this site involves rehabilitation of existing water treatment works components and does not involve any new construction works that will require clearance of vegetation.

Mammals: Thirteen mammal species were recorded which include four species of conservation significance: two endangered species, the Tree pangolin *Phataginus tricuspis*, and Western red colobus *Piliocolobus badius*; and two vulnerable species, the Western pied colobus *Colobus polykomos* and the Sooty mangabey *Cercocebus atys*. In addition there intake tunnel provided a suitable roosting habitat for a colony of the bat, *Hipposideros aff. ruber* (Least Concern) bat colony of about 30 to 50 individuals in the raw water pipe tunnel and studies done in August 2017 highlighted mitigation measures to ensure that the population of the bats are not affected and to ensure also human health protection when entering the tunnel.

Reptiles: Four species of reptiles were recorded at the site with none being of conservation significance

Amphibians: Seven species amphibian species were recorded with 2 of them being of conservation significance as Nearly threatened and these are *Phrynobatrachus phyllophilus*, and *Odontobatrachus natator*. Both species were encountered on around the ingres tunnel of the Guma Valley Dam

Birds: A total of 69 species bird species were recorded among which were 4 species that are listed as near threatened and vulnerable respectively. 37 species were identified as high forest dependent species. The rehabilitation work in this area is restricted to specific locations at the dam and the fact that the forest has larger coverage area, most of the forest can serve as offset especially for the high forest dependent species as recorded here. The following are the species with conservation significance because they are listed on the IUCN Red List: Green-tailed Bristlebill, *Bleda eximius* and Rufous-winged, *Illadopsis rufescens* are Nearly Threatened; and the Yellow-casqued Hornbill, *Ceratogymna elata* and the Brown-Checked Hornbill *Bycanistes cylindricus* are listed as Vulnerable.

At the Mortem Worksite the following fauna were recorded:

Mammals – Seven species of mammals were recorded at this site and there were none were listed as of having any conservation significance.

Reptiles and Amphibians: Three species of reptiles and three species of amphibians were recorded at the site. Only one species of amphibian recorded is listed as Nearly Threatened, *Odontobatrachus natator*.

Birds: 31 species of birds were recorded at this site and none of it was found to be of conservation significance.

4.3 SOCIAL-ECONOMIC ENVIRONMENT

This section provides a summary of the existing socio-economic conditions in the project impact areas. This is based on a desk study and socio-economic studies and interviews carried out in the project impact area.

4.3.1 Population Characteristics

The majority of the population is settled on the coastal strip between the hills in the centre-south of the peninsula, the Atlantic Ocean to the west and the Sierra Leone Estuary to the north and east. Typically, these areas are densely developed, especially in the north and east. These are also the main business and industrial areas. The remainder of the population has spread up the hills and over the top into the Orugu valley, which lies south of the city, on a north-west - south east axis. These areas are generally less densely developed.

4.3.2 Economic environment
The majority of people earn less than Le 2,000,000 (£196, $260)33 and are owners of their own property. Generally, the proportion of house tenure and ownership does not change except in the case of caretakers. Caretakers is not common above Le 2,000,000. They hold a range of occupations, mainly petty trading (27%), Construction and Building (12%), Business and Office Workers (11%) and not in employment or other (13%). Most of them live less than 1km from where they work (46%). The rest have to travel between 1 and 5 km (25%) or over 5km (28%). Through focus group discussions it was established that the people living in the project impact area have the following economic activities: petty trading; stone mining; fishing; farming; motor bike riding; plumbing, carpentry, construction, and masonry.

4.3.3 Health
The focus group discussion revealed that the areas are currently facing the following health problems: Malaria, Typhoid, Cholera, Diarrhea, skin diseases. These they attributed to the following: unsafe and contaminated drinking water; poor waste management; poor hygiene practices; vector habitats such as stagnant water for Mosquitos. Women also expressed the lack of adequate health centres

4.3.4 Water and Sanitation
Currently in the piped water is the main source of water (39% in Dry and 41% in Wet). Protected wells are the second most common in dry season (26%) however rainwater is the second most common (25%) in wet season. As you can expect, rainwater is not used in dry season. Domestic water sources have less reliance on piped water (21% in dry; 17% in wet). In dry season the most common water source is the protected well (43%) but in wet season it is rainwater (43%). The majority of people took 15 to 30 minutes to collect water (32%) however there is still 21% of people taking over a 1 hour. This is mostly collected by women and/or children (84%). The main issues faced in terms of collecting water is overcrowding and distance. However other issues occur, such as seasonality, poor quality, poor pressure, intermediate supply and harassment.

4.3.5 Socio-Cultural Aspects
There are no socio-cultural and religious sites located in the project impact areas. However, chance find procedures will be followed during construction works.

4.3.6 Transport
Transport in Freetown is mainly road transport comprising of motorists and motor cyclists. The construction works especially pipelines for the water supply system are expected to impact on road traffic. A traffic management plan will be developed for the project.

4.3.7 Gender
The project impact area has men, women and the youth who are residing in the project impact area. During consultations the following gender issues were highlighted: shortages of water; women and the girl child walking long distances to fetch water and the dangers that these poses to them; unemployment especially for the youth.

5. PROJECT ALTERNATIVES
The project has considered and investigated several alternatives to reduce the impacts on the environment and also social and resettlement impacts which have been incorporated into project design and implementation arrangements. These are outlined below.

5.1 “NO ACTION” ALTERNATIVE
- Doing no works at the WTPs would have a major negative impact on GVWC’s capacity to manage its utility more efficiently and can have an effect on the water supply in Freetown. In addition it will deny a lot of the Freetown water population access to safe drinking water and improved sanitation which will also improve their livelihoods due to reduction in waterborne diseases and diseases that arise because of poor sanitation.
Not building the temporary laydown area at Mile 13 would also have a negative impact on the programme compared to doing it because it makes more efficient the logistics, delivery of equipment and building materials related to work packages located in the western part of Freetown. The lay down area will be decommissioned after the works and returned to its initial state meaning impact is temporary.

Doing nothing about extension of distribution networks would not reduce the leaks in the networks as it stands nor increase the service supply to areas that receive little water in western and eastern parts of Freetown. The distribution system extension is also linked to the two service reservoirs to be constructed in Marjay town and Angola. Conveying water to customers through the “spaghetti” pipe networks connections is an extremely inefficient method of supplying water. Furthermore, the cost of maintaining such a network and tackling leakage on it is very high.

Communal water points/water kiosks are meant to be constructed in areas where the network will be limited or areas supplying people unable to afford individual connections. Not building the water kiosks can affect low-income households unable to afford individual connections

In terms of water supply, Allentown and neighbouring areas in the east contains the worst affected areas of the city. If Allentown WTP receives more water under Work Package 6.5, it makes sense to extend the network to formalise it and rationalise spaghetti pipes in the area.

5.2 “REHABILITATION OF THE WATER SUPPLY SYSTEM”

Refurbishment in the water treatment works are necessary to improve the water management of GVWC and the efficient water supply into the network.

For instance, WP 1.8 (Install back-wash water recycling system) has a direct impact on the quantity of water supplied by increasing the reliable output of the plant by 2-3Mld. Another example is that the following work packages do improve the quality and reliability of the plant which has a positive impact on the management and performance of the utility (1.4 Repair Leaking Structures; 1.5 Refurbish filter beds; 1.6 Rehabilitate electrical and control installations; 1.7 Install Plant Flow Metering).

There is no alternative to replacing a problematic 4.4km section of high pressure 450/550mm dia. old steel main which is prone to bursting and damage. The National Water and Sanitation Policy (2010) aims at improving management and delivery of sustainable water services which is linked to the replacement of problematic parts of the network. The alternative of laying the replacement section in the existing pipeline alignment is not possible as this would result in an unacceptable outage to water supply during construction and commissioning.

WP 3.2 consists in constructing two steel service reservoirs at Marjay Town and Angola that will assist in controlling supply pressures, providing additional storage to aid the rationing programme along the Peninsular Road.

This work package includes new mains extensions in supply areas where spaghetti connections are widespread to improve reliability and reduce losses. A core new network of 35kms of new mains provided and properties bordering this core network to receive new service connection. Also, the decommissioning of significant lengths of spaghetti mains by GVWC will contribute to reducing leakage. Rationalisation and improvement of the network means significantly less network to maintain and repair. It is estimated that for every 1 km of new network main laid in WP 5.2, GVWC can decommission 30km of spaghetti pipe. This results in significantly less pipe
to maintain and should significantly reduce leakage losses in the area. Furthermore, the
design of the new networks in WP 5.2 has incorporated pressure managed areas,
significantly reducing pressures in the area, and saving significant amounts of water as a
result.

