PART III –
Environmental and Social Management Plan

- ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Environmental and Social Management Plan for the Kariba Dam Rehabilitation Project (Zambia and Zimbabwe) on the Zambezi River

Zambezi River Authority

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Environmental and Social Management Plan for the Kariba Dam Rehabilitation Project (Zambia and Zimbabwe) on the Zambezi River

January 2016

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For and on behalf of
Environmental Resources Management

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This report represents the Environmental and Social Management Plan (ESMP) for the proposed Kariba Dam Rehabilitation Works, specifically the rehabilitation of the plunge pool and the spillway (hereafter referred to as 'the Project'). This ESMP provides for environmental and social management, monitoring and reporting for the pre-rehabilitation and rehabilitation phases of the Project. Environmental and social management and monitoring for the ongoing operation and eventual decommissioning of the dam is not included in this ESMP, as it is assumed that this is included existing Standing Operations Procedures for managing the dam and reservoir.

This ESMP provides:

- An overview of the Environmental and Social Management System (ESMS) under which the environmental and social impacts of the Project will be managed;

- The policy, legislation, guidelines and standards against which environmental and social aspects need to be managed;

- The institutional arrangements required for governance, implementation, monitoring and reporting;

- A description of the range of management plans required for the management of environmental, social, and health and safety aspects as a result of rehabilitation works;

- The specific monitoring plans provided in the Environmental and Social Management Plans; and

- An estimate of the costs of implementing the Environmental and Social Management Plans.

Each individual Management Plan outlines proposed mitigation measures in accordance with proposed performance criteria for specified acceptable levels of environmental and social performance. The Management Plans identify:

- Environmental and social objectives that the management plan aims to achieve;
- Person responsible for implementation;
- Performance criteria;
- Mitigation strategies;
- Relevant monitoring requirements; and
- Reporting and corrective action requirements.

The Management Plans included in the overall ESMP include:

- Noise and Vibration Management Plan

- Air Quality and Dust Management Plan
- Soil Erosion and Sediment Control Management Plan
- Waste Management Plan
- Dangerous Goods and Hazardous Substances Management Plan (Including Storage of Explosives)
- Surface Water Quality Management Plan
- Aquatic Ecology Management Plan
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- Blasting Management Plan
- Emergency Preparedness Plan
- Dam Safety

The total estimated cost for implementation of environmental and social management commitments (including monitoring) is estimated at US$ 2,225,000.00.

1 OVERVIEW

1.1 INTRODUCTION

This report represents the Environmental and Social Management Plan (ESMP) for the proposed Kariba Dam Rehabilitation Works, specifically the rehabilitation of the plunge pool and the spillway (hereafter referred to as 'the Project'). This ESMP provides for environmental and social management, monitoring and reporting for the pre-rehabilitation and rehabilitation phases of the Project. Environmental and social management and monitoring for the ongoing operation and eventual decommissioning of the dam is not included in this ESMP, as it is assumed that this is included existing Standing Operations Procedures for managing the dam and reservoir.

1.2 STRUCTURE OF THE ESMP

This ESMP provides:

- An overview of the Environmental and Social Management System (ESMS) under which the environmental and social impacts of the Project will be managed;
- The policy, legislation, guidelines and standards against which environmental and social aspects need to be managed;
- The institutional arrangements required for governance, implementation, monitoring and reporting;
- A description of the range of management plans required for the management of environmental, social, and health and safety aspects as a result of rehabilitation works;
- The specific monitoring plans provided in the Environmental and Social Management Plans; and
- An estimate of the costs of implementing the Environmental and Social Management Plans.

Each individual Management Plan outlines proposed mitigation measures in accordance with proposed performance criteria for specified acceptable levels of environmental and social performance. The Management Plans identify:

- Environmental and social objectives that the management plan aims to achieve;
- Person responsible for implementation;
- Performance criteria;

- Mitigation strategies;
- Relevant monitoring requirements; and
- Reporting and corrective action requirements.

The structure of the Management Plans is outlined in *Table 1.1*.

Table 1.1 Management Plan Structure

Aspect/Impact	The aspect or impact that needs to be managed in order to minimise the impact on the biophysical and socioeconomic environment.
Responsibility	The party responsible for implementing the management plan.
Objective	The management objective that applies to each aspect or impact.
Performance Criteria	Measurable performance criteria (outcomes) for each element.
Mitigation Measure	The strategies, tasks or action program (to nominated operational design standards) that will be implemented to achieve the performance criteria.
Monitoring	The monitoring requirements to measure actual performance (i.e. specified limits to pre-selected indicators of change).
Auditing	The auditing requirements to demonstrate implementation of agreed environmental mitigation measures and compliance with agreed performance criteria.
Reporting	Format, timing and responsibility for reporting and auditing of monitoring results.
Corrective Action	The action (options) to be implemented in case a performance requirement is not reached and the person responsible for that action (including staff authority, responsibility and management structure).

1.3 PURPOSE AND OBJECTIVES OF THE ESMP

The ESMP has been prepared to cover the activities associated with the Kariba Rehabilitation Works. The purpose of this ESMP is to outline appropriate management strategies and actions in order to meet acceptable levels of environmental and social performance. The purpose is also to provide a basis for an on-site environmental and social manual for staff, maintenance personnel, contractors and consultants with responsibilities for the Project.

The objective of the ESMP is to provide:

- Environmental and social management procedures and mitigation measures for the control of impacts of the Project to ensure that environmental and social requirements are specified and complied with;

- Environmental and social performance indicators, monitoring requirements and review procedures for the Project activities;

- Government authorities, stakeholders and proponents with a common focus for approvals and compliance with relevant policies, approvals, licences, agreements, legislation and other requirements; and
- The community with evidence that the environmental and social management of the Project is acceptable.

The Zambezi River Authority (ZRA) will have ultimate responsibility for implementing the ESMPs.

1.4 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

The ESMP consists of a series of plans and components outlining management measures to address different impacts throughout the life of the Project.

An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders (see *Figure 1.1*). Drawing on the elements of the established business management process of "plan, do, check, and act," the ESMS entails a methodological approach to managing environmental and social risks and impacts in a structured way on an ongoing basis. A good ESMS appropriate to the nature and scale of the project promotes sound and sustainable environmental and social performance, and can lead to improved financial, social, and environmental outcomes.

The main elements of this approach comprise the following:

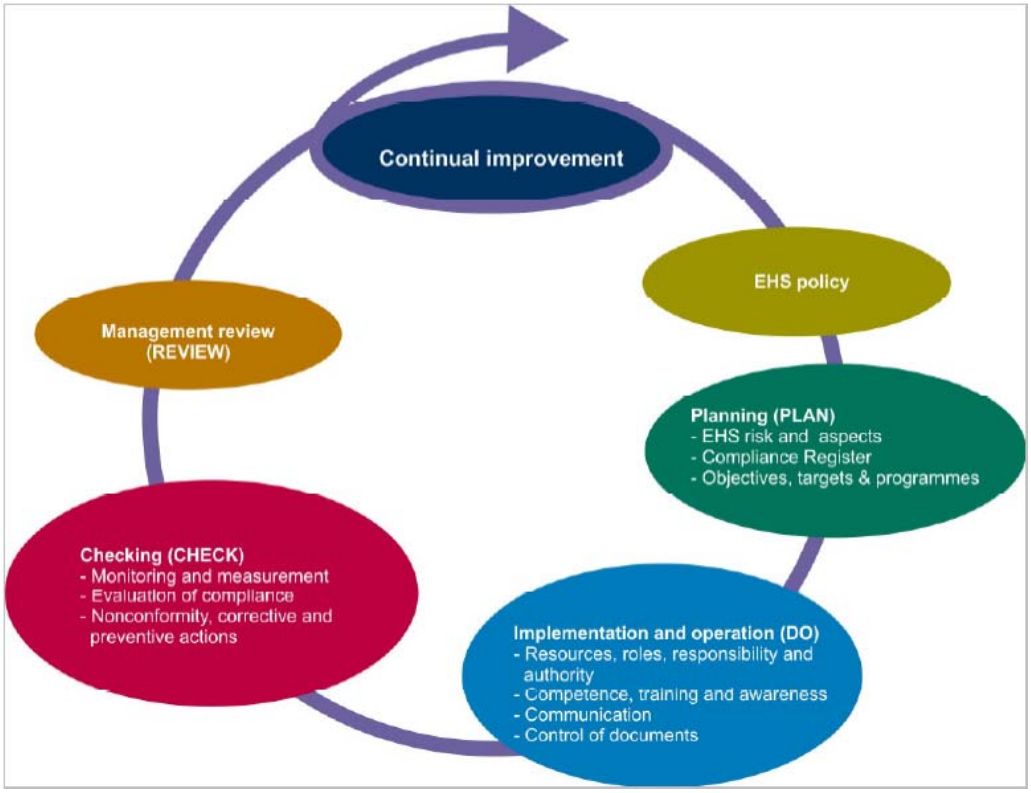
- **Planning**: Establishing actionable steps and key performance indicators, necessary to deliver results in compliance with regulations and obligations.

- **Doing**: Implementation of actionable steps, and assigning responsibilities for undertaking or implementing these requirements.

- **Checking**: Monitoring and measuring performance against key performance indicators, and other requirements, and reporting of the results.

- **Acting**: Taking actions to continually improve performance of the ESMP through the training of personnel and auditing of results.

Figure 1.1 Elements of an Environmental and Social Management System



1.5 ZAMBEZI RIVER AUTHORITY (ZRA) MISSION, VISION, VALUES AND POLICY

The development of the ESMS has been guided by the overall ZRA mission, vision, values and social corporate policy (refer to the boxes below). These are high-level corporate statements of intent and establish the principles to be followed in the management of environmental and social issues. The ZRA mission, vision, values and social corporate policy therefore constitute the framework against which all related activities should be judged.

ZRA MISSION, VISION AND VALUES

Mission – the ZRA commits themselves to satisfying all stakeholders through purposefully and sustainably exploiting the natural advantages offered by the Zambezi River.

Vision – to be a dynamic and vibrant organisation, inspired by the passion to harness and manage the Zambezi waters for socio-economic development.

Values – fairness, transparency, integrity, respect, health and safety and professionalism.

ZRA SOCIAL CORPORATE RESPONSIBILITY

As part of its Social Corporate Responsibility, ZRA has a social contract with the society in which it is operating. As a corporate citizen, ZRA defines this social contract by giving back to the community in which it operates and resides. As an institution, the ZRA believes that a satisfied human resource translates into multiplied productivity. The authority has therefore a policy to integrate social and environmental concerns in its business operations and also in its interaction with the stakeholders (both internal and external) and on a voluntary basis. As such, the Authority is cognizant of its stakeholders' welfare through enhanced health, social and economic programmes which benefit all stakeholders.

This ESMS and management plans support the commitments made by the ZRA.

2 SUMMARY OF PROJECT DESCRIPTION

2.1 OVERVIEW

The Kariba Dam is a double curvature concrete arch dam located at 16°31′18″S 28°45′41″E in the Kariba Gorge of the Zambezi River Basin between Zambia and Zimbabwe (*Figure 2.1*). The arch dam was constructed between 1956 and 1959 together with two separate hydropower plants one on the Zambian side and one on the Zimbabwean side of the Zambezi River.

Water is released from the reservoir through six sluice gates located approximately 80 m above the river level downstream of the dam. In the first 20 years after the dam was constructed there were sustained heavy spillage episodes resulting in erosion of the bedrock to 80 m below the normal water level. This area is known as the 'Plunge Pool'. The plunge pool represents a risk to the stability of the dam wall and therefore risk of a flood event and reduced operating capacity of the dam.

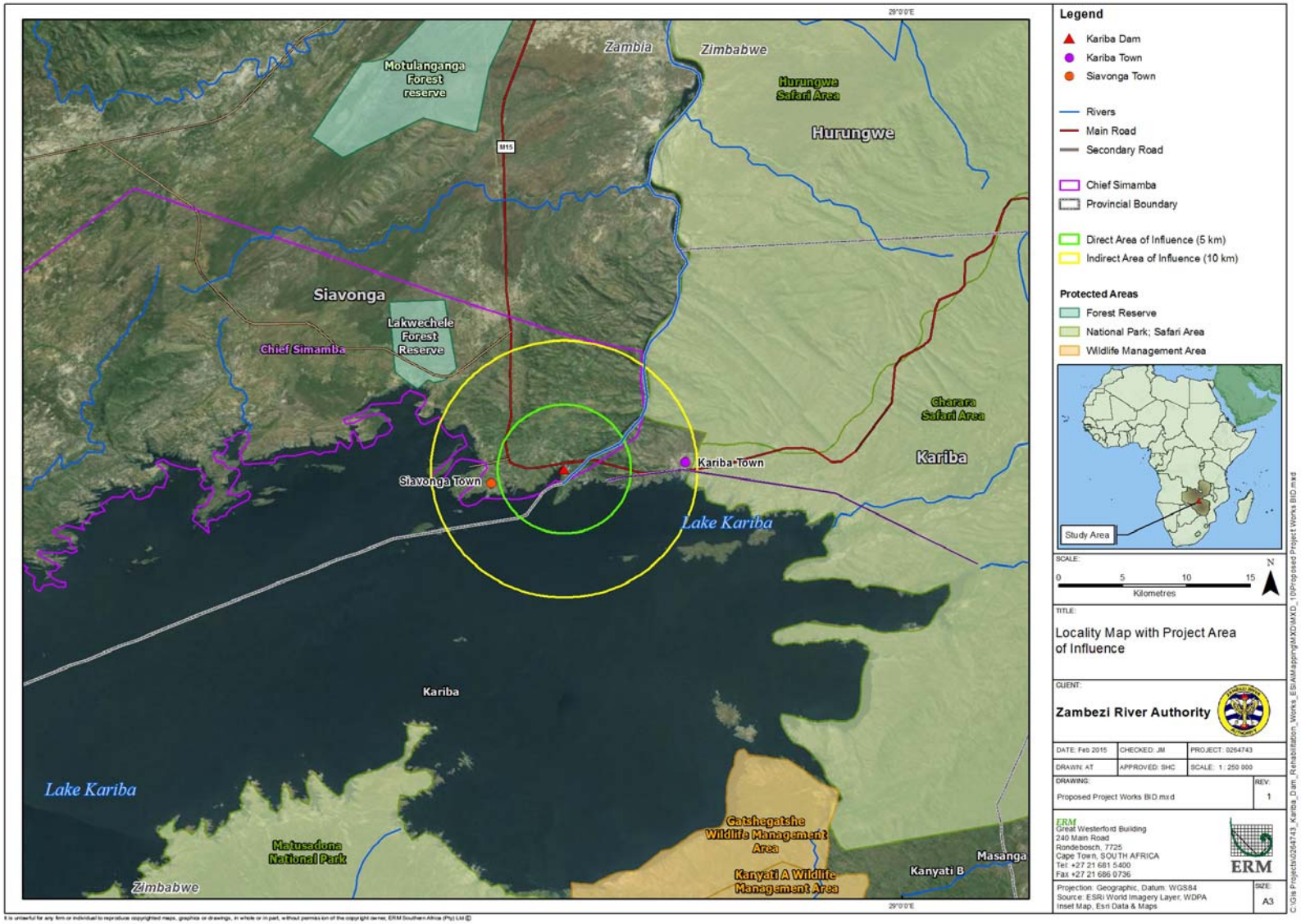
Failure to implement remedial measures to the plunge pool will result in the failure to operate the reservoir as expected (i.e. at a reduced capacity) and an increase in the risk of dam wall failure. A scenario where the dam wall fails will release a flood event of a total 273 km^3 resulting in a major loss of life as the flood plain is home to approximately three million people; loss of livelihoods (socio-economic activities); environmental degradation; and a loss of main source of power to the region. Therefore it is necessary to implement the remedial action to avoid such an event.

Apart from the need to reshape the plunge pool, there is also a need to rehabilitate the six sluice gates that make up the spillway. The work needed within the sluices is associated with the refurbishment of the concrete surface of all sluices which have been distorted over the years due to an advanced alkali-silica reaction. Without functional sluices the reservoir level cannot effectively be maintained to take into account the flood regime of the Zambezi River. Without the ability to release water from the reservoir, there is a danger of the reservoir being too full prior to a flood event, and the subsequent flood event causing over topping of the dam wall which could lead to dam failure.

The aim of the Kariba Dam Rehabilitation Works is to improve the stability of the plunge pool through reshaping its profile. This will limit the preferential erosion towards the foundations of the dam along zones of weak rock. The project also aims to rehabilitate the six sluice gates of the spillway, enabling the ongoing use of the spillway function to manage the reservoir levels.

The two key components of the rehabilitation works, namely the reshaping of the plunge pool reshaping and the spillway rehabilitation, are discussed in more detail in the next sections.

Figure 2.1 Locality of the Kariba Dam Rehabilitation Works



2.2 *RESHAPING OF THE PLUNGE POOL*

2.2.1 *Key Works*

The reshaping of the plunge pool is made up of a number of activities. These include the following:

- Establishment of general construction site, including construction camp for workers, workshops, lay down area, batching plants etc.;
- Transport of construction materials to the site;
- Management of spill before and during the rehabilitation works;
- Construction of an access road into the plunge pool area;
- Construction of the access road to construct the cofferdam;
- Construction of the cofferdam;
- Pumping of water from the cofferdam downstream;
- Blasting and excavation of the plunge pool;
- Removal of rock from the plunge pool via blasting and loading to trucks;
- Transport of waste rock from plunge pool to waste rock dumpsite;
- Disposal of waste rock; and
- Site clean-up and rehabilitation.

2.2.2 *Timing of Plunge Pool Reshaping*

The schedule will depend on the spillage duration governed by the specific hydrological conditions during the works. The preferred option is to allow a three phase works schedule, known as Alternative Scenario 3 (Tractebel Engineering (France) and Coyne et Bellier, 2012). Based on this alternative scenario the on-site works to reshape the plunge pool are estimated to take about three and a half years to complete. This will be finalised during the Scoping Phase.

2.3 *REHABILITATION OF THE SPILL WAY*

Apart from the need to reshape the plunge pool, there is also a need to rehabilitate the six sluice gates that make up the spillway. The work needed on the sluices is associated with the refurbishment of the concrete surface of all sluices. The surfaces have been distorted over time due to an advanced alkali-silica reaction. Without functional sluices the reservoir level cannot effectively be maintained to take into account the flood regime of the Zambezi River. Without the ability to release water from the reservoir there is a danger of the reservoir being too full prior to a flood event. Therefore if a flood event occurs causing over topping of the dam wall, the potential for dam failure exists.

2.3.1 Key Works

Refurbishment of the sluice gates will include the following activities:

- Establishment of a general construction site, including construction camp for workers, workshops, lay down area, batching plants etc.;
- Upgrade of access road to slipway;
- Transport of construction materials to the site;
- Dredging of material to deepen the slipway channel below the water level and disposal of the dredge material;
- Upgrade of the slipway to allow for the assembly of the cofferdam required for the refurbishment;
- Assembly of the cofferdam and floating to and installation on the dam wall;
- Dewatering of sluice gate and concrete works within the sluice gate chambers;
- Waste management; and
- Site clean-up and rehabilitation.

2.3.2 Timing of the Spillway Rehabilitation

The schedule will depend on the spillage duration governed by the specific hydrological conditions during the works. The on-site works to refurbish the spillway will be performed after the plunge pool reshaping.

The works will start with the site installations, the upgrading of the slipway and the associated access roads. The refurbishment of one sluice takes one year from the installation of the temporary cofferdam to its removal. The cofferdam is successively transferred from one sluice to the adjacent one. It expected that total works will take eight years to complete.

3 ADMINISTRATIVE FRAMEWORK

This *Chapter* presents a summary of the following national and international legal requirements and standards relevant to this ESMP –

- Zambian Legal Requirements and Standards (refer to *Zambian Legal* ***REQUIREMENTS AND STANDARDS APPLICABLE TO THIS ESMP***
- Table 3.1)
- Zimbabwean Legal Requirements and Standards (refer to *Table 3.2*)
- International Guidelines and Standards (refer to *Table 3.3*), including –

    - World Bank Group Operational Policies
    - International Finance Corporation (IFC) Performance Standards
    - International Finance Corporation (IFC) Environmental, Health and Safety (EHS) Guidelines
    - African Development Bank Group's Integrated Safeguard System and Operational Safeguards

It should be noted that the IFC EHS Guidelines do not only address the EHS expectations of the IFC, but also that of the World Bank group's.

This *Chapter* provides a brief summary of these various legal requirements, standards and guidelines and describes the applicability of these to this ESMP.

PLEASE NOTE:

This Chapter does not make mention of the following International Guidelines and Standards –

- IFC Performance Standard (PS) 5 - Land Acquisition and Involuntary Resettlement
- IFC Performance Standard (PS) 7 - Indigenous Peoples

- African Development Bank Operational Safeguard (OS) 2 – Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation

These International Guidelines and Standards have not been included in this ESMP because the Kariba Dam Rehabilitation Project will not result in the direct or economic resettlement of any persons. Moreover, the IFC PS 7 has not been included as the local communities are not considered to be an indigenous group.

Although this Project will not result in any resettlement at this stage, if needed, a Resettlement Policy Framework is attached to *Annex B*.

3.1 ZAMBIAN LEGAL REQUIREMENTS AND STANDARDS APPLICABLE TO THIS ESMP

Table 3.1 Zambian Legal Requirements and Standards Applicable to this ESMP

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
General Environmental Management	The Zambian Environmental Management Act (Act 12 of 2011)	Section 4 mentions that every person living in Zambia has the right to a clean, safe and healthy environment and should a person is threatened or is likely to be threatened as a result of an act or omission of any other person, bring an action against the person whose act or omission is likely to cause harm to human health or the environment. Moreover, Section 5 states that every person has a duty to safeguard and enhance the environment. Part IV (Division 1) contains provisions for pollution control including protection of the atmosphere (Section 31), environmental emergency preparedness (Section 41) and regulations around pollution control (Section 43). This ESMP has taken these provisions into account.
	The Environmental Impact Assessment (EIA) Regulations, which fall under the EPPCA (Statutory Instruments No. 28 of 1997)	These Regulations provide the framework for conducting an Environmental Impact Assessment (EIA) and requires that an Environmental Management Plan (EMP) be developed that is in support of the EIA. In this respect an ESMP (this document) has been developed.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Permits	The Environmental Management (Licensing) Regulations, S.I. No. 112 of 2013	The Regulations were published under the Zambian Environmental Management Act (Act 12 of 2011) and provide for licensing and management requirements for – • **Air Pollution Monitoring Permits** – under the Air Pollution Control (Licensing and Emission Standards) Regulations, 1996 • **Water Effluent Discharge Permits** – under the Water Pollution Control (Effluent and Wastewater) Regulations, 1993 • **Waste Management Licenses** – under the Waste Management (Transporters of Waste/Operation of Waste Disposal Sites) Regulations, 1993 Hazardous Waste Management Regulations, 2001 • **Pesticides and Toxic Substances Licences** – under the Pesticides and Toxic Substances Regulations, 1994 These specific permits/licenses will need to be considered as Part of final Project Design.
Water	Water Resources Management Act, No 21 of 2011	Part V (Water Quantity and Quality Management), Section 46 mentions that discharge into a water resource shall be done in accordance with the Environmental Management Act, 2011. According to Section 71 (activities where water permits may be required), a person who intends to carry out activities identified in this Section shall apply for a permit and pay such charges, for the use of the water, as may be prescribed. It is the understanding of this process that a water permit will not be necessary for this Project. In accordance to Section 149 (Part XIV), all significant spills to a water course must be reported to the police, appropriate authorities (including conservation authorities), catchment council and local authority. Such management measures have been considered in this ESMP, particularly to the Zambezi River downstream of Kariba Dam.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
	The Zambian Environmental Management Act (Act 12 of 2011)	Division 2, Sections 45 to 48 of the Act make considerations for water resources. More specifically, Section 46 states that a person shall not discharge or apply any poisonous, toxic, eco-toxic, obnoxious or obstructing matter, radiation or other pollutant, or permit any person to dump or discharge such matter or pollutant into the aquatic environment in contravention of water pollution control standards.
Terrestrial Ecology	Zambia Wildlife Act, No. 12 of 1998	Part VI (Game Animals and protected Animals) includes provisions for game and protected animals. More specifically Section 31 of Part VI states that any person who hunts any game or protected animal, except under or in accordance with the conditions of a valid license issued under Part VII of this Act, shall be guilty of an offence. This is further reiterated in Section 67 of the Act. Notwithstanding anything of the contrary of the Act, Section 78 of Part IX states that a person may kill any wild animal in defence of himself or in defence of any other person if it is necessary – provided that nothing in the Act shall exonerate any person, who at the time of killing any wild animal in self-defence or in defence of any other person, was committing an offence under the Act. Should such a kill take place, the person who killed the animal shall, within a period of forty eight hours, make a report of the facts to the nearest proper officer. In accordance with Section 80 of the Act, any person who kills any game animal or protected species through accident or error shall within a period of fourteen days make a report of the act to nearest proper officer. As the Kariba Dam Rehabilitation Project will be in relatively close proximity to Protected Areas, management/mitigation commitments for the protection of terrestrial fauna are included in *Section 6.2.2*.
	The Zambian Environmental Management Act (Act 12 of 2011)	Section 77 (2) of Division 8 of the Act states that no person shall place any invasive alien species into any element or segment of the environment. Moreover, Section 78 states that an occupier of any land shall take such measures as are prescribed and are reasonably necessary for the eradication or prevention of the spread of invasive alien species. The control of alien species has been considered in *Section 6.2.2* of this ESMP.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Aquatic Ecology	National Policy on Wetlands Conservation, September 2001	This Policy was formulated in response to the fragmented sectoral policies and Acts. It aims to provide a holistic programme of action to promote the conservation and wise use of wetland ecosystems. It acknowledges the importance of wetland ecosystems in Zambia in providing major fisheries and as important habitats for various wildlife species. The management of surface water quality, aquatic environments (including aquatic vegetation) and terrestrial ecology (including fauna utilising wetland habits) is provided in *Sections 6.1.3*, *6.2.1* and *6.2.2* respectively. These plans have considered the provisions of this National Policy.
Noise	Part IV of Zambian Environmental Management Act (Act 12 of 2011)	Section 68 of Division 6 (Part IV) of the Act states that person shall not emit noise in excess of the noise emission standards established.
	Zambian Noise Standards	There are no Zambian standards yet for noise and the World Health Organisation, World Bank or donor country standards apply. The Authorities are still developing noise standards, and regulations are in draft. A noise and vibration management plan is presented in *Section 6.1.1*. This plan has taken this into consideration.
Air Quality	Part IV of Zambian Environmental Management Act (Act 12 of 2011)	Section 52 of Division 3 (Part IV) of the Act states that ambient air quality standards and guidelines shall be established under this Division and published.
	Section 37, 46 and 96 – The Air Pollution Control (Licensing and Emission Standards) Regulations, S.I. 141 of 1996	This regulation provides a table of guideline limits for ambient air quality pollutants including Sulphur Dioxide, Total Suspended Particulate, Particulate Matter, Carbon Monoxide, Ambient Lead and Dust Fall. An air quality management plan is presented in *Section 6.1.2*. This plan has considered these regulations and associated ambient air quality standards.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Explosives	Explosives Act (No 10 of 1974) Regulations are in draft stage.	Section 3 of the Act states that the Act shall apply (amongst others) to the, storage, use, possession and transportation of explosives. Part I of the Act provides general measures for the storage, handling and use of explosives. Part III includes provisions for the transportation of explosives by waterway, road, rail or air; and Part IV includes provisions for the transportation of explosives around the work site. Part V includes provisions for the storage of explosives at the work site and Part VIII includes requirements for the use of explosives. *Section 0* presents blasting management measures. The development of these measures and detailed design around blasting management for the Kariba Dam Rehabilitation Project has and will take these requirements into consideration.
Health	Factories Act (Chapter 441 of the Laws of Zambia) (as amended by Statutory Instrument (S.I.) No. 165 of 1989, No. 75 of 1990, and Act No. 13 of 1994).	The Factories Act is intended to make further and improved provision for the regulation of the conditions of employment and regards the safety, health and welfare of persons employed therein. Part V (Health: General Provisions) of the Act includes provisions around cleanliness, overcrowding, ventilation, lighting and sanitary requirements for employees and Part VI (Safety: General Provisions) includes provisions for the use of machinery, training, facilities, precautions for the use of explosives, emergency drill training requirements for employees. Moreover, Part IX includes provisions for the welfare of employees, including provisions for drinking water, washing facilities, accommodation and change rooms, first aid and resting facilities. Section 71 of Part X includes requirements for provision of Personal Protective Equipment (PPE) and additional health and safety and welfare measures. *Section 6.3.9* (Worker Health and Safety) have considered the provisions included in this Act.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Roads and Traffic Safety	Roads and Road Traffic Act (Cap 464)	Part III and IV of this Act include provisions for the registration and licensing of motor vehicles and trailers. Such provisions include ownership details, vehicle/trailer specifications, etc. Moreover, Part V includes the requirements for the licensing of drivers of motor vehicles and Part VII includes the provisions for third part insurance. The Act stipulates that no person shall drive a motor vehicle on a road unless he is the holder of a valid licence issued to him in respect of motor vehicles of the class concerned. The Act provides the minimum age limits associated with driving of vehicles on roads. Part VI includes the provisions for motor vehicle insurance against third party. Part XI includes the provisions for road safety and driving offences (speed limits, reckless driving, driving under the influence, driving behaviours, vehicle emissions, littering etc.). *Sections 6.3.7*and *6.3.8* presents the Road Safety Management Plan and Traffic and Transport Management Plan. The provisions of this Act have been included in these.
Cultural Heritage	National Heritage and Conservation Act, 1989	Part V of this Act (Conservation of Heritage) states that (Section 35) any person who wishes to destroy, demolish, alter or remove from its original site any monument, relic or ancient heritage shall apply for permission to the Commission. Moreover, Section 37 states that any person who desires to excavate any ancient heritage or collect relics shall apply to the Commission for permission. In accordance with Section 42, any person who discovers a potential ancient heritage or relic shall report the find to the commissions and suspend operations in the immediate vicinity to the discovery. *Section 6.3.11* presents the Cultural and Heritage Management Plan including a Chance Find Procedure, which has considered the provisions of this Act.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Employment	Citizens Economic Empowerment Act No 9 of 2006	Provides for the encouragement and support of citizens of Zambia to get involved in business activities for wealth creation and support of livelihoods. More specifically, Part II of the Act provides measures for economic empowerment including (amongst others) the prohibition of discrimination, skills development, education and training, preferential procurement, regional development, codes of good practice and mechanisms for measuring progress. This ESMP provides measures to ensure that the Kariba Dam Rehabilitation Project provides opportunities to Zambian citizens. These provisions are included in the Procurement of Good and Services Management Plan (*Section 6.3.6*) and the Employment and Training Management Plan (*Section 0*).