- There is no alternative to community water kiosks that would increase improved water
supply in areas where the network coverage is limited.

Alternatives for avoiding and minimizing resettlement include the following:

- The alignment of the replacement section of the transmission main has been designed
to be parallel to the existing section as far as practicable. Therefore running the
replacement section parallel reduces disruption and the land required.

- The pipeline has been designed to minimum depths reducing trench widths and
construction programme. The pipe route has been adjusted locally to avoid properties
especially for the 1st 200m where the route was adjusted during detail design to utilise
the contractor’s laydown area and avoid disrupting the properties adjacent. This further
meant that land clearance was minimised in this area

- Inlet and outlet mains for the 2 new reservoirs will be located in the utility right of ways
as advised by the SLRA to minimise disruption to landowners.

- The 2 reservoir sites have already been purchased by GVWC from the previous
landowners and currently both sites only have small temporary structures for the
caretakers.

- The location of the distribution network pipes have been decided after negotiations with
SLRA, GVWC and the EPC Programme. It is estimated that as part of WP 5.2 (New
Networks in the West), approximately 40% of new watermains will be in demarcated
roads and with 60% in non-demarcated roads.

- The re-commissioning of the Bulk Transfer System (BTS) is arguably the most crucial
element of the overall project as it will once again provide water to the reservoirs in the
east and allow significantly greater quantities of water to reach the east of the city.
However, in order to then ensure that water can be distributed from the reservoirs to
customers without significant leakages issues, key sections of the network in the east
need to be rehabilitated.

- The location of the intake is based on height to ensure Allen Town can be gravity fed
and negating any need for pumping. Intake structure is designed to minimise the use of
imported materials and will utilise gabions built from locally sourced and processed
rock. Pipes in the forested area will be shallow buried to provide long term protection
to the pipe. Existing intake pipework has been shown to be vulnerable to fire and impact
damage as well as being vulnerable to tapping. Power for chlorination facility will be
solar energy

5.3 JUSTIFICATION FOR THE CHOSEN PROJECT ALTERNATIVE

Based on the alternative analysis above; even though the project will impact on the
environment and cause resettlement of the people; most of these rehabilitation works will occur
in already existing GVWC facilities and the impacts on the environment will mostly be due to
the new weir sites and the new distribution networks. These are site specific impacts that can
be mitigated by the ESMP and RAP. In addition measures have been taken to minimize
resettlement impacts and all the PAPs will be compensated for both physical and economic
displacement impacts. The positive impacts that the water supply system will have actually
outweighs the anticipated negative impacts.
6. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS
The project is anticipated to have both positive and negative impacts. However the positive impacts are expected to outweigh the negative impacts. Below are the anticipated positive and negative impacts.

6.1 POSITIVE IMPACTS

6.1.1 Water Resource Use Efficiency due to reductions in water loss throughout the supply system
There is a positive impact on the reduction of leakages at the WTP. The refurbishment of the scour valve (WI1.1), has reduced the flow of water wasted completely. A Vnotch weir calculator recorded a flow of almost 2000m3 a day (approx. 23 litres/s) which has stopped after the refurbishment. The impact of reducing the run-off from the scour valve is considered low. Also, through the installation of a back-wash system (WI1.8) at the WTP the EPC project considers there is potential for significant reduction in water loss associated with backwashing. Overall by reducing the frequency of backwashing and reclaiming most of the backwash water, a net saving of at least 1,500 m3/day of water should be realisable.

6.1.2 Improvement of Life and Livelihoods of the people in Freetown City
The project will improve the population having access to safe drinking water and sanitation facilities thereby improving the life of the people living in Freetown. This will also reduce the incidences of waterborne diseases that result from drinking and using contaminated water. Burying the distribution network will reduce the incidence of contamination through proximity to waste. A ‘sealed’ system will help guarantee the quality of water. Reducing waterborne diseases; raising living standards; and increased economic activity for businesses with increased access to potable water.

6.1.3 Job Creation and Private Sector Development
The project will directly contribute to the creation of temporary jobs during construction activities, most of which will be contracted locally. In addition, the project will stimulate the development of additional income-generating activities via the hiring of subcontractors and a variety of general services. There will be creation of permanent jobs during operation phases. At the height of works up to 200 labourers from the local community expect to be employed.

6.1.4 Gender impacts
The project will create employment for men women and youths in the impact areas. Nearby access to safe drinking water can alleviate adverse health effects and can reduce the time spent fetching water by mostly women, girls and boys. This time is better spent in attending schools for children or in economic activities for women. In addition, improvement of livelihoods due to increased access to potable water will have indirect positive through reduction of differentiated impacts that arise from incidences of water borne diseases; taking time to fetch water due to water shortages; walking long distances to fetch water and increase in businesses that require good sanitation.

6.1.5 Improved Social Services
The project will result in improved access to water by social services such as health facilities and education institutions thereby providing a cleaner environment with proper sanitary facilities for the Freetown Communities

6.1.6 Stimulation of Development
Increased access to water will impact positively on local and national businesses including the tourism industry. Businesses will have access to water without much shortages. This will also enable the facilitation of other economic activities in the settlement areas.
6.2 NEGATIVE IMPACTS

6.2.1 Air Quality Impacts
Respiratory health impacts can be caused by motorised vehicles and equipment with impact on pedestrians, nearby residents and site workers. Dust generated by the works will travel downwind depending primarily on wind speed and particle size. The potential impacts are disturbance of local residents and deposition on vegetation, organisms and surfaces. The residual impacts associated with combustion emissions and greenhouse gas emissions will be of low significance. Although a short-term increase in dust levels during construction is unavoidable, they are considered to be generally of low significance.

6.2.2 Impacts on Flora and Fauna
The direct impacts on flora and fauna are expected to be minimal to low because most of the works will be happening in existing GVWC facilities and involve rehabilitation works. Vegetation and wildlife will be impacted directly at the new sites and where new trenches for water pipes will have to be laid. Impacts will be minimized by using raw materials for the construction and clearing only the worksite areas for weirs and pipelines. In addition, risk of destruction of the roosting habitats for a colony of the bat *Hipposideros aff. ruber* will be minimized by following proper mitigation measures.

Indirect impacts can arise for flora and fauna if the new project sites open up the areas to further encroachment and deforestation including poaching of wildlife. The construction of weirs at Mongegba and Mortem will not require vehicular access into the protected area and buffer zone as transport of pipes and materials is planned only on foot and using winches. Therefore, the existing foot path to the weir will require some widening to allow easier and safer movement of materials and workers to the site.

6.2.3 Impacts on Drainage, Surface Waters and Water Resources
The improper management of construction materials and wastes including wastewater from portable toilets can have an environmental health impact in adjacent properties, drainage channels and nearby streets. Hazardous materials such as oils and fuel for machinery and cement if stored and handled inappropriately or spilled, these materials may pollute soils and nearby streams. Liquid effluents from preparation of concrete, sediment dewatering and wastewater from portable toilets or private dwellings or offices may contaminate the canal waters. The following planned construction and commissioning activities could affect surface water receptors: increased sediment run-off from the construction sites, pipe storage areas and offloading areas; discharge of storm water from the pipeline trench and excavations – this is likely to contain sediment; accidental release of potential contaminants (e.g. fuel, hazardous waste, chemicals) during pipeline, construction or at the construction camp, pipe storage areas and offloading areas; a number of sediment-generating activities have been identified that may occur during construction. Where there is a significant slope, consequent erosion may deliver fine sediments from the site to the drainage channel that is then carried to downstream receptors (Freetown bay). Sediment may also be discharged in water pumped from the pipe trench and excavations during construction and during the construction of open-cut crossings, either because of soil handling or the use of vehicles.

6.2.4 Impacts on land due to excavation and construction
Excavation works for trenches and clearing of works sites will lead to soil erosion and land degradation. Erosion may be a problem during construction, especially in areas with thin soil layers. Risk of machinery damage to soil, especially from wheeled vehicles can affect the geomorphology of some specific locations. Poor & long-term stockpiling of soil – affecting its structure, erosion and/or sedimentation via uncontrolled runoff is another risks and Soil pollution from oils and hydrocarbon spills from machinery can cause land pollution.
6.2.5 Noise and Vibration Impacts
The construction and rehabilitation works are likely to cause temporary disturbance due to noise and vibrations as the works are in urban areas. Noise will be produced by excavation, concrete and rock breaking from powered mechanical equipment as well as other sources of noise from regular construction activities. These can include: logistics and use of access roads by construction vehicles; the maintenance and use of vehicles, plant and equipment during construction; construction camp operations (including generators); stringing pipe, cold pipe bending and pipe welding; and operation of borrow pits and concrete.