3.2 ZIMBABWEAN LEGAL REQUIREMENTS AND STANDARDS APPLICABLE TO THIS ESMP

Table 3.2 Zimbabwean Legal Requirements and Standards Applicable to this ESMP

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
General Management Requirements	Constitution of Zimbabwe Amendment Act (No. 20 of 2013), Section 73 (Environmental Rights)	According to Section 73 of the Constitution of Zimbabwe, every person has a right to an environment that is not harmful to their health or well-being and to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures. Other than Section 73, the current Constitution has no specific clause that provides for the protection of the environment. The objective of this ESMP is to ensure for the protection of the environment and associated key natural socio-environmental resources.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
	The Environmental Management Act (the Act) (Chapter 20:27), No. 13 of 2002	This Act aims to provide for the sustainable management of natural resources and protection of the environment; [and] the prevention of pollution and environmental degradation. Section 4 the Act affords all citizens of Zimbabwe the right to live in a clean environment that is not harmful to their health; access to environmental information; the right to protect the environment for the benefit of present and future generations; and the right to participate in the implementation of legislation and policies that prevent pollution and environmental degradation and promote the sustainable management and use of natural resources, as well as justifiable economic and social development. The Act also includes provisions for aspects including (amongst others) water, air, waste, hazardous wastes, noise, toxic substances, wetlands and control of invasive plant species. These provisions will be discussed in the relevant sections below. This ESMP has taken these provisions into account.
	Environmental Management (Environmental Impact Assessments and Ecosystems Protection) Regulations, SI No. 7 of 2007	The Environmental Management Regulations deal with the regulation of the EIA process and the protection of ecosystems. Part 11 of the Act stipulates that no industrial project shall be implemented without an EIA having been done. In this respect an ESIA and associated ESMP (this document) has been developed. The Project will not go ahead until approval is sort from the Zimbabwean and Zambian Environmental Management Agencies.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Water	Water Act, 2003 (Chapter 20:24)	Section 67 of the Act states that water resource management needs to be consistent with environmental approaches and due consideration should be given to the protection, conservation and sustenance of the environment; and the right of access by members of the public to places of leisure or natural beauty related to water or water bodies. According to Section 69, a person who intends to discharge or dispose into a water course shall apply for a permit and pay such charges, for the use of the water, as may be prescribed. It is the understanding of this process that a water permit will not be necessary for this Project. Part IX includes provisions on the safety of dams. Namely Section 109 and 110 include requirements around procedures for emergency for any sudden or unprecedented flood or alarming or unusual circumstance or occurrence, whether anticipated or existing, which may adversely affect the dam. Such management measures have been considered in this ESMP, particularly to the Surface Water Quality Management Plan (*Section 6.1.3*) and Dam Safety Management Plan (*Section 6.4.6*).
	The Environmental Management Act (the Act) (Chapter 20:27), No. 13 of 2002	Section 57 of the Act mentions that any person, who discharges or applies any poison or toxic, noxious or obstructing matter, radioactive waste or other pollutants or permits any person to dump or discharge such matter into the aquatic environment in contravention of water pollution control standards shall be guilty of an offence. This provision has been duly noted in this ESMP.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Terrestrial Ecology	Forest Act, 1948 (Chapter 19:05)	Provides for demarcating and conserving forests and nature reserves. More specifically, Part VI (conservation of timber resources) governs the removal of indigenous trees. Prior to the removal of indigenous trees, notice of intention must be provided to the appropriate Commission. Management/mitigation commitments for the protection of terrestrial flora are included in *Section 6.2.2*. This section has considered management of forest habitats
	Parks and Wildlife Conservation Act, 1975 (Chapter 20:14)	Provides for the conservation and control of wildlife, fish and plants; and designates specially protected animals and indigenous plants. More specifically, Part IX (specially protected animals) (Section 45) and Part XII includes provisions around the hunting, removal of animals and animal products. Part X and Part XI of the Act include provisions for protected plants specified in the Seventh Schedule (insertion by Act 19 of 2001 with effect from the 1st June, 2002) and provisions for the control of picking of indigenous plants. The Terrestrial Ecology Management Plan (*Section 6.2.2*) and Revegetation and Rehabilitation Management Plan (*Section 0*) have considered the provisions of this Act.
	The Environmental Management Act (the Act) (Chapter 20:27), No. 13 of 2002	Part XIII of the Act includes provisions for the control of alien plant species. Essentially, every person has the responsibility to clear or cause to be cleared any invasive alien species growing or occurring on the land in respect of which he is responsible. The Terrestrial Ecology Management Plan (*Section 6.2.2*) and Revegetation and Rehabilitation Management Plan (*Section 0*) have considered the provisions of this Act.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Aquatic Environment	GN 380 of 2013 (Protection of Wetlands) per Section 113 of the Environmental Management Act	This Section of the Act includes provisions for the protection of wetlands in Zimbabwe. Such controls include the preservation of beds, banks; controlling stormwater; restrictions of removing clays and deposits from wetlands; reducing pollution of any kind to wetlands and restoration of wetlands. The management of surface water quality, aquatic environments (including aquatic vegetation) and terrestrial ecology (including fauna utilising wetland habits) is provided in *Sections 6.1.3*, *6.2.1* and *6.2.2* respectively. These plans have considered the provisions of this Section of the Act.
Air	Air Pollution Control Regulations SI 72, 2009	Provides for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The provisions of these regulations have been considered in the Air Quality and Dust Management Plan (refer to *Section 6.1.2*).
	The Environmental Management Act (the Act) (Chapter 20:27), No. 13 of 2002	Section 63 of the Act mentions that ambient air quality standards need to be established.
	Draft Air Quality and Emission Standards (draft number EN 005 - D977/2)	These have not been enacted; however, Section 4 of these draft standards provides ambient air quality in Zimbabwe. Moreover, Section 7 provides limit values for vehicle emissions.
Noise	The Environmental Management Act (the Act) (Chapter 20:27), No. 13 of 2002	Sections 79 to 81 (in Part IX of the Act) provide requirements around noise management. More specifically, the Act mentions the need for standards to be established for the emissions of noise and vibration pollution. Section 80 mentions that any person who emits noise in excess of the noise emission standards prescribed in terms of section seventy-nine shall be guilty of an offence. No reference to noise standards could be sourced and it appears as if these do not yet exist. This said, a Noise and Vibration Management Plan has been produced (refer to *Section 6.1.1*).

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Waste	Effluent and Solid Waste Disposal Regulations SI 6, 2007	This regulation concerns the disposal of effluent and solid wastes. Persons are prohibited from disposing waste into public water courses without initially acquiring permission. Moreover, a generator of waste (other than domestic households) is now required to produce a Waste Management Plan. The plan should deal with sound environment management of wastes. *Section 6.4.1* of this ESMP presents a Waste management Plan. Moreover, *Section 0* presents a Rehabilitation and Revegetation Plan. These plans have considered the provisions of these Regulations.
	Hazardous Waste Management Regulations SI 10, 2007	Provides for the licensing for generation, storage, use, recycling, treatment, transportation or disposal of hazardous waste. Generators of hazardous waste are also required to prepare waste management plans and targets. Regulates waste collection and management by local authorities. In addition, regulates the importation and exportation of hazardous waste and waste oils. According to this regulation, generators of hazardous waste are required to prepare waste management plans. The Waste Management Plan (*Section 6.4.1*) takes into account the management of hazardous waste.
	Plastic Bottles and Plastic Packaging Regulations, SI No. 98 of 2010	This regulation encourages a reduction in the use of certain types of plastics. According to Article 3(1), it is prohibited to produce, import or distribute plastic packaging with a thickness of less than 30 microns. The Waste Management Plan (*Section 6.4.1*) encourages minimisation of waste generation and maximisation of reuse and recycling of waste products.
	Environmental Management (Hazardous Waste Management) Regulation 10 of 2007	Regulates the handling of hazardous waste. The Waste Management Plan (*Section 6.4.1*) takes into account the management of hazardous waste.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
	The Environmental Management Act (the Act) (Chapter 20:27), No. 13 of 2002	Section 69 of Part IX of the Act mentions that no person shall discharge or dispose of any wastes, whether generated within or outside Zimbabwe, in such a manner as to cause pollution to the environment or ill health to any person. Moreover, Section 69 includes provisions for the transport and disposal of waste. Section 73 of the Act prohibits the discharge of hazardous substances, chemicals and materials or oil into the environment. The appropriate management of waste has been included in the Waste Management Plan (refer to *Section 6.4.1*).
Explosives	Explosives Act (Chapter 10:08)	Part IV of this Act includes provisions for the storage of explosives. No person shall keep explosives in or on any premises unless the premises are licensed. Moreover, Part V of the Act governs the use of explosives. Part VI provides restrictions and provisions for the transport of explosives. *Section 0* presents blasting management measures. The development of these measures has taken this Act into consideration. Moreover, detailed design around blasting management for the Kariba Dam Rehabilitation Project has and will take these requirements into consideration.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Hazardous Substances	Regulation 12 of 2007 Environmental Management Act (Hazardous Substances, Pesticides and other Toxic Substances)	The Regulation provides for the labelling, packaging, repackaging and sale of hazardous substances or articles containing hazardous substances in Zimbabwe. The Regulations prescribe conditions that employers have to observe in the handling of hazardous substances at the workplace, conditions for transporting hazardous substances, and procedures to be followed when there is an accidental spillage of hazardous substances. The Agency is empowered to issue spot fines to any person who violates the law. In addition, any person whose substances affect the environment is liable to pay for the cost of restoring the environment (i.e. the polluter pays principle). The offender is also liable to pay compensation for any damage that the offence caused to any person. The provisions of this Regulation have been considered in the Dangerous Goods and Hazardous Substances Management Plan (*Section 6.4.2*) and Emergency Preparedness Plan (*Section 6.4.5*).
Road and Traffic	Road Motor Transportation Act, 1997	The proposed Kariba Dam Rehabilitation Project will require the transport of materials and machinery into the Project Area. Part III (Section 7 to 16) of the Road Motor Transportation Act details the requirements for goods vehicles on all roads and that these vehicles/drivers need to hold an operator's license. The operator's license application needs to be assigned for a specific route. Part IV of the Act provides the requirements for the operation of foreign vehicles on Zimbabwean roads. Requirements include the provision of a foreign license. Part V includes the provisions for the inspection of vehicles and the issuance of a certificate of fitness for vehicles. *Sections 6.3.7*and *6.3.8*presents the Road Safety Management Plan and Traffic and Transport Management Plan. The provisions of this Act have been included in these.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
	Road Traffic Act (Chapter 13:11)	Part II of this Act includes the provisions for the licensing of drivers of motor vehicles and the requirements for licenses (age limits, medical examinations, etc.). The Act stipulates that no person shall drive a motor vehicle on a road unless he is the holder of a valid licence issued to him in respect of motor vehicles of the class concerned, and complies with the conditions, if any, subject to which the licence was issued. Section 7 of the Act provides the minimum and maximum age limits associated with driving of vehicles on roads. Part III makes provision for the issuing of international driving permits. Section 17 states that any person who is an ordinarily resident in Zimbabwe; and the holder of a driver's licence or foreign drivers licence and who wish to drive a motor vehicle outside Zimbabwe, he must apply for an international driving permit. Part IV through to V (and VA) includes the provisions for motor vehicle insurance against third party. Part VI includes the provisions of traffic signs and police directions and the requirements around conformance. *Sections 6.3.7*and *6.3.8* presents the Road Safety Management Plan and Traffic and Transport Management Plan. The provisions of this Act have been included in these.
Immigration	Immigration Act (Chapter 4:02)	Part III of this Act includes provisions for the entry of persons to Zimbabwe (*viz.* compliance with the directions of immigration officers, travel document requirements, entry refusals, etc.). Part V of the Act includes the provisions for departure of Zimbabwe. These provisions have been included in the Worker Health and Safety Plan (*Section 6.3.9*).
Access Control	Protected Place and Areas Act (Chapter 11:12)	This Act includes the provisions for the control of entry of persons into certain places, for the protection of the premises. The control of access to work areas associated with the Kariba Dam Rehabilitation Project will be undertaken in accordance with the provisions/requirements in this Act.

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Cultural and Heritage	National Museums and Monuments Act (Chapter 25:11)	Makes provision for the preservation of ancient, historical and natural monuments, relics and other objects of historical or scientific value or interest. Section 21 of the Act requires that the appropriate board be notified of any ancient monument or relic. Moreover, Section 24 states that no person may excavate and ancient monument or national monument without obtaining written permission by the appropriate Board. *Section 6.3.11* presents the Cultural and Heritage Management Plan including a Chance Find Procedure, which has considered the provisions of this Act.
Employment	Labour Act (Chapter 28:01) as amended by Labour Act [Chapter 28:01] amended 2006 and the Labour Amendment Act, 2005 (Act 7/2005)	An Act to declare and define the fundamental rights of employees. Part II (Sections 4 to 7) provides the fundamental rights of employees, including entitlement to be a member of a trade union, protection against discrimination, the right to fair labour standards and the right to a democratic workplace. Part III of the Act provides provisions safeguarding employees to unfair labour practices and Part IV provides the general conditions of employment (*viz.* dismissal, retrenchment, wages, sick leave, death, maternity leave etc.). This ESMP makes provision for the rights of employees (refer to Worker Health and Safety Management Plan in *Section 6.3.9*).

Table 3.3 International Guidelines and Standards Applicable to this ESMP

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
WORLD BANK GROUP OPERATIONAL POLICIES		
General Environmental Management	World Bank Group Operational Policies – Operational Procedure (OP) 4.01: Environmental Assessment	This OP amongst other requirements requires that environmental assessments prevent, minimise, mitigate, or compensate for adverse environmental impacts and enhance positive impacts, and that it must include a process of mitigating and managing adverse environmental impacts throughout project implementation. The ESMP has been prepared to cover the activities associated with the Kariba Rehabilitation Works and includes measures associated with post-rehabilitation revegetation and rehabilitation. The purpose of this ESMP is to outline appropriate management strategies and actions in order to meet acceptable levels of environmental and social performance for the proposed Kariba Dam Rehabilitation Project.
Cultural Heritage	World Bank Group Operational Policies – Operational Procedure (OP) 4.11: Physical Cultural Resources	This OP promotes addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Any project involving significant excavations, demolition, movement of earth, flooding, or other environmental changes are to take cognisance of this OP. This OP has been considered in the Cultural Heritage Management Plan (*Section 6.3.11*).
Dam Safety	World Bank Group Operational Policies – Operational Procedure (OP) 4.37: Safety of Dams	This OP requires that experienced and competent professionals design and supervise construction, and that the borrower adopts and implements dam safety measures through the project cycle. Aspects of dam safety have been considered in the Dam Safety Management Plan (*Section 6.4.6*).

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
International Waterways	World Bank Group Operational Policies – Operational Procedure (OP) 7.50: Projects on International Waterways	This OP applies to any river or body of surface water that flows through, two or more states, whether these states are World Bank members or not. OP 7.50 is triggered by the Kariba Rehabilitation Works Project and according to the ZRA notification has been made in accordance with provisions of Southern African Development Community (SADC) Protocol / Zambezi Watercourse Commission (ZAMCOM) Agreement and meeting the requirements of OP 7.50.
INTERNATIONAL FINANCE CORPORATION (IFC) PERFORMANCE STANDARDS		
Management of Social and Environmental Risks	Performance Standard (PS) 1 - Assessment and Management of Environmental and Social Risks and Impacts	This PS underscores the importance of managing social and environmental performance throughout the life of a project (any business activity that is subject to assessment and management). The ESMP has been prepared to cover the activities associated with the Kariba Rehabilitation Works and includes measures associated with post-rehabilitation revegetation and rehabilitation. The purpose of this ESMP is to outline appropriate management strategies and actions in order to meet acceptable levels of environmental and social performance for the proposed Kariba Dam Rehabilitation Project.
Worker Health and Safety	Performance Standard (PS) 2 - Labour and Working Conditions	This PS recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. *Section 6.3.9* (Worker Health and Safety) have considered the provisions included in this PS.
Pollution Prevention	Performance Standard (PS) 3 - Resource Efficiency and Pollution Prevention Performance Standard	This PS recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. The provisions included in this PS have been considered in the Noise and Vibration Management Plan (*Section 6.1.1*), Air Quality and Dust Management Plan (*Section 6.1.2*), Waste Management Plan (*Section 6.4.1*), Dangerous Good and Hazardous Substances Management Plan (*Section 6.4.2*) and E Emergency Preparedness Plan (*Section 6.4.5*).

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Community Health and Safety	Performance Standard (PS) 4 - Community Health, Safety and Security	This PS recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development. The provisions included in this PS have been considered in the Community Health and Safety Plan (*Section 6.3.3*).
Biodiversity Conservation	Performance Standard (PS) 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources	This PS recognizes that protecting and conserving biodiversity (the variety of life in all its forms, including genetic, species and ecosystem diversity) and its ability to change and evolve, is fundamental to sustainable development. The protection of biodiversity (aquatic and terrestrial) has been considered in the Surface Water Quality Management Plan (*Section 6.1.3*), Aquatic Ecology Management Plan (*Section 6.2.1*), Terrestrial Ecology Management Plan (*Section 6.2.2*) and Revegetation and Rehabilitation Management Plan (*Section 0*).
	Performance Standard (PS) 8 - Cultural Heritage	This PS recognises the importance of cultural heritage for current and future generations. The management of cultural heritage for the Kariba Rehabilitation Project is included in the Cultural Heritage Management Plan (*Section 6.3.11*).
INTERNATIONAL FINANCE CORPERATION (IFC) ENVIRONMENTAL, HEALTH AND SAFETY (EHS) GUIDELINES		
Air Quality	IFC Environmental, Health and Safety (EHS) Guidelines - 1.1 Environmental Air Emissions and Ambient Air Quality	Includes the general principles of assessing impacts to air quality. In addition to the air quality standards set out, emission limits and guidelines for specific technologies and operations are also specified. The guidelines included in this EHS Guideline have been considered in the Air Quality and Dust Management Plan (*Section 6.1.2*).
Water	IFC Environmental, Health and Safety (EHS) Guidelines - 1.3 Wastewater and Ambient Water Quality	This EHS guideline specifies that discharges should not result in contaminant concentrations in excess of local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality. Water quality management measures (together with performance criteria) have been provided in the Surface Water Quality Management Plan (*Section 6.1.3*).

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Noise	IFC Environmental, Health and Safety (EHS) Guidelines - 1.7 Noise	This is an internationally recognised guideline document containing information for the assessment and management of noise. It also presents noise level criterion values applicable to sites such as the proposed Project. The guidelines make reference to noise from facilities and stationary noise sources, and are commonly applied as design standards for industrial facilities, and whilst this may imply they relate to some threshold of noise effects in a general sense, the IFC has indicated that they are not directly applicable to transport or mobile noise sources. Measurements are to be taken at noise receptors located outside the project property boundary. The guidelines included in this EHS Guideline have been considered in the Noise and Vibration Management Plan (*Section 6.1.1*).
Community Health and Safety	IFC Environmental, Health and Safety (EHS) Guidelines – 3.1 to 3.7 Community Health and Safety	These EHS guidelines address aspects of project activities taking place outside of the traditional project boundaries and deal with communal issues (amongst others) around water quality and availability, traffic safety, transport of hazardous chemicals, disease prevention and emergency preparedness and response. The guidelines included in these EHS guidelines have been considered in the Community Health and Safety Plan (*Section 6.3.3*) and Emergency Preparedness Plan (*Section 6.4.5*).
Construction	IFC Environmental, Health and Safety (EHS) Guidelines – 4.1 to 4.3Construction and Decommissioning	These EHS guidelines provides additional, specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities. The guidelines included in these EHS guidelines have been considered in the Community Health and Safety Plan (*Section 6.3.3*) and Worker Health and Safety Plan (*Section 6.3.9*).

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
AFRICAN DEVELOPMENT BANK GROUP'S INTEGRATED SAFEGUARD SYSTEM AND OPERATIONAL SAFEGUARDS		
Environmental and Social Assessment	African Development Bank Operational Safeguard (OS) 1 – Environmental and Social Assessment	This OS provides mainstream environmental and social considerations. An objective of this OS is to avoid or, if avoidance is not possible, minimise, mitigate and compensate for adverse impacts on the environment and on affected communities. The ESMP has been prepared to cover the activities associated with the Kariba Rehabilitation Works and includes measures associated with post-rehabilitation revegetation and rehabilitation. The purpose of this ESMP is to outline appropriate management strategies and actions in order to meet acceptable levels of environmental and social performance for the proposed Kariba Dam Rehabilitation Project.
Biodiversity	African Development Bank Operational Safeguard (OS) 3 – Biodiversity, Renewable Resources and Ecosystem Services	This OS outlines the requirements for borrowers or clients to (i) identify and implement opportunities to conserve and sustainably use biodiversity and natural habitats, and (ii) observe, implement, and respond to requirements for the conservation and sustainable management of priority ecosystem services. The protection of biodiversity (aquatic and terrestrial) has been considered in the Surface Water Quality Management Plan (*Section 6.1.3*), Aquatic Ecology Management Plan (*Section 6.2.1*), Terrestrial Ecology Management Plan (*Section 6.2.2*) and Revegetation and Rehabilitation Management Plan (*Section 0*).
Pollution Prevention and Control	African Development Bank Operational Safeguard (OS) 4 – Pollution Prevention and Control, Hazardous Materials and Resource Efficiency	This OS outlines the main pollution prevention and control requirements for borrowers or clients to achieve high-quality environmental performance, and efficient and sustainable use of natural resources, over the life of a project. More specifically, the outlines requirements for borrowers to reduce pollutants resulting from the project—including hazardous and non-hazardous waste—so that they do not pose harmful risks to human health and the environment. The provisions included in this OS have been considered in the Noise and Vibration Management Plan (*Section 6.1.1*), Air Quality and Dust Management Plan (*Section 6.1.2*), Waste Management Plan (*Section 6.4.1*), Dangerous Good and Hazardous Substances Management Plan (*Section 6.4.2*) and Emergency Preparedness Plan (*Section 6.4.5*).

Aspect	Legislation, Standard and/or Guideline Document	Applicability to the Kariba Dam Rehabilitation ESMP
Labour Health and Safety	African Development Bank Operational Safeguard (OS) 5 – Labour Conditions, Health and Safety	This OS outlines the main requirements for borrowers or clients to protect the rights of workers and provide for their basic needs. The provisions included in this OS have been considered Worker Health and Safety Plan (*Section 6.3.9*).