6.2.6 Climate Change Impacts
There may be increase in emissions due construction equipment and vehicles but this is expected to be minimal. However, climate change impacts may arise due to rain patterns because the dam relies on rainwater to refill. In addition, some of the water sources on which the weirs will be constructed could be affected by climate change if rainfall patterns change.

6.2.7 Involuntary resettlement
The project has the potential to trigger displacement through the development and rehabilitation of improved facilities in the target areas. This could entail development through laying of new pipelines or repairing existing pipelines or the construction or rehabilitation of ancillary infrastructure, such as reservoirs. To strengthen GVWC’s capacity to manage displacement impacts, DFID has recently appointed Mott MacDonald to carry out the Resettlement Action Plan (RAP) for GVWC. The project will implement a RAP where all PAPs affected by the project will be adequately compensated before project works start based on the applicable requirement standards. Considerate design should result in avoidance and minimising the potential for displacement. Current practice is to lay pipelines within existing road rights of way, but not under the road pavement.

6.2.8 Disruption of public utilities and services
The works proposed will necessitate some road cuts, excavation of trenches which in some cases produce the following impacts: relocation of existing public utilities resulting in the interruption of water and electricity services for a limited period of time; accidental damages to existing services and private properties might occur during excavation; increased risk of accidents; materials supply and disposal will generate traffic congestion across parts of the city; the works related to pipeline rehabilitation or construction will affect temporary access to homes and other places such as schools, places of worship, etc.

6.2.9 Water Shortages due to rehabilitation works
There is a risk of additional water shortages during the construction works because some sections of the network will need to be disconnected temporarily. This concern has been acknowledged widely during FGDs and interview with PAPs and if not managed properly can lead to social unrest. GVWC will need to ensure a minimum water service provision which is not under the responsibility of the contractor.

6.2.10 Downstream Water Demands Impacts
Flow quantity is often as important as water quality in rivers and streams. Interruption of river flows has the potential to adversely impact ecological sustainability, fisheries, other water abstractions and the dilution of other downstream discharges. The weirs located at Mortem and Mongegba will capture water flowing to the Orugu River. Mortem and Mongegba streams do pass around 2Mld each during for around 7 months of the year (generally June through to December), although December flows may not be reliable in drier years. There is no data on the hydrological assessment of the flows/intakes because such activity was descope as part of “value engineering” for the stage 3 pricing of the EPC project. Temporary damming of watercourses will reduce the flow, therefore, the environmental flow at Mortem and Mongegba.
would need to be considered. Also, there is a community in Mongegba that collects water for domestic and agricultural uses from the Mongegba River downstream which will be affected if the weir upstream impounds all available water. If so, these communities will be encouraged to fetch water at the new weir therefore compromising its water quality and the surrounding environment.

6.2.11 Traffic related impacts
The EPC project will generate traffic congestion and temporary road closures due to materials supply and disposal that will generate circulation of trucks on the Peninsular Highway and Reagent Road among others. This can lead to increased risk of accidents

6.2.12 Social Unrest and Vandalism
Lack of communication and community engagement is perceived as a major risk for this project. Issues like resettlement, willingness to pay for water service that do work as well as water cuts are hot topics that if managed inappropriately can increase community dissatisfaction and thus can be a potential source of social unrest and vandalism of water infrastructure. It is therefore important that the EPC, GVWC, the contractor and other relevant stakeholders participate actively in a common community engagement approach.

6.2.13 Impacts on Social cultural Life and Networks amongst local communities
Most of the project works sites are located within urban areas whereby impacts on cultural life and networks is expected to be minimal. There is a high risk that the temporary workers influence and interaction with communities will lead to conflict, disease and early pregnancy which can be consider a major risk. The contractor should include an education and awareness training of the risks of HIV or other diseases through clear signs in the entrance and recreational areas of all its work sites. The training should also cover women and girls rights. Additionally, the contractor should enforce a zero tolerance approach to sexual misconduct of its workers. There is need to have a Code of Conduct to avoid conflicts and impacts of migrant workers.

6.2.14 Public Health Impacts
The presence of construction workers and related increase in disposable cash makes the transmission of STDs a possibility. Inadequate management of construction waste and domestic waste generated at the work sites and sewage from the construction camp(s) would create conditions for the growth of vectors and increases in diseases such as malaria, and other waterborne diseases. Measures will be implemented to ensure that there is no obstruction of water ways and ponding including proper waste management to avoid pollution of nearby water sources.

6.2.15 Occupational Health and Safety Impacts
The excavation of 700mm to 2.5 m deep trenches, the open trenches and manholes can create health and safety risks for both workers and pedestrians in case of instable excavation sections, inadequate storing, fencing and signage.

6.2.16 Landscape and Visual Impacts
The visual impact of the water supply system will be minimal since it will mostly be done in human settlement areas and already existing GVWC premises.