4 ENVIRONMENTAL AND SOCIAL IMPACTS

The ESIA process undertaken for the plunge pool reshaping and the spill way rehabilitation identified and assessed a range of potential environmental and social impacts associated with the proposed Kariba Dam Rehabilitation Project. Impacts included –

4.1 PHYSICAL ENVIRONMENTAL IMPACTS

- Possible loss of downstream flows due to dam spilling / non-spilling requirements.

- Deterioration of water quality downstream of the dam as a result of rehabilitation works (*viz.* draining the plunge pool, blasting, increased sediment loads, accidental spillage of water contaminants, etc.).

- Increased erosion and sedimentation from the removal and disturbance of vegetation and soil as well as blasting activities.

4.2 BIOPHYSICAL ENVIRONMENTAL IMPACTS

- Direct fish mortalities as a result of dredging, blasting and dewatering.

- Destruction and/or disturbance of sensitive habitats due to rehabilitation works.

- Potential exposure and scaring of fauna in the Project Area due to increased road traffic, night time lighting, and noise levels from vehicles, generators, etc.

- Effects to protected areas downstream of the Kariba Dam as a result of unplanned and / or non-routine Project activities (such as spillages or failure of cofferdam).

4.3 SOCIAL IMPACTS

- A change to the visual landscape of the area. This change is most likely to be experience at key vantage points by tourists coming to visit the dam.

- Effects on fishery resources as a result of decreased water quality downstream.

- Increased employment creation in the Project Area as a result of the Project's workforce needs over a medium-term.

- The opportunity for local, regional and national (small, medium, and large enterprises) to become part of the Project's supply chain.

- Possible unfair and unsafe working conditions on Site.

- Exposure and potential contraction of sexually transmitted infections including HIV/AIDs.

- Injuries/fatalities to people and livestock as a result of increased road traffic.

4.4 SUMMARY OF IMPACTS AND RESIDUAL IMPACTS

A summary of pre- and post- (residual) mitigation physical and biophysical impacts is provided in *Table 4.1*.

Table 4.1 Summary of Physical and Biophysical Impacts

Impact	Significance (pre-mitigation)	Residual Impact Significance
IMPACTS ON THE PHYSICAL ENVIRONMENT		
Impacts on Hydrology	**Major Negative Impact**	**Negligible Negative Impact**
Impacts on Water Quality	**Moderate Negative Impact**	**Minor Negative Impact**
Impacts on Erosion and Sedimentation	**Minor Negative Impact**	**Negligible Negative Impact**
IMPACTS ON THE BIOPHYSICAL ENVIRONMENT		
Impacts on the Aquatic Environment	**Moderate Negative Impact**	**Minor Negative Impact**
Impacts on Terrestrial Habitat	**Negligible Negative Impact**	**Negligible Negative Impact**
Impacts on Terrestrial Species of Conservation Concern	**Minor Negative Impact**	**Minor Negative Impact**
Impacts on Protected Species	**Moderate Negative Impact**	**Negligible Negative Impact**
IMPACTS ON THE SOCIAL ENVIRONMENT		
Impacts on Tourism	**Negligible Negative Impact**	**Negligible Negative Impact**
Impact on Fisheries-Based Livelihoods	**Negligible to Moderate Negative Impact**	**Minor to Negligible Negative Impact**
Creation of Employment Opportunities	**Positive Impact**	
Procurement of Goods and Services	**Positive Impact**	
Impacts related to Possible Unfair and Unsafe Working Conditions	**Moderate Negative Impact**	**Minor Negative Impact**
Increased Incidence of Sexually Transmitted Infections (STIs) including HIV/AIDs	**Major Negative Impact**	**Minor to Moderate Negative Impact**
Increased Risk of Road Traffic Accidents	**Moderate to Major Negative Impact**	**Minor Negative Impact**

5 IMPLEMENTATION OF THE ESMP

5.1 INTRODUCTION

This *Chapter* details the required mitigation measures, and is partly prescriptive, identifying specific people or organisations to undertake specific tasks in order to ensure that impacts on the environment are minimised during the rehabilitation works. The ESMP is applicable to all work activities during the site establishment and the rehabilitation works. It is a dynamic document implying that information gained during site establishment and the rehabilitation works and monitoring on the site could lead to changes in the ESMP.

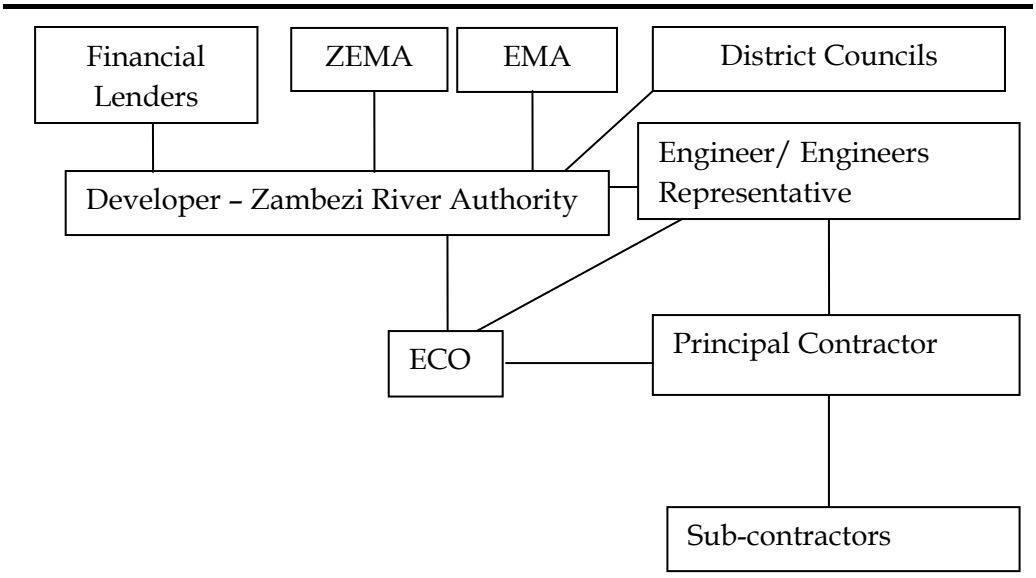
5.2 ROLES AND RESPONSIBILITIES

The key role-players during the rehabilitation works, for the purposes of environmental and social management on the site, include but are not limited to:

- The Developer (ZRA);
- The Engineer;
- The main Contractors (direct appointments including civil works contractor, building contractor, landscape contractor etc.);
- The Environmental Control Officer (ECO);
- Representatives of the relevant Zambian and Zimbabwean Authorities; and
- Any lenders the provide funding for the Project.

Details of the responsibilities of each of the key role-players have been provided in *Sections 5.2.1* to *5.3* below. Lines of communication and reporting between the various parties are illustrated in *Figure 5.1* below.

Figure 5.1 Roles and Responsibilities



5.2.1 The Developer

For the purpose of this document, "the Developer" and its appointed facilitators refers to those to whom permission has been granted to proceed with the Kariba Rehabilitation Works Project (i.e. ZRA), and who is thus ultimately responsible for compliance with all conditions of approval of the Project or any aspect thereof by any authority.

With respect to the **site establishment phase** of the Project, the Developer is to:

- Implement the recommendations outlined in the ESMP for site establishment activities.
- Implement mitigation measures that will lessen the environmental and social impact of the Project from the design stage and the rehabilitation phase.

With respect to the **rehabilitation works**, the Developer is to:

- Ensure that all relevant approvals and permits have been obtained prior to the start of rehabilitation activities on the site.
- Ensure that the ESMP has been approved by ZEMA and EMA prior to the start of rehabilitation activities on the site.
- Ensure that the requirements of the ESMP form part of the tender documents for contractors, and that contractors have provided

appropriately qualified staff and realistic costs for the implementation of the ESMP.

- Ensure that ZEMA and EMA have been notified of the date on which rehabilitation activities will be starting, prior to commencement of the activity.

- Ensure that all conditions of approval have been complied with.

- Appoint a suitably qualified or experienced ECO prior to the start of rehabilitation activities on the site, and for the duration of the rehabilitation works.

5.2.2 The Engineer

For the purposes of this document, "The Engineer" refers to the engineer for the Project, or any other person authorised by the Developer, to be responsible for the technical and contractual implementation of the works to be undertaken.

The responsibilities of the Engineer are to:

- Ensure that the requirements as set out in this ESMP and any other conditions stipulated by the relevant Authorities are implemented.

- Assist the ECO in ensuring that the conditions for ESMP are adhered to and promptly issue instructions requested by the ECO to the Contractor. All instructions relating to environmental and social matters issued by the Engineer at the site to the Contractor are to be copied in writing to the ECO.

- Assist the ECO in making decisions and finding solutions to environmental and social problems that may arise during the rehabilitation works.

- Review and approve work method statements with input from the ECO.

- Order the removal of person(s) and/or equipment not complying with the specifications (as required by the ECO or otherwise).

- Provide input into the ECO's on-going internal review of the ESMP.

5.2.3 The Contractor

For the purposes of this document "The Contractor" refers to any company or individual appointed by the Developer to implement any aspect of the works.

The Contractor is to:

- Implementation of ESMP, associated Management Plans and method statement during all works on the site, including all additional requirements as may be contained in approved method statements.

- Ensure that all sub-contractors', employees, suppliers, agents etc. are fully aware of the environmental and social requirements detailed in the ESMP.

- Liaise closely with the Engineer and the ECO and ensure that the works on the site are conducted in an environmentally and socially controlled manner.

- Inform the Engineer as well as the ECO should environmental and social conditions on the site deteriorate, e.g. dumping, pollution, littering and damage to vegetation, community grievance.

- Carry out instructions issued by the Engineer, on request of the ECO, required to comply with the ESMP.

The Contractor shall designate a permanent onsite employee as the Environmental and Social Manager who shall be responsible for undertaking a daily site inspection to monitor compliance with this ESMP. The Contractor shall submit the name of the Contractor's Environmental and Social Manager to the Engineer prior to the rehabilitation works starting.

5.2.4 Environmental Control Officer

For the purposes of this document "The Environmental Control Offices" refers to any company or individual appointed by the Developer to ensure the implementation of the ESMP.

During the rehabilitation works, the ECO is to:

- Ensure that the Contractor has a copy of the ESMP and all agreed method statements.

- Undertake regular site inspections (with frequency determined by the nature of the on-site activities as may be appropriate) to audit compliance of all parties with the requirements of the ESMP.

- Advise/recommend on actions or issues impacting on the environment to the Engineer, who shall issue any required site instructions to the Contractor.

- Conduct awareness training with the Contractor and all staff on key requirements of the ESMP, environmental and social safeguards, good housekeeping practices, and general aspects relating to site sensitivity.

- Review and approve method statements together with the Engineer(when applicable).

- Assist the Contractor in finding responsible solutions to environmental and social problems that may arise.

- Recommend to the Engineer the removal of person(s) and/or equipment not complying with the ESMP.

- Undertake photographic monitoring of the rehabilitation works at the site.

- Keep records of all activities/ incidents concerning the environmental and social issues on the site in a site diary / logbook.

- Complete temporary and permanent site closure checklists.

- Take immediate action on the site to stop works where significant and irreparable damage is being inflicted on the environment, and to inform the Engineer immediately of the occurrence and action taken.

- Undertake regular internal review of the ESMP and make recommendations regarding its updating to the Engineer and Developer.

The ECO has the authority to recommend to Engineer that works be stopped if in his/her opinion serious harm to, or impact on the environment is likely to occur or has occurred and such actual or potential harm or impact is in contravention of the ESMP, and which is or may be caused by construction or related works.

In the event of failure by the Contractor or Contractor's employee to show adequate consideration to the environmental and social aspects of this contract, the ECO may recommend to the Engineer and the project management team to have the Contractor's representative or any employee(s) removed from the site or to suspend work until the matter is remedied.

The ECO shall keep a site Diary or Logbook in which events and concerns of environmental and social significance are to be recorded. The ECO will compile a monthly report of such events, concerns and general compliance of the Contractor with the rehabilitation works requirements of the ESMP. The ECO's monthly report will be submitted to the Engineer and if required, to ZEMA, EMA and the relevant District Councils. The ECO is also required to attend regular meetings of the project management team to report on environmental and social issues and to minute the requirements that emerge.

The ECO will be responsible for the compilation of a final completion checklist for the Project, completed when all rehabilitation works related to the Project have terminated and the site has been cleared of all construction related debris, materials or equipment not forming part of the permanent works. The

completion checklist will audit the Contractor's compliance with the rehabilitation works requirements of the ESMP throughout the duration of the works and, together with a final written report, will be submitted to ZEMA and EMA and where appropriate to the relevant lenders in order to achieve "environmental and social closure" for the Project.

5.3 COMMUNICATION CHANNELS ON THE SITE

5.3.1 Site Meetings during Rehabilitation Works

The ECO is required to attend regular meetings of the project management team to facilitate the transfer of information and to update all parties on the environmental and social compliance of the Project as a whole. The ECO or delegated person will minute the discussions, and specifically any decisions arising relating to environmental and social management actions and responsibility.

The ECO will compile a summary report outlining the main rehabilitation works relating to the environment, aspects of non-compliance, and document agreed environmental and social actions and dates of achieving compliance by the Contractor. The summary report will form part of the rehabilitation works ESMP records.

The following people should attend these meetings:

- Developer's Representative;
- Engineer;
- The ECO; and
- Contractor(s) representative (e.g. Site Manager).

5.3.2 Environmental and Social Education and Awareness

The Contractor, in consultation with the ECO, shall arrange for a presentation to site staff to familiarise them with the environmental and social requirements of the rehabilitation works ESMP within fourteen days from the commencement date of the works. This presentation should take cognizance of the level of education, designation and language preferences of the staff. General site staff would commonly receive a basic environmental and social awareness presentation or talk highlighting general environmental and social "do's and don'ts", including good housekeeping practices. This information would be provided throughout works in the form of regular toolbox talks. Management level staff on the site, e.g. site agents and foremen, who require more detailed knowledge about the environmental and social sensitivities on site and the rehabilitation works requirements of the ESMP, will benefit from a separate and more detailed presentation of these issues. If required, the ECO may call upon the services of a professional trainer or environmental consultant to present the technical contents of the ESMP.

Environmental and social education of staff can be assisted by compilation of posters placed in staff venues e.g. canteens and site offices.

5.3.3 Method Statements

The Contractor shall compile and provide Method Statements to the ECO and the Engineer for approval prior to the rehabilitation works commencing. Method statements will be required for specific activities that are deemed or identified to pose a risk to the environment and/or which require site specific detail beyond that contained in the ESMP or when requested by the Engineer or ECO.

A Method Statement is a "live document" in that modifications are negotiated between the Contractor and the ECO/project management team, as circumstances unfold. Changes to, and adaptations of, Method Statements can be implemented with the prior consent of all parties. All Method Statements will form part of the rehabilitation works of the ESMP documentation and are subject to the terms and conditions contained within the ESMP.

Note that a Method Statement is a starting point for understanding the nature of the intended actions to be carried out and allows for all parties to review and understand the procedures to be followed in order to minimise risk of harm to the environment.

A Method Statement describes the scope of the intended work in a step-by-step description, in order for the ECO and the Engineer to understand the Contractor's intentions. This will enable them to assist in devising any mitigation measures, which would minimize environmental and social impact during these tasks.

For each instance where it is requested that the Contractor submit a Method Statement to the satisfaction of the Engineer and ECO, the format should clearly indicate the following:

- **What** - a brief description of the work to be undertaken;
- **How** - a detailed description of the process of work, methods and materials;
- **Where** - a description/sketch map of the locality of work (if applicable);
- **When** - the sequencing of actions with due commencement dates and completion date estimates;
- **Who** – The person responsible for undertaking the works described in the Method Statement; and
- **Why** – a description of why the activity is required.

All Method Statements must be developed to the satisfaction of the ECO, Engineer and, where practical or stipulated in the Environmental Licence, should be endorsed as being acceptable by a representative of ZEMA and EMA.

A list of possible Method Statements that the Contractor may be required to submit during the course of the rehabilitation works is provided in *Annex A,* along with an indication of those which the ECO may require the Contractor to provide prior to the start of works on the site.

5.3.4 ECO Diary/Logbook Entries

The ECO will maintain a site diary or logbook that relates to environmental and social issues as they occur on the site for record keeping purposes. Recorded issues will form part of feedback presented at Project meetings by the ECO.

5.3.5 Site Memo Entries

Site Memos, stipulating recommended actions required to improve compliance with the ESMP by the Contractor will be issued by the ECO to the Engineer, who in turn will ensure that the Contractor is informed of the recommended instruction.

Comments made by the ECO in the site Memo book are advisory and all consequential site Instructions required may only be issued by the Engineer. Site memos will also be used for the issuing of stop work orders to the Contractor for activities deemed to pose immediate and serious risk of unnecessary damage to the environment.

5.3.6 Dispute Resolution

Any disputes or disagreements between role players on the site (with regard to environmental and social management) will firstly be referred to the Engineer during rehabilitation. If no resolution on the matter is reached the Developer will be consulted and reference made to the Contractors contract.

5.3.7 ZRA Community Relations

The ZRA should continue to engage with stakeholders throughout the Project. Communication with local communities and other local stakeholders will be a key part of this engagement process and is one where the ZRA and the Contractor will need to work closely during rehabilitation works. Development of a Community Engagement Plan (CEP) is important to guide and provide a framework for this communication.

The objectives of communication and liaison with local communities are the following:

- To provide residents in the vicinity of the Project and other interested stakeholders with regular information on the progress of work and its implications.

- To monitor implementation of mitigation measures and the impact of the Project on communities via direct monitoring and feedback from those affected, in order to ensure the mitigation objectives are achieved.

- To manage any disputes between the ZRA, the Contractors and local communities.

5.4 SITE ESTABLISHMENT

5.4.1 Site Division

The Contractor will restrict all activities, materials, equipment and personnel to within the area specified, and shall restrict activities to only those areas that are necessary to undertake the works.

A Method Statement detailing the layout and method of establishment of the temporary construction camp, all buildings, offices, lay down areas, fuel storage areas, batching areas and other infrastructure required for the running of the Project shall be submitted.

Disturbed areas rather than pristine or intact landscape areas will preferably be used for the temporary construction camp.

5.4.2 Site Demarcation

The Contractor shall erect and maintain permanent and/ or temporary fences of the type and in the locations directed by the Engineer. Such fences shall, if so specified, be erected before undertaking designated activities.

5.4.3 Site Clearance

If topsoil / top material is removed from areas cleared of vegetation, it will be retained for future landscaping use. Top material will exclude litter, building rubble, alien plant material or any other waste. All topsoil, and specifically any topsoil from areas which are likely to contain bulbs, must be stripped and stockpiled for re-use in landscaped areas. This will constitute at least a 300 mm layer.

Topsoil will be stored in areas demarcated by the ECO and Engineer and in piles not higher than 2 m, and may not be removed from the site, or used for any purpose other than in the final landscaping of the site. The stockpiles will not be compacted or disturbed, and will be domed at the top to promote runoff. The period between the stockpiling of topsoil and its utilization will be as short as possible, and ideally the topsoil should be transferred to its intended site of use immediately following site clearance and stockpiling. This would also avoid double handling.

Stockpiles that are to be stored for less than three months will be covered with shade-cloth or geotextile fabrics or similarly suitable material to prevent erosion, and kept moderately moist in order to maintain the vitality of the soil. If stockpiles are to be stored for more than three months a protective vegetation layer must be established to cover topsoil stockpiles in order to protect them against erosion and desiccation. The stockpile must be kept moist in order to maintain the vitality of the vegetation. Vegetation may not consist of invasive alien vegetation, but must comprise grass or ground covers.

5.5 GENERAL REQUIREMENTS DURING THE REHABILITATION WORKS

5.5.1 Materials Handling, Use and Storage

The Contractor will ensure that any delivery drivers are informed of all procedures and restrictions (including "no go" areas) required to comply with the ESMP. The Contractor shall ensure that these delivery drivers are supervised during off loading, by someone with an adequate understanding of the requirements of the ESMP.

Materials will be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to, sand, stone chips, fine vegetation, refuse, paper and cement, will have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor will be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

All manufactured and/ or imported material will be stored within the Contractor's temporary construction camp. All lay down areas outside of the temporary construction camp will be subject to the Engineer's approval.

All building materials will be stored at least 50 m away from aquatic ecosystems and the areas bunded appropriately such that there will be no runoff from these areas towards aquatic systems. All building materials will be removed after rehabilitation works.

5.5.2 Fuel (Petrol and Diesel) and Oil

All fuel is to be stored within a demarcated area in the Contractor's temporary construction camp. No refuelling of vehicles or machinery is to take place outside of this demarcated area unless authorised by the Engineer. The Engineer will be advised of the area that the Contractor intends using for the storage of fuel.

The Contractor will ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut. Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks will be sealed and stored in an area where the ground has been protected.

Tanks containing fuels will be situated on a smooth impermeable surface (plastic or concrete) base with a bund (if plastic, it must have sand on top to prevent perishing) to contain any possible spills and prevent infiltration of fuel into the ground. The impermeable lining will extend to the crest of the bund and the volume inside the bund will make up 110 percent of the total capacity of all the storage tanks.

The floor of the bund will be sloped towards an oil trap or sump to enable any spilled fuel to be removed. An Enretech or similar hydrocarbon absorption/remediation product approved by the ECO will be installed in the sump to reduce the risk of pollution. Bulk fuel storage (which is anticipated to include Above Ground Storage Tanks [ASTs] with a volume range of approximately 4.5 to 46 m^3) and bunded areas will have overhead cover to prevent rain from entering the bunded area. The Contractor will keep fuel under lock and key at all times.

If fuel is dispensed from, the proper dispensing equipment will be used, and the drum will not be tipped in order to dispense fuel. The dispensing mechanism used to dispense fuel from the drums will be stored in a waterproof container when not in use.

During fuel tanker delivery, the tanker driver must be present at all times during offloading of product. An emergency cut-off switch must be installed to immediately stop fuel delivery should an accident occur. An anti-flash nozzle must be installed at the end of the vent pipe with a fuel dispenser equipped with an automatic cut-off switch to prevent fuel tank overfills.

No smoking will be allowed in the vicinity of the stores. Symbolic safety signs depicting "No Smoking", "No Naked Lights" and "Danger" are to be provided. The volume capacity of the tank will be displayed. The product contained within the tank will be clearly identified using the emergency information system. Any electrical or petrol-driven pump will be equipped and positioned, so as not to cause any danger of ignition of the product.

Areas for storage of fuels and other flammable materials will comply with standard fire safety regulations and may require the approval of the Municipal Fire Prevention Officer. The Contractor will ensure that there is adequate fire-fighting equipment at the fuel stores.

Where reasonably practical, vehicles and equipment shall be refuelled at a designated re-fuelling area or at the workshop as applicable. If it is not reasonably practical then the surface under the temporary refuelling area will be protected against pollution and drip trays used to the reasonable satisfaction of the Engineer prior to any refuelling activities. The Contractor will ensure that there is always a supply of appropriate material readily available to absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials will be able to handle a minimum of 200 litres of hydrocarbon liquid spill. This

material must be approved by the Engineer prior to any refuelling or maintenance activities.

5.5.3 Ablution Facilities

Washing, whether of the person or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided. Latrine and ablution facilities and first-aid services will comply with the regulations of the local authority concerned and shall be maintained in a clean and sanitary condition to the satisfaction of the Engineer. These facilities will include water borne sewage connected to the local authority mains for the contractors' camp and portable chemical toilets at the active working areas. In the event that connection to the local authority mains is not possible, the use of sceptic tanks and soak away systems will be adopted and implemented.

The Contractor will provide suitable sanitary arrangements at the Contractor's temporary construction camp and approved points around the designated work area to allow easy access for all employees on the site. Project staff are not permitted to commence with work on the site without suitable toilet facilities being available for them.

Sanitary facilities will be located within 100 m from any point of work, but not closer than 50 m to any water body. One chemical toilet is to be provided on site for every 15 contract personnel at each working area. These toilets must have doors and locks and shall be secured to prevent them blowing over. Toilet paper will be provided.

The Contractor will ensure that suitable sanitation facilities are provided for or by all his sub-contractors on the site.

Chemical (portable) toilets are to be periodically emptied on a weekly basis by an approved and reputable contractor. The contractor will ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site. Discharge of waste from toilets into the environment and burial of waste is strictly prohibited.

The Contractor shall keep the toilets in a clean, neat and hygienic condition. If the Contractor fails to provide and/or maintain all site sanitation facilities in a clean and hygienic condition, the Engineer may order the Contractor to suspend any or all work on the site until these requirements are met. No payment shall be made for any delays or disruption of the Works caused thereby nor shall extensions of time be granted for such delays.

5.5.4 Eating Areas

The Contractor shall designate eating areas to the approval of the Engineer, which will be clearly demarcated. Sufficient bins will be present in this area.

Any cooking on site will be done in a designated area with well-maintained cookers with fire extinguishers present.

5.5.5 Drinking Water

The Contractor will ensure that drinking water is available for all staff on the site. If no potable water source is available, then the Contractor will import drinking water to the site.

5.5.6 Site Structures

The Contractor will supply and maintain adequate and suitable sheds for the storage of materials. Sheds for the storage of materials that may deteriorate or corrode if exposed to the weather will be weatherproof, adequately ventilated and provided with raised floors.

All site establishment components (as well as equipment) will be positioned to limit visual intrusion and the size of the area disturbed. The type and colour of roofing and cladding materials comprising the Contractor's temporary structures will be selected to reduce reflection. The Contractor's camp will be fenced, and the camp area will be screened via the attachment of shade cloth or equivalent to the fence surrounding the site camp.

5.5.7 Workshop, Equipment Maintenance and Storage

Where practical, all maintenance of plant on the site will be performed in the workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor will obtain the approval of the Engineer prior to commencing activities.

The Contractor will ensure that the workshop and other plant maintenance facilities, including those areas where, after obtaining the Engineer's approval, the Contractor carries out emergency plant maintenance, there is no contamination of the soil or vegetation. The workshop will have a smooth impermeable floor either constructed of concrete or thick plastic covered with sufficient sand to protect the plastic from damage. If constructed of concrete the floor will be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil). A Method Statement detailing the design and construction of the workshop must be submitted.

When servicing equipment, drip trays will be used to collect the waste oil and other lubricants. Drip trays will also be provided in active work areas areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles).

All vehicles and equipment will be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or be removed from the site

The washing of equipment will be restricted to preventative maintenance requirements only. All washing will be undertaken in the workshop or maintenance areas, and these areas must be equipped with a suitable impermeable floor and sump/oil trap. The use of detergents for washing will be restricted to low phosphate and nitrate containing and low sudsing-type detergents.

5.5.8 "No go" Areas

The demarcated buffer areas around sensitive ecological or heritage areas are to be "no go" areas. The Contractor will ensure that, insofar as he has the authority, no person, machinery, equipment or material enters the "no go" areas at any time.