7. ENHANCEMENT/MITIGATION MEASURES AND COMPLEMENTARY INITIATIVES
GVWC and the Contractors will implement the detailed Environmental and Social Management Plan (ESMP), which has been developed for the project. The ESMP will ensure compliance with applicable environmental standards during both construction and operation. The Contractor will be required to develop a Construction ESMP (CESMP) to ensure compliance with the AfDB requirement standards and applicable national regulations before construction works begin.
<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Enhancement Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic development</td>
<td>- Increased access to water within Freetown will positively impact on public and private facilities thereby stimulating local and national development due to improved sanitation</td>
</tr>
<tr>
<td>Impacts on different gender groups</td>
<td>- Put in place gender differentiated measures such as: encourage men and women and the youth to provide goods and services as part of their business opportunities</td>
</tr>
<tr>
<td></td>
<td>- Ensure that there is gender disaggregated data during monitoring to ensure that benefits also accrue to women and the youth e.g. employment</td>
</tr>
<tr>
<td></td>
<td>- Increased access to potable water and inclusion of more water points for access by communities will reduce the gender burden of looking and waiting for water due to water shortages and walking long distances</td>
</tr>
<tr>
<td></td>
<td>- HIV/AIDS component to target women as well</td>
</tr>
<tr>
<td>Employment Opportunities</td>
<td>- The Local Agency will be responsible for recruitment and ensure that measures are put in place for local employment especially for unskilled workers</td>
</tr>
<tr>
<td>Water Resource Use efficiency due to reduction in leakages</td>
<td>- Include even access through distribution networks even in secondary and tertiary road connections.</td>
</tr>
<tr>
<td></td>
<td>- Replacement of ‘spaghetti’ connections</td>
</tr>
<tr>
<td>Ensure Social Inclusion</td>
<td>- The project has included community water access points to high density areas</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negative Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat degradation and fragmentation; loss of flora and fauna</td>
<td>- Develop and implement a Biodiversity Action Plan for both construction and operation phases</td>
</tr>
<tr>
<td></td>
<td>- Maintain water channels with regulated flow of water downstream of the weirs to ensure the survival of fish species</td>
</tr>
<tr>
<td></td>
<td>- To prevent Mortem could encourage encroachment, which could be addressed by closing &amp; re-routing access post works</td>
</tr>
<tr>
<td></td>
<td>- The forest cover around the work site should be maintained to protect temporal and permanent habitats for some birds</td>
</tr>
<tr>
<td></td>
<td>- To avoid and reduce any impacts on the Bat population in the tunnel the following mitigation measures will be followed; carrying out the works where the bat population is at its lowest which is during the rainy season; reduction of lights during the works preventing any unnecessary use of lights when possible and considering working at night.</td>
</tr>
<tr>
<td></td>
<td>- Amphibians need water for breeding and other activities so leaving water channels and maintaining adequate flow quantity downstream during work will reduce the impact especially if works requires draining all available water.</td>
</tr>
<tr>
<td></td>
<td>- Amphibians like hiding under leaf litters thus care must be taken to protect them from physical damage if they are detected</td>
</tr>
<tr>
<td></td>
<td>- Care must also be taken to avoid snakes and other reptiles during work if they are detected</td>
</tr>
<tr>
<td></td>
<td>- Reduce the temporal duration of works as much as possible to avoid and minimise impacts on these animals</td>
</tr>
<tr>
<td></td>
<td>- Ensure the protection of these animals especially those with conservation significance during both construction and operation phases since the quest for bush meat is high among the locals</td>
</tr>
<tr>
<td>Disruptions to of public utilities and service due to relocation and damage and shortage of water due to rehabilitation works</td>
<td>- Area of works well demarcated following consultations with utility companies to determine the locations and alignments of electrical cables, water mains and communication cables.</td>
</tr>
<tr>
<td></td>
<td>- Keep utilities informed prior to excavations within the 20 m of their respective alignments</td>
</tr>
<tr>
<td></td>
<td>- Produce a detailed works’ planning and construction phasing schedule to reduce disruption time, and coordinate service interruption with public utilities and FCC/Wards.</td>
</tr>
<tr>
<td></td>
<td>- Advise affected people in advance regarding schedule interruptions in water and electricity services.</td>
</tr>
<tr>
<td></td>
<td>- Stakeholder Engagement Plan</td>
</tr>
<tr>
<td></td>
<td>- Provide alternative supplies for water to affected areas</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>- Provision of PPEs such as noise mufflers and limiting hours of exposure</td>
</tr>
<tr>
<td></td>
<td>- Hearing protection equipment, noise limitations to working hours for staff.</td>
</tr>
<tr>
<td></td>
<td>- Proper maintenance of vehicles and machinery following maintenance requirements</td>
</tr>
</tbody>
</table>
| **Air Quality** | - Take into consideration noise suppression capability in the procurement of vehicle and powered mechanical equipment Critical areas (schools, health posts) will be protected with temporary barriers.  
- Contractor will be prevented from working in settlement areas after the hours of darkness.  
- Maintenance of Vehicles and equipment  
   - Appropriate use of transport and equipment - as per the official transport or equipment instructions and using the appropriately tool for the job.  
   - Cover loose material on the construction sites.  
   - Cover materials being transported.  
   - If there is a large amount of dust likely to be produced from certain activities or due to adverse weather, then wetting down transport tires and equipment and screening of specific sites to prevent dust entering the atmosphere. |
| **Public and Occupational Health and Safety** | - Safety conditions in the trenches during construction phase shall be ensured through the use of appropriate battering, shoring systems and dewatering  
- Workers should not enter a trench more than waist deep without appropriate safety precautions such as shoring.  
- Adequate and proper standard sanitary facilities will be provided at each project camp site. Mobile toilet facilities will be provided for construction workers in order to ensure that decent and comfortable places of convenience are provided for the workers and to prevent pollution.  
- Develop a code of conduct for workers, preceded by training on how to abide by these; both on and off site in project affected communities for the project duration  
- Safe access and thoroughfare must be provided on site at all times.  
- Trenches and excavated areas shall be clearly identified and temporary fencing, drainage crossing, access routes and signage provided to improve access and avoid accidental falls into these areas.  
- Clearly understandable warning signs, barriers and signals shall be placed at strategic locations in sufficient number and spacing for all prominent access ways to the sites.  
- Warning signs and other protective barriers shall be erected to prevent accidents to citizens due to open ditches, heavy machinery and construction vehicles etc.  
- Public health and safety awareness campaigns in all areas especially human settlement areas to avoid accidents from construction traffic and trenches for pipelines. |
| **Waste Generation** | - Develop a waste management plan for all solid, liquid and hazardous wastes  
- Secondary containment for fuels to avoid spill contamination and inspection during operation  
- Toolbox training including training in fuel and waste handling  
- According to the law in Sierra Leone the contractor should coordinate with the FCC the disposal and handling of construction waste in areas that are suitable and included in the contractors waste management plan.  
- Designate an area within the construction sites to keep non-hazardous construction waste:  
- Manage the collection of the construction waste by an official waste removal company  
- Ensure that the waste is disposed of in a safe and appropriate location (i.e. no risk of leachate from the waste causing harm to humans or the environment). For the Asbestos cement pipes leave them underground for now to avoid release of asbestos bonded fibres and develop an asbestos waste handling and disposal procedure  
- Ensure compliance with local laws and regulations. Solvents and similar hazardous materials must not be disposed of in a manner likely to result in soil or groundwater contamination, if groundwater is potentially useable for potable water or irrigation purposes.  
- Spoil heaps and temporary waster need to be managed safely. |
| **Land and Soil degradation** | - The Contractor would be directed to provide an Erosion and Sediment Prevention and Control Plan to prevent soil erosion and sedimentation that will cause siltation of watercourses prior to the start of the relevant construction,  
- The Contractor would be expected to exercise care and due diligence during site preparation to avoid indiscriminate clearing of vegetation.  
- Under no conditions shall clearing and/or excavation without prior approval of the Project Engineer, expose a large surface area of credible earth material at one time.  
- Any cleared areas will be rehabilitated through compaction and revegetation after construction works  
- Put in place appropriate measures to intercept, divert, or otherwise reduce the storm water runoff from exposed soil surfaces, excavations, spoil heaps, waste rock dumps |
### Involuntary Resettlement
- Minimise runoff and control sediment to the maximum extent possible. All erosion control and sediment containment facilities must receive proper maintenance during their design life.
- RAP Implementation and Monitoring
- Compensation and relocation of PAPs for assets and livelihood lost through livelihood restoration plans and community development plans
- Implement a Land Acquisition Plan for the Reservoir sites whereby land is bought from private land without human settlement and land disputes
- Implement a SEP and GRM including Resettlement Committees

### Creation of Social Conflicts
- Do water demand analysis especially for the two weirs for downstream water users to avoid and minimise impacts
- Implement a Stakeholder Engagement Plan and GRM

### Degradation and Pollution of Water Resources
- The Contractor may need to extract storm waters from the trenches and other construction works to ensure working conditions and manage run-off in a way that erosion is limited.
- Proper storage of materials and wastes (not overfilling bins or use bins with covers)
- In case of accidentally dumping waste, the contractor should inform EPA/relevant authorities and compensation measures will be triggered.
- The excavated materials in the vicinity of the worksite should be kept in flat stripped land when possible to avoid dispersion and sedimentation of drainage channels, nearby street and adjacent properties.

### Impacts on Archaeological/Cultural Heritage
- Use of Chance find procedures for any chance finds during construction

### Traffic Impacts
- Prepare and implement traffic management plan
- Coordinate all traffic arrangements with Police, SLRA and FCC, Ministry of Works, Wards and other authorities as relevant
- Delivery and discharge trucks might be assigned restricted circulation hours
- Advise affected people in advance regarding road closures and rerouting of vehicle and pedestrian traffic
- Works will be carried out on lots of limited length, in a way to minimize closure of main streets stretches, according to the Project Planning.
- Outside of working hours, especially at night, all barriers and signs will remain at sites, with lighting and/or lighted signs placed as required to warn both vehicular and pedestrian traffic
- Flagmen shall be used to warn and direct vehicle traffic around construction sites and hazards during working hours
- Restore the project environment to the state to which it was prior to construction.
- Where safety/isolating barriers, etc., cannot be installed sufficient trained staff shall always be present to manage construction-related activities and public movement (consider use of 2-way radios).
- GVWC to keep community leaders informed

### Environmental Flows and Down Stream Impacts
- Ensure environmental flow is left at the weir
- Ensure the design includes an alternative to leave 20% of water to flow to downstream users at Mongegba
- During the dry season there is the possibility, even if only for a short time, that there will be insufficient flows at the weir to operate the intake and it will be closed off in which case all flow (however little) will go downstream. In order to maintain a downstream flow GVWC would need throttle the intake valve to ensure downstream flow.

### Encroachment into Forested areas where the weirs will be constructed
- Inter-governmental collaboration between, MWR, NPAA, MLPE, EPA and GVWC to protect the area
- Community engagement with neighbouring communities to reduce encroachment
- The project must ensure that care is taken to protect valuable tree species to prevent the loss of these trees.
- Use lessons learnt from other sites for the GVWC water intake and treatment sites where rangers are protecting
- Planting local trees on the deforested path to Mongegba is recommended to replace those lost during construction work.
- It is not advisable to plant invasive species such as Eucalyptus or Acacia.
- Monitoring of the signage of encroachment and loss of trees and vegetation
8. MONITORING PROGRAM

8.1 Monitoring Plan
The project will include monitoring of the following aspects: Air Quality; Noise and vibration; water resources; land and soils through erosion control and management plan; Waste Management and Disposal Plan including hazardous waste; Public and Occupational Health and Safety; Biodiversity Action Plan; Resource Use Efficiency; HIV/AIDS Awareness and Prevention; Social Conflicts; Resettlement Action Plan Implementation; Gender Impacts; and Chance Finds. Details of the monitoring parameters, duration and responsibilities are included in the ESMP (Section 10).