5.5.9 Construction Personnel Information Posters

The Contractor will erect and maintain information posters for the information of all employees depicting actions to be taken to ensure compliance with aspects of the environmental and social mitigation measures. Such posters will be erected at the eating areas and any other locations specified by the Engineer.

5.5.10 Concrete and Cement Work

Cement powder has a high pH value. Spillage of dry cement powder and concrete slurry will affect both soil and water pH adversely. Careless handling of cement products resulting in spillage can have detrimental effects on the surrounding environment.

The location of the batching area (including the location of cement stores and sand and aggregate stockpiles) will be indicated on the site layout plan and approved by the ECO. A Method Statement indicating the layout and preparation of this facility is required in this regard. Cement is to be stored in a secure weatherproof location to avoid contamination of the environment.

All runoff from batching areas will be strictly controlled so that contaminated water does not enter storm water or run-off into the Zambezi River. Plastering boards and mixing trays will be used at all mixing and supply points. Cleaning of equipment and flushing of mixers will not result in pollution of the surrounding environment.

Suitable screening and containment will be in place to prevent windblown contamination associated with bulk cement silos, loading and batching. All excess concrete will be physically removed to an approved waste site on completion of the concrete pour section and disposed of.

5.5.11 Safety

The Contractor will at all times observe proper and adequate safety precautions on the site. Telephone numbers of emergency services, including the local firefighting service, shall be posted conspicuously in the Contractor's office near the telephone.

5.5.12 Security

With the possible exception of any security staff who may be required to be present overnight at the Contractor's temporary construction camp, no personnel will be permitted to live on the site. Security staff must be provided with heating and cooking facilities (in order that they do not need to light fires), and access to toilet facilities and communication equipment.

5.5.13 Grievance Procedures

The Contractor will develop a grievance procedure to ensure fair and prompt resolution of problems arising from the Project. The grievance procedure will be underpinned by the following principles and commitments:

- Implement a transparent grievance procedure, and disseminate key information to directly impacted stakeholders;
- Implement and maintain a complaints register;
- Seek to resolve all grievances timeously; and
- Maintain full written records of each grievance case and the associated process of resolution and outcome for transparent, external reporting.

The responsibility for resolution of grievances will lie with the ZRA and its Contractors.

5.5.14 Protection of Natural Features

The Contractor will not deface, paint, damage or mark any natural features (e.g. rock formations and trees) situated in or around the site for survey or other purposes unless agreed beforehand with the Engineer. Any features affected by the Contractor in contravention of this clause will be restored/ rehabilitated to the satisfaction of the Engineer.

The Contractor will not permit his employees to make use of the Zambezi River for the purposes of swimming, personal washing and the washing of machinery or clothes.

5.5.15 Working Hours

Working hours in terms of the planning approval shall be adhered to. If works are to take place outside of normal working hours, the ECO and the Engineer are to be notified and disturbance to the surrounding residents or

land users is to be prevented. The Engineer will, where required, in turn notify the Local Authority of work done outside of normal working hours.

5.5.16 Excavation and Trenching

During excavation and trenching activities, care is to be taken to ensure that the stockpiling of top material is kept separate from sub-soils. Top material thus saved is to be replaced as top material and is to be the final layer when back-filling. The Contractor will reinstate all working areas to the satisfaction of the Engineer.

Areas opened for trenching will be restricted to the minimum required to be worked in and closed up in a working day or as dictated by technical requirements such as length of pipe or cable, in order to prevent them from posing safety hazards to people, traffic and animals and to prevent rainwater erosion. Trenches will be re-filled to the same level as (or slightly higher, to allow for settlement) the surrounding land surface to minimise erosion. Excess soil will be stockpiled in an appropriate manner. No stockpiling must occur within 50 m of a water course.

In the event of material removed during trenching being excessive after backfilling or being unsuitable as overburden, the excess material must be removed from the site to a site agreed upon by the Engineer and, where applicable, the Local Authority

5.5.17 Temporary Site Closure

If the site is closed for a period exceeding one week, a checklist procedure will be carried out by the Contractor in consultation with the ECO. The Contractor is to check the site and report to the Engineer regarding the following:

Fuels / flammables / hazardous materials stores:

- Ensure fuel stores are as low in volume as possible;
- No leaks;
- Outlet secure / locked;
- Bund empty;
- Fire extinguisher serviced and accessible;
- Secure area from accidental damage, e.g. vehicle collision;
- Emergency and Management telephone numbers to be available and displayed; and
- Adequate ventilation.

Other:

- All trenches and manholes secured;
- Fencing and barriers in place;
- Notice boards applicable and secured;

- Security persons briefed and have facility for contact;
- Night hazards checked, e.g. reflectors, lighting, traffic signage;
- Fire hazards identified – local authority notified of any potential threats, e.g. large brush stockpiles, fuels etc.;
- Pipe stockpile wedged / secured;
- Scaffolds secure; and
- Inspection schedule and log by security or contracts staff.

The ECO is to check and report to the Engineer regarding the following issues:

- Wind and dust mitigation in place, e.g. straw, brush packs, irrigation;
- Slopes and stockpiles at stable angle;
- Landscape areas watering schedules and supply secured;
- Fuels/hazardous substances stores secure;
- Cement and materials stores secured;
- Toilets empty and secured;
- Refuse bins empty and lids secured;
- Bunding clean and treated, e.g. Spill Sorb or Enretech #1 powder;
- Drip trays empty and secure; and
- Structures vulnerable to high winds secure.

The Contractor is to ensure that all temporary closure requirements are met before leaving the site.

5.5.18 Chinhoyi Quarry

The Contractor will need to confirm that the Chinhoyi quarry site has current and up to date permits and quarrying guidelines prior to the commencement of rehabilitation and the the sourcing of aggregate from the Chinhoyi Quarry.

5.6 SITE CLEAN UP AND REHABILITATION

5.6.1 Site Clean Up

The Contractor will ensure that all temporary structures, equipment, materials, waste and facilities used for rehabilitation work purposes are removed upon completion of the rehabilitation works. Site clean-up shall be to the satisfaction of the Engineer and the ECO.

5.6.2 Rehabilitation

Where appropriate, the Contractor shall employ a suitably qualified person (a botanist with experience in restoration of grassland areas) to rehabilitate areas damaged by activities associated with rehabilitation works during the course of the Project. The Contractor shall be responsible for rehabilitating areas identified by the ECO and the Engineer, or recommended by the aforementioned botanist. The Contractor's procedure for rehabilitation shall

be approved by the ECO and the Engineer and, where required, the Local Authority's environmental representative.

5.7 CHANGE MANAGEMENT

As Project design is finalised, design changes may occur that need to be accommodated by the ZRA and its associated contractors. Similarly, the organisational structure and roles and responsibilities included in the ESMP may also change as the Project progresses.

The ESMP will require a mechanism to manage change. At times these changes may be material, potentially influencing the original findings of the ESIA, and hence, the basis for its approval. Such a mechanism to manage change, or a change management system, must ensure that changes to the scope of the Project are subjected to a robust social and environmental assessment process. Any changes to Project scope will be evaluated for their degree of significance, and will be incorporated into the appropriate ZRA documentation as follows:

- Minor changes will be reflected in updates to the ESMP; and

- Substantive design / technology changes that might potentially alter the ESIA findings (i.e. those that result in changes to the predicted significance of environmental and social impacts) will be subject to re-assessment, further stakeholder consultation, supplementary reporting and revision of the ESMP. Typically, such substantive changes will be submitted as an addendum to this ESIA.

This *Chapter* includes the management plans for the various aspects of the proposed Kariba Dam Rehabilitation Project. Each management plan provides the following detail:

Table 6.1 Management Plan Structure

Aspect/Impact	The aspect or impact that needs to be managed in order to minimise the impact on the biophysical and socioeconomic environment.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and/or Spillway)
Aspect (Project Activity)	Project related activities resulting in the impact
Responsibility	The party responsible for implementing the management plan.
Objective	The management objective that applies to each aspect or impact.
Performance Criteria	Measurable performance criteria (outcomes) for each element.
Mitigation Measure	The strategies, tasks or action program (to nominated operational design standards) that will be implemented to achieve the performance criteria.
Monitoring	The monitoring requirements to measure actual performance (i.e. specified limits to pre-selected indicators of change).
Auditing	The auditing requirements to demonstrate implementation of agreed environmental mitigation measures and compliance with agreed performance criteria.
Reporting	Format, timing and responsibility for reporting and auditing of monitoring results.
Corrective Action	The action (options) to be implemented in case a performance requirement is not reached and the person responsible for that action (including staff authority, responsibility and management structure).

As part of the initial Scoping phase, certain potential impacts were **screened out** and not assessed as part of the ESIA process. However, common mitigation/management measures for these screened out impacts have been included in this ESMP in the form of standalone management plans (refer to "*Less Significant Screened out Impacts*" in *Table 6.2*).

Moreover, the ESIA process assessed Project related impact on hydrology, erosion and sedimentation, aquatic ecology, terrestrial ecology and various social impacts. The mitigation/management recommendations for these impacts are presented in this ESMP as commitments in the form of detailed management plans (refer to "*More Significant Impacts Assessed in the ESIA*" in *Table 6.2*).

Table 6.2 Environmental and Social Management Plans Reference

Environmental and Social Management Plans	Less Significant Screened out Impacts					More Significant Impacts Assessed in the ESIA											
						Physical Impacts		Biophysical Impacts			Social Impacts						
	Noise	Dust (Air Quality)	Cultural Heritage	Visual and Landscape	Waste	Hydrology / Water Quality	Erosion and Sedimentation	Aquatic Ecology	Terrestrial Ecology	Protected Areas	Tourism	Fisheries-Based Livelihoods	Employment Opportunities	Procurement of Goods and Services	Possible Unfair and Unsafe Working Conditions	Sexually Transmitted Infections (STIs) including HIV/AIDS	Risk of Road Traffic Accidents
Physical Environment Management Plans																	
Section 6.1.1 – Noise and Vibration Management Plan	X																
Section 6.1.2 – Air Quality and Dust Management Plan		X															
Section 6.1.3 – Surface Water Quality Management Plan						X		X									
Section 6.1.4 – Soil Erosion and Sediment Control Management Plan						X	X	X									
Biophysical Environment Management Plans																	
Section 6.2.1- Aquatic Ecology Management Plan								X				X					
Section 6.2.2 – Terrestrial Ecology Management Plan									X	X							
Section 6.2.3 – Revegetation and Rehabilitation Management Plan									X								
Social Management Plans																	
Section 6.3.1 – Tourism Management Plan				X							X						
Section 6.3.2 – Social Values Management Plan											X						
Section 6.3.3 – Community Health and Safety Management Plan												X				X	
Section 6.3.4 – Employment and Training Management Plan													X				
Section 6.3.5 – Social Infrastructure Management Plan																	
Section 6.3.6 – Procurement of Goods and Services Management Plan														X			
Section 6.3.7 – Road Safety Management Plan																	X
Section 6.3.8 – Traffic and Transport Management Plan																	X
Section 6.3.9 – Worker Health and Safety Management Plan															X		
Section 6.3.10 – Grievance Management and Incident Reporting Plan											X	X	X	X			X
Section 6.3.11 – Cultural Heritage Management Plan			X														
Other Management Plans																	
Section 6.4.1 – Waste Management Plan					X												
Section 6.4.2 – Dangerous Goods and Hazardous Substances Management Plan (Including Storage of Explosives)						X		X									
Section 6.4.3 – Environmental Induction and Training Management Plan						X		X	X	X							
Section 6.4.4 - Blasting Management Plan						X		X									
Section 6.4.5 – Emergency Preparedness Plan																	
Section 6.4.6 – Dam Safety																	

The management plans mentioned in *Table 6.2* are presented below.

6.1 PHYSICAL ENVIRONMENT MANAGEMENT PLANS

6.1.1 Noise and Vibration Management Plan

Noise and Vibration Management Plan	
Objective	To construct in a manner that minimises the impact of noise and vibrations on surrounding residences.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool only).
Aspect (Project Activity)	• Noise from refurbishment activities (site preparation and general construction activities associated with refurbishment of the plunge pool and spillway). • Vibration and noise associated with blasting.
Responsibility	Contractor
Performance Criteria	• For the reason that there are currently no standards for noise emissions in Zambia and Zimbabwe (refer to *Section 3.1* and *Section 3.2* respectively) the Project will adopt the IFC/World Bank noise level guidelines. These guidelines state that the maximum allowable ambient noise levels at the nearest noise sensitive receptor, LAeq,1hr, dB(A) Free field, are 55 dB(A) during the daytime (07:00 – 22:00) and 45 dB(A) during the night time (22:00 – 07:00). • No undue concerns expressed by surrounding stakeholders in terms of vibration. • Respond to all noise and vibration related complaints received from surrounding stakeholders and implement mitigation measures.
Mitigation Measures	• Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be periodically checked. • Use suitable and effective silencing devices for pneumatic tools and other plant that would otherwise cause a noise level exceeding 85dB (A) during excavations and other work. • Implement noise monitoring if noise complaints are received. • Careful monitoring of vibration during blasting will form a key component of dam safety. • To manage perceptions of possible dam wall collapse, blasting schedule and methods to be effectively communicated to relevant stakeholders and community members.
Monitoring and Auditing	• Complaints relating to noise and vibrations will be recorded and closed out by the Environmental Manager or delegate. • Noise monitoring only to be undertaken if complaints received. • The method of measurement and reporting will be conducted in accordance with relevant international standards. • Vibration monitoring as per dam safety aspects.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • Complaints relating to noise and will be addressed promptly, with further investigations and reporting to ZEMA and EMA if required. • Non-compliance and incident reports will be reviewed and closed

Noise and Vibration Management Plan	
	out by senior management. • Regular reviews, recommendations and corrective actions will be implemented.