8.2 Internal Monitoring and Reporting

8.2.1 Monitoring and Reporting Arrangements
GVWC has a Project Management Unit that has been implementing other donor funded projects and will be responsible for ensuring that adequate monitoring is being done on E & S issues stipulated in the ESMP and RAP. It will be the responsibility of the GVWC/PMU to conduct regular internal monitoring of the project to verify the E & S monitoring and reporting by the Resident Engineer and the Contractor on the implementation of environmental mitigation measures contained in the ESMP and construction contract clauses for the Project. The monitoring should be a systematic evaluation of the activities of the operation in relation to the specified criteria of the condition of approval. If the project is approved, GVWC as the Executing Agency will be required to submit reports from external monitoring by the EPA and any regulatory agencies and submit to the Bank on Quarterly basis E & S Progress reports on ESMP and RAP implementation including contractor ‘management and any remedial and corrective actions for non-compliance’ as part of the Project Progress monitoring and reporting arrangements.

GVWC and the EPC Contractors will commit to comply with the terms of the Environmental License. The consequences of not resolving these non-conformities or other serious failures to comply with the EIA licenses can lead to US $10,000 and/or 2 years imprisonment. The Contractors will have internal procedures for monitoring implementation and reporting on outcomes based on applicable national regulations, applicable requirements and implementation of the CESMMP/HS and labour conditions mitigation measures. The environmental and social monitoring indicators will have to be specified in the Contractor’s CESMMP and specific sub-management plans. Contractor is responsible for reporting monitoring and implementation results on CESMMP during construction works.

8.2.2 Evaluation and Audit
E & S Performance of the project in relation to ESMP and RAP implementation, monitoring and reporting will be evaluated and audited as part of the Project Evaluation and Auditing Activities.

9. PUBLIC CONSULTATION AND DISCLOSURE

9.1 Public Consultation
Community participation and consultation of all key stakeholders were undertaken during both the scoping phase (13th to 20th April 2018) and the ESHIA (5th to 21st June 2018) and RAP studies. There were Key informant interviews with the following: Freetown City Council, Ministry of Health, Ministry of Lands, Planning and Environment, Ministry of Water Resources, Ministry of Works and Public Assets, National Protected Areas Authority, Sierra
Leone Electricity and Water Regulatory Commission, Tacuguma Rangers, and WASH Net. In addition FGD were part of the consultations during the ESHIA in the following communities: Kissy Town, Allen and Calaba Town, Adonkia Goderich and MMTC, Majay Town, Mongegba, Mortem, Southern Section to M13, New London, Ogoo Farm and Laka with women, men and youths including local community leaders and business leaders. These consultations enabled interested and affected parties to contribute their concerns (views, and opinions on the proposed development). During the study, the consultant and GVWC further explained to the public and relevant stakeholders the proposed project activities and anticipated impacts. The following were the main positive impacts raised during the consultations: positive impacts from the project such as access to safe drinking water; employment of locals increase in business activities; increase in school attendance and improved health and sanitation. Other issues raised included: resettlement impacts and compensation of PAPs including relocation; erosion control, traffic and other accidents; contamination of water resources; impacts on flora and fauna; and access to information during project implementation; and project implementation, monitoring and maintenance. Overall there is broad community support for the project as long as the project benefits enhancement and mitigation measures for negative impacts are implemented.

The Project ESIA and RAP will be disclosed according to Sierra Leonian laws and in accordance with AfDB requirement standards. The ESIA and RAP summaries will be also be disclosed on AfDB Website at least 120 days before the project is taken to board. The ESHIA is expected to be disclosed locally once the EPA approve draft ESHIA report. The EPA will be kept informed in the meeting schedule. The participants of the public disclosure will include persons from civil society, residents of the community or the area affected by the development and the geographic area where the undertaking is located. Two or more public meetings will occur. Alongside this continuous consultations with Ministries and Government will be undertaken. In venue selection we will likely revisit the venues used in the FGDs. This will be the first activity as it will need to be submitted as part of advertisement. The dates will be agreed within the ESHIA team and GVWC. Information of the Freetown Project and information on the public disclosure will be published within the Awoke and Standard Evening. This will a half page inside the newspapers. The ESHIA on the radio station however we have yet to decide which station will be most appropriate. This step will be undertaken the moment the venue and dates are agreed.

9.2 Stakeholder Engagement Plan
To ensure continued participation of stakeholders during both construction and operation the GVWC will implement a Stakeholder Engagement Plan throughout the life of the project. The GVWC has already been engaging with various stakeholders before the project and will continue on-going engagement and reporting with the various stakeholders based on the developed Stakeholder Engagement Plan(SEP) that will support the long term viability of the project by establishing and maintaining good relations with the project affected persons and other stakeholders. GWC working with the RE will ensure that there is availability of information and materials to community members on the project and allow the public to meet and communicate personally with company representatives, to obtain information on ongoing project activities, ask questions on topics of interest as well as to lodge complaints or concerns.

The specific Stakeholder Engagement Plan for the project construction and operations stages shall be developed and the components of this plan shall include: Planned consultation meetings/workshops per year for stakeholders and planned project information dissemination activities including a voluntary participatory programme in the local radio to ensure that all socio-economic and environmental issues are adequately addressed.
9.3 Grievance Redress Mechanism
GWC currently has a system in place that receives and responds to stakeholders’ questions and issues on a case by case basis. However to ensure efficiency; a systematic Grievance Redress Mechanism will be developed for the project to ensure that project affected persons, local communities and other stakeholders can raise their grievances about actual or perceived impacts in order to mitigate social risks. In order to ensure that such grievances are addressed, the GVWC and the Contractors in consultation with key stakeholders in the communities and local authorities shall establish a Grievance Redress Mechanism which will be comprised of the different stakeholders.

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
The Environmental and Social Management Plan forms the final phase of the ESHIA and produces a document that will assist in the implementations. The objectives of the ESMP are:

- Reduce the impacts on the environment, socio-economics, community and works health through well thought out mitigation measures;
- Providing monitoring measures that will ensure that the impacts are being limited and the mitigation measures enforced;
- Provide a framework for the implementation of the mitigation and monitoring measures.

The ESMP is a stand-alone document that builds on identified impacts and risks and can be implemented and it includes the following: organisational capacity and competency; monitoring and evaluation; The Management, Mitigation and Monitoring measures. The following will be the key implementers of the ESMP. It also include institutional capacity building on the ESMP through training. It has a full action plan which sets out general mitigation measures for all WP and the specific mitigation measures for WP1, WP 3, WP5, WP6 and WP9. The key mitigation measures include: Biodiversity Management Plan; Waste Management including a plan in case of asbestos pipes; Public and Worker Safety; Toolbox briefings on a range of environmental, social and safety aspects; Traffic Management Plan and Stakeholder engagement and coordination.

10.1 Contractor Management
The project has already started under the DFID funded components and the Contractors for the project are BAM Nuttall Ltd. DFID and GVWC will be responsible for ensuring that the ESMP implementation aspects of that are the responsibilities of the Contractor are being implemented and that there is compliance with all other applicable requirements.
### Project ESMP INCLUDING MONITORING PLAN

#### Table 7: General Project ESMP and Monitoring Plan

<table>
<thead>
<tr>
<th>Category</th>
<th>Impacts</th>
<th>Mitigations</th>
<th>Action Party</th>
<th>Schedule</th>
<th>Monitoring Part</th>
</tr>
</thead>
</table>
| Worker and Public Safety          | The manipulation of equipment and machinery as well as excavation of 700mm to 2.5m deep trenches, the open trenches and manholes can create health and safety risks for both workers and public in case of unstable excavation sections, inadequate shoring, fencing and signage | • Safety conditions in the trenches during construction phase shall be ensured through the use of appropriate battering, shoring systems and dewatering.  
  • Workers should not enter a trench more than waist deep without appropriate safety precautions such as shoring.  
  • Safe access and thoroughfare must be provided on site at all times.  
  • Trenches and excavated areas shall be clearly identified and temporary fencing, drainage crossing, access routes and signage provided to improve access and avoid accidental falls into these areas.  
  • Clearly understandable warning signs, barriers and signals shall be placed at strategic locations in sufficient number and spacing for all prominent access ways to the sites.  
  • Warming signs and other protective barriers shall be erected to prevent accidents to citizens due to open ditches, heavy machinery and construction vehicles etc.  
  • The entrance to the site should be gated or similarly securable:  
     • An appropriate locking system.  
     • Security guard to be at gate during working hours, and maybe even when closed.  
     • Use and enforcement of appropriate PPE  
     • No Working for over 12 hours;  
     • No alcohol or drugs on site and no drinking or drug taking within 24 hours of operating machinery or equipment. | BAM          | Throughout the works | Visual inspection, construction documents review (H&S plan)                                                                 |              |                           |                                               |
| Disruption of Public Utilities and Service due to relocation and damage | The works proposed will necessitate some road cuts, excavation of trenches which in some cases produces the following impacts:  
  - Relocation of existing public utilities resulting in the interruption of water and electricity services for a period of time.  
  - Accidental damages to existing services might occur during excavation; | • Area of works well demarcated following consultations with utility companies to determine the locations and alignments of electrical cables, water mains and communication cables.  
  • Keep utilities informed prior to excavations within the 20 m of their respective alignments  
  • Produce a detailed works’ planning and construction phasing schedule to reduce disruption time, and coordinate service interruption with public utilities and FCC/Wards.  
  • Advise affected people in advance regarding schedule interruptions in water and electricity services. | BAM          | Throughout the works | Visual inspection, construction documents review                                                                                                                                                                                                                         |              |                           |                                               |
<table>
<thead>
<tr>
<th>Water discharges</th>
<th>Minimize the impact of water movement on and off site and its associated erosions, sedimentation and potential pollution effects</th>
<th>The Contractor may need to extract storm waters from the trenches and other construction works to ensure safe working conditions.</th>
<th>BAM</th>
<th>Particularly during site set up and through out the works</th>
<th>Visual inspection, construction documents review. If temporary drainage was required then take pictures of its installation.</th>
</tr>
</thead>
</table>
| Traffic congestion                                   | Traffic congestion and temporary road closures:  
- Increased risk of accidents  
- Materials supply and disposal will generate circulation of trucks on the Peninsular Highway Reagent Road | • Prepare and implement traffic management plan  
• Coordinate all traffic arrangements with Police, SLRA and FCC, Ministry of Works, Wards and other authorities as relevant  
• Delivery and discharge trucks might be assigned restricted circulation hours  
• Advise affected people in advance regarding road closures and rerouting of vehicle and pedestrian traffic  
• Works will be carried out on lots of limited length, in a way to minimize closure of main streets stretches, according to the Project Planning.  
• Outside of working hours, especially at night, all barriers and signs will remain at sites, with lighting and / or lighted signs placed as required to warn both vehicular and pedestrian traffic  
• Flagmen shall be used to warn and direct vehicle traffic around construction sites and hazards during working hours  
• Restore the project environment to the state to which it was prior to construction.  
• Where safety/isolating barriers, etc., cannot be installed sufficient trained staff shall always be present to manage construction-related activities and public movement (consider use of 2-way radios).  
• GVWC will inform community leaders | BAM & GVWC & Motts | Throughout any diversions | > Evidence of consultation (meeting notes and meeting calendar set ups) with the police:  
> Evidence of informing the chiefs where possible (i.e.SMS):  
> Reports/notes and other information on the route diversions and traffic management plans. |
| Excavation of Trenches and Road Cuts for installation of water mains/pipelines | Access to homes and other places | Works will be effected on lots of limited length, following a project phasing plan, to minimize disturbance. GUMA to identify where access is to be provided on completion of the detailed design Trenches and and excavated areas shall be clearly identified and temporary fencing, drainage crossing, access routes and signage provided to improve access and avoid accidental falls into these areas. GUMA to give Prior consultation and notification to affected people is required. | BAM/GVWC | Through out the works | Inspection and documentary review |
| Air pollution due to dust and emissions generated from construction activities | Respiratory health impacts caused by motorised vehicles on pedestrians, nearby residents and site workers | • Appropriate use of transport and equipment - as per the official transport or equipment instructions and using the appropriately tool for the job.  
• Cover loose material on the construction sites.  
• Cover materials being transported.  
• If there is a large amount of dust likely to be produced from certain | BAM | Through out the works | Visual inspection, documentary review (H&S plan) |
| Noise generation | Noise produced by excavation and concrete and rock breaking from powered mechanical equipment and other sources of noise from regular construction activities | • Hearing protection equipment, noise limitations to construction activities during working hours. <br>• Proper maintenance of vehicles and machinery following maintenance requirements <br>• Take into consideration noise suppression capability in the procurement of vehicle and powered mechanical equipment | BAM | Through out the works | Inspection and documentary review |
| Handling and Storage of Construction Materials and Wastes | Environmental degradation in adjacent properties, drainage channels, nearby streets, due to improper management of construction materials and wastes | • Proper storage of materials and wastes (not overfilling bins or use bins with covers) <br>• According to the law in Sierra Leone the contractor should coordinate with the FCC the disposal and handling of construction waste in areas that are suitable and included in the contractors waste management plan. <br>• In case of accidentally dumping waste the contractor should inform EPA/relevant authorities and compensation measures will be triggered. The excavated materials in the vicinity of the worksite should be kept in flat stripped land when possible to avoid dispersion and sedimentation of drainage channels, nearby street and adjacent properties. | BAM | Through out the works | Visual inspection and documentary control (Waste management plan) |
| Use and Storage of fuels and Hazardous materials | Contamination of soil and water sources due to spills or leaks. Risk of fire. | • Secondary containment for fuels to avoid spill contamination and inspection during operation <br>• Toolbox training including training in fuel and waste handling <br>• Maintain the MSDS Sheets for hazardous materials on site. <br>• Firefighting equipment, designated trained staff contact details of fire & rescue service <br>• Designate an area within the construction sites to keep non-hazardous construction waste: <br>• Manage the collection of the construction waste by an official waste removal company: <br>• Ensure that the waste is disposed of in a safe and appropriate location (i.e. no risk of leachate from the waste causing harm to humans or the environment) | BAM | Through out the works | Visual inspection and documentary control (MSDS/H&S and Emergency Response plan). Every time the waste is collected form the site: Waste Consignment Note should be collected by BAM and the waste collector which shows what the waste is, approximately how much there is and where it is going. This should then be signed by both parts. <br>• Once every 3 months: Spot checks undertaken by BAM to confirm where the waste is actually going. <br>• If finds the waste is being incorrectly disposed of by the waste collector then |
| Resettlement | Relocation of houses and business | • Stakeholder management plan  
• Communication plan  
• Adapted communication  
• Permission to lay pipes inside the RoW  
• Timely mobilization of funds required for acquisition and compensation  
• Rapid follow up on land titling process once Valuation Report(s) approved and payment made  
• Restoration and/or creation of alternative sources of livelihoods  
• Design to avoid resettlement | MM, SLRA, GVWC | Through out the works | RAF monitoring plan |
| --- | --- | --- | --- | --- |
| Vegetation clearing | Loss of Vegetation | > Minimise Cutting of Vegetation on the Access Road to only to where it is necessary for safe and efficient work;  
> Oversee the work to ensure that vegetation cutting is minimised. | BAM | During the site set up | > Check that vegetation is not being excessively cleared;  
> Photos of before and after the vegetation clearing. |
| Handling and Storage of Construction Materials and Wastes | Waste sludge management (including faecal sludge from portable toilets) | Manage the collection of the sludge waste from portable toilets by an official waste removal company ensuring that faecal sludge will be disposed in an official treatment site (i.e. drying beds)  
> Ensure that the waste is disposed of in a safe and appropriate location (i.e. no risk of leachate from the waste causing harm to humans or the environment) | BAM | Every time the waste is disposed | > Every time the waste is collected form the site:  
Waste Consignment Notes should be collected by BAM and the waste collector which shows what the waste is, approximately how much there is and where it is going. This should then be signed by both parts.  
> Spot checks about once every 2 months should be undertaken by BAM to confirm where the waste is actually going.  
> If finds the waste is being incorrectly disposed of by the waste collector then efforts to rectify this need to be undertaken as soon as possible and EPA need to be notified.  
In case of faecal sludge random checks at least 1 x |
Vegetation clearing

- Clearing overhanging branches from the access road
- > Minimise Cutting of Vegetation on the Access Road to only to where it is necessary for safe and efficient work:
- > Oversee the work to ensure that vegetation cutting is minimised.

BAM

During the site set up

- > Check that vegetation is not being excessively cleared:
- > Photos of before and after the vegetation clearing.

Biodiversity

- Light disturbance on bats in the intake tunnel
- > Turn off Lights When The Last Worker Leaves the Water intake Tunnel and Tower

BAM

Through out the works

- > Checking the lights are off

**ESMP for Work Package 1**

<table>
<thead>
<tr>
<th>Category</th>
<th>Impacts</th>
<th>Mitigations</th>
<th>Action Party</th>
<th>Schedule</th>
<th>Monitoring Part</th>
<th>Monitoring Indicators</th>
<th>Monitoring Indicators</th>
</tr>
</thead>
</table>
| Vegetation clearing | Loss of Vegetation          | > Minimise Cutting of Vegetation on the Access Road to only to where it is necessary for safe and efficient work:  
> Oversee the work to ensure that vegetation cutting is minimised. | BAM          | During the site set up          | > Check that vegetation is not being excessively cleared:  
> Photos of before and after the vegetation clearing. | 10mins                  | 10mins                  |
<table>
<thead>
<tr>
<th>Handling and Storage of Construction Materials and Wastes</th>
<th>Waste sludge management (including faecal sludge from portable toilets)</th>
<th>Manage the collection of the sludge waste from portable toilets by an official waste removal company ensuring that faecal sludge will be disposed in an official treatment site (i.e. drying beds)</th>
<th>BAM</th>
<th>Every time the waste is disposed</th>
<th>&gt; Every time the waste is collected form the site: Waste Consignment Notes should be collected by BAM and the waste collector which shows what the waste is, approximately how much there is and where it is going. This should then be signed by both parts. &gt; Spot checks about once every 2 months should be undertaken by BAM to confirm where the waste is actually going. &gt; If finds the waste is being incorrectly disposed of by the waste collector then efforts to rectify this need to be undertaken as soon as possible and EPA need to be notified. In case of faecal sludge random checks at least 1 x week for 1st month, then random checks every 3 weeks</th>
<th>&gt; Copies of the forms need to be kept; &gt; Reports of incorrect disposal needs to be kept along with evidence that this has been rectified.</th>
<th>The Waste Consignment Note should take 5 mins. Spot Check- 2 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation clearing</td>
<td>Clearing overhanging branches from the access road</td>
<td>&gt; Minimise Cutting of Vegetation on the Access Road to only to where it is necessary for safe and efficient work: &gt; Oversee the work to ensure that vegetation cutting is minimised.</td>
<td>BAM</td>
<td>During the site set up</td>
<td>&gt; Check that vegetation is not being excessively cleared: &gt; Photos of before and after the vegetation clearing.</td>
<td>&gt; Maintain copies of the photos:</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Light disturbance on bats in the intake tunnel</td>
<td>&gt; Turn off Lights When The Last Worker Leaves the Water intake Tunnel and Tower</td>
<td>BAM</td>
<td>Through out the works</td>
<td>&gt; Checking the lights are off</td>
<td>No monitoring</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Noise disturbance on bats in the intake tunnel</td>
<td>&gt; Instruct Workers to keep the noise down- no music and minimise shouting - during the toolbox meeting.</td>
<td>BAM</td>
<td>Through out the works</td>
<td>&gt; Evidence that the topic is covered in the Toolbox meeting</td>
<td>&gt; Toolbox meeting agenda</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Reduction in the number of bats due to habitat disturbance during construction and interaction with workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; Appropriate Signs provided by the ESHIA Team to be put up during construction.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; Toolbox meeting on interaction with bats- keep noise down, turning off lights, washing hands afterwards, where boots, don’t touch the bat droppings, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; Work will be undertaken during rainy season- if this changes then working at night and looking into nearby alternative roosts (as identified by an expert) will need to be undertaken.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAM</th>
<th>Through out the works</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Evidence that topic is covered in the toolbox meeting</td>
</tr>
<tr>
<td></td>
<td>&gt; Photos of signs</td>
</tr>
<tr>
<td></td>
<td>&gt; Evidence of work completion before the end of the rainy season</td>
</tr>
<tr>
<td></td>
<td>&gt; Records and photos kept</td>
</tr>
<tr>
<td></td>
<td>&gt; Measures can be covered in about 10min in the toolbox meeting and about an 1 hour for the monitoring measures.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Worker’s Safety</th>
<th>Working in Poor Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Appropriate signs and a safety briefing during the toolbox meeting</td>
</tr>
<tr>
<td></td>
<td>&gt; Appropriate Lighting when work is being undertaken.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAM</th>
<th>Through out the works</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Evidence that topic is covered in the toolbox meeting</td>
</tr>
<tr>
<td></td>
<td>&gt; Agenda of toolbox meeting</td>
</tr>
<tr>
<td></td>
<td>10 min for agenda</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Worker’s Safety</th>
<th>Chlorine from old pipes burning workers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; wash &amp; flush all items with water before starting work Ensure appropriate PPE to prevent acid burns</td>
</tr>
<tr>
<td></td>
<td>&gt; Set up procedures so that you can respond to chlorine burns:</td>
</tr>
<tr>
<td></td>
<td>&gt; The toolbox meeting should highlight the risks of chlorine and what to do if chlorine has reached the skin.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BAM</th>
<th>Through out the works</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; Evidence that topic is covered in the toolbox meeting:</td>
</tr>
<tr>
<td></td>
<td>&gt; Photo of workers before the work starts:</td>
</tr>
<tr>
<td></td>
<td>&gt; Copy of Chlorine procedures.</td>
</tr>
<tr>
<td></td>
<td>&gt; Agenda of toolbox meeting:</td>
</tr>
<tr>
<td></td>
<td>&gt; Keep photos</td>
</tr>
<tr>
<td></td>
<td>10 min for agenda</td>
</tr>
<tr>
<td>Topic</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>Worker's Safety</td>
<td>Chlorine leaking into the environment from the old pipes or from construction</td>
</tr>
<tr>
<td>Water quality</td>
<td>cement powder containing water</td>
</tr>
<tr>
<td>Handling and Storage of Construction Materials and Wastes</td>
<td>Waste Management of Chlorine filled pipes</td>
</tr>
<tr>
<td>Land clearance</td>
<td>Chopping Trees of Community Value at the laydown area at Mile 13 (Use of the land was given originally with the idea that the community values trees were kept)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Land/vegetation clearance</td>
<td>Removal of scrubs and small trees</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Public health and temporary workers influence and interaction within the communities leading to increase conflict and disease</td>
</tr>
</tbody>
</table>

**ESMP for Works Package 5**

<table>
<thead>
<tr>
<th>Category</th>
<th>Impacts</th>
<th>Mitigations</th>
<th>Action Party</th>
<th>Schedule</th>
<th>Monitoring Part</th>
</tr>
</thead>
</table>

33
| Abandoned water mains/pipes | Abandoned pipelines can create safety hazards and environmental problems. They effectively create underground voids, which can cause subsidence, soil destabilisation, and water ingress as well as breeding space for rodents | When water mains are abandoned they shall be physically severed from the network. Abandoned mains shall be grouted. | BAM | Through out the works | Visual inspection, construction documents review (post-decommissioning survey/monitoring programme) |
Asbestos cement pipes management | Removal of AC pipes involving cutting and demolition can release asbestos fibres into the air, posing risks to public health. | If asbestos is located on the project site, mark clearly as hazardous material When possible the asbestos will be appropriately contained and sealed to minimize exposure The asbestos prior to removal (if removal is necessary) will be treated with a wetting agent to minimize asbestos dust Asbestos will be handled and disposed by skilled & experienced professionals If asbestos material is to be stored temporarily, the wastes should be securely enclosed inside closed containments and marked appropriately The removed asbestos will not be reused. Joint Asbestos Management approach between FCC, GVWC and the EPC | BAM/GVWC/FCC | Through out the works | Visual inspection, construction documents review (H&S plan, post-decommissioning survey/monitoring programme |

<table>
<thead>
<tr>
<th>Category</th>
<th>Impacts</th>
<th>Mitigations</th>
<th>Action Party</th>
<th>Schedule</th>
<th>Monitoring Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive manual handling (DN150 Ductile Iron Pipe) when installing transmission lines from weir sites to road</td>
<td>Install DN150 transmission lines from weir sites to road</td>
<td>• Temporary works systems to be developed to minimise the effects of manual handling through difficult terrain. Mechanical lifting to be utilised when working in accessible areas.</td>
<td>BAM</td>
<td>Through out the works</td>
<td>Visual inspection, construction documents review (H&amp;S plan)</td>
</tr>
<tr>
<td>Clearing path from weir site to the road</td>
<td>The clearance of the existing path allowing materials and equipment to be taken to the weir site can increase risk of encroachment</td>
<td>Monitoring of the signage of the vegetation of interest. Control of the final plantation control of the defined environmental restoration. MoWR, EPA and NPAA Rangers to Convert the buffer zone into Protected area to ensure the water source at the weir is not at risk of pollution from encroachers EPA to monitor the track during and after BAM works.</td>
<td>EPA/NPAA/GVWC</td>
<td>Through out the works</td>
<td>Visual inspection, construction documents review and water quality testing downstream</td>
</tr>
<tr>
<td>Water pollution at the weir site and downstream</td>
<td>Risk of downstream contamination from construction materials, oil, fuels, wastes, etc. Alteration of the hydrogeomorphology of the fluvial bed at river and stream crossing points</td>
<td>Remove all construction waste from the weir to the road. Encourage the use of local materials (i.e. rocks from the site to fill in gabions) and limit the use of concrete and cement.</td>
<td>ATK/BAM</td>
<td>Through out the works</td>
<td>Visual inspection, construction documents review and water quality testing downstream</td>
</tr>
<tr>
<td>Encroachment</td>
<td>Land grabbing in the catchment area at Mortem and Mongegba can generate pollution at the water source</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Inter-governmental collaboration between, MoWR, NPAA, MoLP, EPA and GVWC to modify land use at the weir area from buffer zone to protected area.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• GVWC to collaborate with Tacugama Rangers to protect the area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fence access from the road to limit encroachment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Community engagement with neighboring communities to reduce encroachment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPA/NPAA/GVWC</td>
<td>Through out the works</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visual inspection, construction documents review</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11. INSTITUTIONAL CAPACITY AND STRENGTHENING PLAN

11.1 Institutional Arrangements

The successful implementation of this ESMP depends on the commitment and capacity of various institutions and stakeholders to implement the ESMP effectively. Thus, the arrangement as well as the roles and responsibilities of the institutions and persons that will be involved in the implementation monitoring and review of the ESMP are discussed below.

**Guma Valley Water Company**
Implementing Agent and Client. Supporting the ESHIA and ESMP process. Will take over use, management and maintenance after the contract has been completed. Their responsibilities include:

- Monitor ESMP and RAP implementation and ensure adequate environmental and social mitigation measures are implemented based on requirement standards, including Contractors and sub-contractors
- Ensure adequate stakeholder engagement plan is being implemented throughout the project implementation and operation including effective grievance redress mechanisms
- Liaise with all key stakeholders at government and CSO level throughout the project

**Department for International Development, UK**

- Funding the rehabilitation of the water supply project which does not include funding for resettlement.
- Providing the oversight and supervision of the overall NEC contract. Also hold responsibility for the supervision of the resettlement action plan and construction supervision.

**Government of Sierra Leone**
Funding the compensation of any resettlement due to the project construction and rehabilitation activities.

**Environmental Protection Authority**

- Approval of the ESHIA and ESMP documentation and in charge or issuing Environmental Licences as well as ensuring compliance with the ESMP.
- Will undertake auditing and enforcement of the licenses and may require access to the sites and monitoring data to provide external monitoring reports for the project

**Mott MacDonald**

- Holds a contract with DFID to deliver the Resettlement Action Plan (RAP) and Construction Supervision.
- As the Resident Engineering they will hold the responsibility for the ensure the correct implementation of the ESMP.

**Atkins**
The engineering firm that is in charge of the design phase of the project which is meant to consider the environmental and social aspects in their detailed designs.
BAM Nuttall Ltd

UK Construction Contractor that will construct the works. As the Contractor, it is their responsibility to undertake the mitigation and monitoring measures specified in the ESMP by developing a Construction Environmental Management Plan (CESMP) with its sub-management plans and are committed to;

- Complying fully with the Environmental Licenses issues by the EPA
- Complying with Sierra Leone laws relevant to the employment of labour, health and safety, Environment and other safeguarding policies relevant to the project
- Abiding by the contractual requirements regarding Environmental protection and social responsiveness
- Minimizing the effects of construction on the environment and social aspects by ensuring implementation of the required mitigation and monitoring measures and undertaking period reviews and reporting
- Integrating good environmental and social principles into all aspects of the construction works
- Promoting a high level of environmental and social awareness within BAM, suppliers, subcontractors and labour agencies
- Ensure that the EPA has access to the site and monitoring data when required for monitoring and enforcement.

Labour Agency

Finding and employing of the labour workforce required for this project. The workers employed by this agency will need to follow the instruction of the ESMP, however BAM will communicate this to them through the measures included in the ESMP. BAM will need to ensure that the contracts covers health and safety, social and environmental aspects. Their responsibilities:

- Following the directions and advice including information from the toolbox meetings and signs;
- Abiding by the contractual requirements regarding Environmental protection and social responsiveness
- Minimizing the effects of construction on the environment and social aspects by ensuring implementation of the required mitigation and monitoring measures and undertaking period reviews and reporting as per directed by BAM
- Integrating good environmental and social principles into all aspects of the construction works
- Ensure a high level of environmental and social awareness
- Attend toolbox meetings

National Protected Areas Authority – Some of the project components will be located in buffer zones of protected areas and this may have indirect impacts on the project such as increase in encroachment. The NPAA manages and controls works that are undertaken within the Protected Area and Buffer Zone.
Sierra Leone Roads Authority – Manages the roads and right of way (RoW) which includes any resettlement in the RoW. The GVWC is expected to work with the GVWC to look at how best they can avoid and minimize impacts on the environment and communities along the RoW.

Sierra Leone Police – Manages traffic in Freetown and will be involved in traffic management especially where the works through laying of pipes affect traffic movement.

Ministry of Local Government and Rural Development: responsibilities includes decentralisation and other local governance reforms, specifying functions to be assigned to local councils, and coordination and implementation of national programmes.

Ministry of Lands, Planning and Environment (MLPE): responsible for conserving and managing the natural environment, land acquisition, national development in a planning capacity, management of the forestry resources, disaster risk reduction and other land, planning and environmental responsibilities.

Ministry of Labour: responsible for the management and enforcement of labour, health and safety legislation.

11.2 Capacity Building and Institutional strengthening
The GVWC has a Project Management Unit (PMU) that has staff that are trained in Environmental Management and Policy and Resettlement and Land Acquisition who have been involved in the ESHIA studies and RAP as part of capacity building and ensure ownership of the process. These staff will be responsible for ensuring implementation of the ESMP and RAP during the whole project cycle during construction, rehabilitation and operation.

However, there is need to strengthen the capacity of all everyone responsible for undertaking works relating to ESMP implementation. There will be training on the contents of the ESMP so that all have a basic level of understanding about the environmental and social factors. This shall include: what the ESMP is and the objectives; the environment and social elements around the work package areas; the potential impacts and proposed mitigate measures such as preventing inappropriate interactions with the local communities through a Code of Conduct; public and occupational health and safety. This will be augmented by

Toolbox Meetings
Site specific measures should be covered in the toolbox meetings before the work at the site begins.
This also should reiterate the initial training measures.

Specific Training
Environmental training on project specific environmental aspects will be given where required to assist staff and labour to carry out their specific tasks within the ESMP. Resources and Costs will be part of the project costs.
12.0 CONCLUSIONS AND RECOMMENDATIONS

The Freetown Water project is intended to deliver improvements to the water supply infrastructure and network in Freetown. Works will improve the reliability of the treatment processes at Water Treatment Plants both at Guma Dam and in Allen Town, rehabilitate or construction extended networks in the city, improve reservoirs, and other associated infrastructure. It is expected to deliver more reliable piped supplies of water to greater portions of the population. An ESHIA has been conducted on the impacts of the project and in general, the majority of the proposed works are expected to have minor to moderate environmental and social impacts, especially if they are designed and constructed in a manner that minimises and mitigate impacts. Examples of this include minimising the extent of above-ground pipelines, installing pipes to avoid resettlement and engaging with affected people properly, among others.

Temporary impacts may be significant in some areas though, especially in densely populated, congested, and highly trafficked areas. Many of these impacts can be mitigated by having a detailed Construction Environmental Management Plan for the project which is followed by the contract, and detailed traffic management plans. Adequate communication and community engagement is a must that GVWC must prioritise with the support of the EPC Contractor. Works that have some significant permanent environmental impacts are associated with: Works relating to bat colonies at GVWC Intake Tower access tunnel; Works in the Western Forest National Park or its buffer zone - related to the construction of two weirs at Mortem and Mongegba; Works requiring handling and disposal of hazardous materials – associated with asbestos cement pipe decommissioning and replacement. The impacts are mostly site specific and the ESMP developed for the project provides adequate mitigation measures that includes requirement of a CESMP and sub-management plans before works begin. In addition a RAP that will ensure adequate compensation and relocation of PAPs will be implemented based on requirement standards applicable to the project. A comprehensive Stakeholder Engagement Plan that includes a GRM will be developed because Lack of adequate community engagement is a risk that has consistently been highlighted during focus group discussions and key informant interviews. It is therefore a must that GVWC and the EPC manage communication effectively to avoid community dissatisfaction. In general stakeholders were positive about the project. Finally, it is considered that the project has an overall positive impact on Freetown. Any permanent effects per the ESHIA assessment are expected to be site specific or local, with little or no widespread permanent impacts.

13.0 REFERENCE AND CONTACTS

African Development Bank’s Integrated Safeguards System 2013 adopted in 2014
African Development Bank’s Environmental and Social Procedures (ESAP)

For more information, please contact:

- R. LUBUNGA, Principal Water and Sanitation Officer, r.lubunga@afdb.org
- C. MHANGO, Senior Environmental Officer, c.mhango@afdb.org