6.1.2 *Air Quality and Dust Management Plan*

Air Quality and Dust Management Plan	
Objectives	To undertake the rehabilitation works in a manner that minimises impacts on ambient air quality.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool only).
Aspect (Project Activity)	• Emissions to atmosphere from refurbishment activities (site preparation and general construction activities associated with refurbishment of the plunge pool and spillway). • Vehicle movement over paved and unpaved surfaces. • Vehicle exhaust emissions.
Responsibility	Contractor
Performance Criteria	• The Zimbabwean ambient air quality standards are still in draft and have not yet been promulgated, as such these will not be considered in this ESMP. The Zambian ambient air quality standards have similar limits for Sulphur Dioxide and PM_{10} when compared to the IFC/World Bank guidelines. In addition, the Zambian standards have limits for Total Suspended Particulates (TSP), carbon monoxide and ambient lead. The only parameter where the IFC/World Bank guidelines are more conservative is for Oxides of Nitrogen (NO_x). As such, the proposed Kariba Dam Rehabilitation Project will adopt the Zambian guideline limits for ambient air pollutants for all parameters except for NO_x where 1-year mean values should not exceed 40µg/m^3 and 1 hour maximum should not exceed 200µg/m^3. • Minimise nuisance dust on unsurfaced roads. • Minimise emissions from construction equipment and vehicles. • Respond to all complaints on air quality.
Mitigation Measures	• Reduce dust through management and control (e.g. watering, mulching cleared vegetation to provide a stable surface and covering stockpile with shade cloth). • Watering frequency will be increased during periods of high risk (e.g. high winds). • Stockpiles of dusty materials must be enclosed or covered by suitable shade cloth or netting to prevent escape of dust during loading and transfer from site. • Vehicles and equipment will be maintained to keep exhaust emissions within manufacturers specifications. • The extent and period of exposure of bare surfaces will be minimised. • A "no burning" policy will be implemented. • Vehicles travelling on unpaved or gravel roads must not exceed a speed of 30 km/hr.
Monitoring and Auditing	• Visual inspection during windy conditions or during time of high traffic on unsurfaced roads. • Record all dust related complaints from surrounding stakeholders. • Visual checks of defective exhausts. • Regular inspections during rehabilitation works to review air and dust issues and watering frequency altered as required. • Maintenance records for all equipment and machinery needs to be filed and made available to the ECO. Maintenance compliance will

Air Quality and Dust Management Plan	
	be assessed on a quarterly basis.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • Complaints relating to air and dust emissions will be addressed promptly, with further investigations carried out and reporting to ZEMA and EMA, if required. • Non-compliance and incident reports will be reviewed and closed out by the Developer.

6.1.3 Surface Water Quality Management Plan

Surface Water Quality Management Plan	
Objective	To minimise the potential impacts associated with blasting, erosion and spills and to prevent the release of contaminants and increase in turbidity downstream of the cofferdam during blasting and dewatering.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool only).
Aspect (Project Activity)	• Construction of access roads across drainage lines. • Pumping of water from the cofferdam into the downstream environment. • Potential spillage events of dangerous/hazardous goods and substances. • Blasting. • Erosion and sediment runoff from active work areas.
Responsibility	Contractor
Performance Criteria	• No significant changes to the ambient water quality of the water downstream of the cofferdam. • Maintain water quality parameters below thresholds as provided in the surface water quality monitoring plan (refer to *Section 7*). • No release of contaminants to surface waters. • No failures of sediment and erosion control techniques leading to unacceptable sediment release.
Mitigation Measures	There are a number of other management plans that will help achieve the above objective. These include: • Soil Erosion and Sediment Control Management Plan for (refer to *Section 6.1.4*). • Dangerous Goods and Hazardous Substances Management Plan (refer to *Section 6.4.2*). • Waste Management Plan (refer to *Section 6.4.1*). • Blasting Management Plan (refer to *Section 0*). **<u>Pumping Water from Cofferdam Downstream</u>** • Water pumped out of the cofferdam will not be released directly downstream if water is suspected to be contaminated or turbidity levels are high. If high turbidity levels then techniques to reduce turbidity will be investigated. • Water quality will be monitored on a weekly and monthly basis. The main variables include: turbidity, pH, electrical conductivity, suspended solids, DO major ions, nutrients and trace metals.
Monitoring and	• Weekly/monthly water quality monitoring downstream of the

Surface Water Quality Management Plan	
Auditing	cofferdam. Refer to surface water quality monitoring plan (in *Section 7*) for parameters and locations. • Regular monitoring of activities involving rehabilitation works in or near watercourses. • Annual audit of controls to minimise impacts on surface water at all facilities and infrastructure.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • The following will be reported regularly: - Contractor compliance with approved erosion and sediment control plan. - Incidents of erosion or surface water contamination. - Results of routine inspections. • The following are classified as incidents relating to surface-water management: - Erosion and sediment control plan not prepared and/or implemented. - Breach in integrity of bunds. - Any temporary sediment basins demonstrating significant reduced available volume. - Insufficient housekeeping to prevent general rubbish and contaminants entering stormwater and runoff from the site. - Turbidity levels and water quality parameters exceeding desired parameters. • Should an incident/failure to comply occur, the following corrective actions could be considered: - Repair soil erosion and sediment controls. - Repair stormwater controls. - Contain and remedy or dispose of contaminated material/s. - Clean out temporary sediment basins. - Improve level of housekeeping. - Review the relevant plans. - Adjust pumping mechanisms and water discharge so as to reach appropriate turbidity levels.

6.1.4 Soil Erosion and Sediment Control Management Plan

Soil Erosion and Sediment Control Management Plan	
Objective	To minimise environmental impacts caused by soil loss and erosion.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool only).
Aspect (Project Activity)	• Clearing of vegetation. • Sediment laden run-off from active worksites. • Soil stockpiles.
Responsibility	Contractor
Performance Criteria	• Erosion and sediment control techniques implemented onsite where necessary. • No failures of sediment and erosion control techniques leading to unacceptable sediment release.

Soil Erosion and Sediment Control Management Plan	
Mitigation Measures	• Keep the work area to a minimum so that the smallest possible ground area is disturbed. • Where appropriate, installation of temporary sediment basins to capture sediment laden runoff from site. • Stabilising cleared areas not used for infrastructure with vegetation or appropriate surface treatments such as mulching or jute matting as soon as practicable following earthworks, to minimise erosion. • Diversion channels and silt fences will be constructed around the topsoil stockpiles to prevent erosion and loss of topsoil. • Place erosion control structures such as diversion drains, rock-check dams and silt fences or traps at key locations (swales, stormwater pit inlets, around stockpiles) to capture the suspended sediment. • Divert stormwater away from exposed soil to reduce overland flow or channel flow on vulnerable soils. • Provide bunding around stockpiles to prevent the material from being washed away. The height of the bund depends on the site location, the volume and type of material being stockpiled, as well as the topography. • Reinstate all drainage pits and clean out accumulated sediment or leaf litter in pits after storm/heavy rain events. • Reinstate all existing erosion-control structures after storm/heavy rain events. • Divert stormwater away from disturbed channels or swales to minimise the flow of water and risk of erosion. • On completion of works, reseed the ground with the appropriate indigenous species. • Remove temporary erosion-control structures when no longer required. • Stockpile topsoil close to rehabilitation areas and away from drainage lines. • Temporary stockpiles of soil will be protected from erosion by using a reduced slope angle, where practical, and by incorporating sediment traps in drainage ditches. • Keep stockpiles <2 m in height and aim to reuse within 12 months. • Stockpiles should be vegetated or covered, depending on size. • Stockpile topsoil and subsoil separately to allow better site restoration.
Monitoring and Auditing	• Routine maintenance inspections will be conducted of all erosion and sediment control structures to identify areas where erosion is occurring and where action is required. • All erosion control measures will be monitored for the duration of the Project. • Erosion and sedimentation controls will be inspected following any significant rainfall event.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • In the event of a control measure failing, the ECO will record it, as well as the reasons for failure and appropriate actions undertaken. • Remedial measures will be put in place should any controls fail. • Any defects revealed by maintenance and inspection of erosion and sediment control structures will be rectified immediately, and these works are to be cleaned, repaired and augmented as required to

Soil Erosion and Sediment Control Management Plan	
	ensure effective erosion and sedimentation control thereafter. • The Contractor is responsible for ensuring all necessary erosion and sediment control structures are installed and operating effectively.

6.2 BIOPHYSICAL ENVIRONMENT MANAGEMENT PLANS

6.2.1 *Aquatic Ecology Management Plan*

Aquatic Ecology Management Plan	
Objective	• To protect aquatic habitats and receiving aquatic communities from the adverse effects of Project activities. • Avoid the contamination or sedimentation of aquatic habitats.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway)
Aspect (Project Activity)	• Construction of access roads across drainage lines. • Pumping of water from the cofferdam into the downstream environment. • Potential spillage events of dangerous/hazardous goods and substances. • Blasting. • Erosion and sediment runoff from active work areas.
Responsibility	Contractor
Performance Criteria	• Minimise impacts to aquatic habitats. • Maintain water quality parameters below thresholds as provided in the surface water quality monitoring plan (refer to *Section 7*).
Mitigation Measures	Implementing mitigation measures for impacts related to water quality, hydrology, erosion and sedimentation, will also mitigate most expected impacts on aquatic biota. However, it is envisaged that there will be fish kills associated with rehabilitation works and blasting activities once the cofferdam has been constructed. The following are additional commitments: • Where practical fish will be captured and released downstream prior to dewatering the cofferdam area or blasting. • Universities or research institutions will be engaged to assist with the fish capture and monitoring. • The practicality and safety of allowing community member's access to any fish kills will be considered. • A representation of the fish community captured or killed are to be made available for scientific study in order to further taxonomic resolution. • Peak particle velocity, caused by blasting should not exceed 13 mm/s.
Monitoring and Auditing	• Water quality and turbidity monitoring in accordance with the surface water quality monitoring plan (refer to *Section 7*). • Records will be maintained of fish casualties and if these were used for scientific study.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • Fish mortality records.

Aquatic Ecology Management Plan	
	• Quarterly biomonitoring reports during the duration of rehabilitation works. • Biannual biomonitoring reports over a period of two years following the completion of rehabilitation works.

6.2.2 *Terrestrial Ecology Management Plan*

Terrestrial Ecology Management Plan	
Objective	To protect natural habitats and minimise impacts on the loss or disturbance of terrestrial and aquatic flora and fauna as a result of Project activities.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	The Project Area extends over terrestrial habitats. These habitats and associated flora and fauna will be impacted on either directly or indirectly by the Project.
Responsibility	Contractor
Performance Criteria	• Minimise impacts to natural vegetation and on habitat fragmentation. • Avoid, where practicable, endangered, vulnerable and rare (EVR) flora species and the habitat of EVR fauna. • No unauthorised clearing of natural vegetation occurs. • Permits and approvals are in place prior to any unavoidable disturbance of EVR flora and fauna species. • No introduction of declared pests occurs as a result of Project activities.
Mitigation Measures	**<u>Terrestrial Flora Protection Measures</u>** • Prepare a formal application to remove natural vegetation on sites in accordance with any requirements in the Zambian Forest Act (Cap 199) and the Zimbabwean Forest Act, 1948 (Chapter 19:05). • The total area to be cleared will be restricted to the minimal area required, leave mature trees where possible and avoid soil compacting in order to promote regrowth. • Outer limits of the area to be cleared will be marked prior to any works commencing, and any mature trees that are not to be disturbed will be appropriately marked. • Cleared vegetation will be either stick raked or chipped and stored for use as mulch during site rehabilitation works and/or in surrounding vegetated areas susceptible to erosion. • Access of construction personnel to areas outside the disturbed areas will only be allowed with the prior approval of the ECO. • An invasive plant control program will be implemented, which will include: - Effective management methods to control the spread of declared invasive plant species. - Routine monitoring to identify any new incidents of invasive plant infestation. - Provision of information for personnel on the identification of declared weeds. - Wash-down protocols for vehicles. - Appropriate procedures for invasive plant eradication and disposal. • Stockpile areas and haul roads will be clearly defined, so that invasive plant establishment and the potential spread of plant diseases may be contained. Stockpiles will be developed in

	previously cleared areas, with adequate open-spaces buffers, where possible. • Individual site pre-clearance surveys will be undertaken for each proposed clearing, to enable detection and avoidance of flora whenever possible, but should be expanded to include: - Recording of the presence or absence of listed communities and species. - Confirmation of the results of EVR flora field clearance searches and fauna microhabitat features. - Identification of permitting requirements. - Noting the presence or absence of declared invasive plant species in order to develop site-specific weed management options (control, vehicle and machinery washdowns). **<u>Terrestrial Fauna Protection Measures</u>** • Contact will be established with locally available persons (such as a veterinarian) capable of handling venomous snakes and dangerous fauna. Their contact details will be retained by the ECO and provided to onsite engineers, foremen or persons in authority onsite. • In the event of a dangerous animal being present that is threatened by, or presents a risk to activities, activities will be stopped and a qualified and equipped specialist will be called to relocate the animal to a safe location in an appropriate manner. • The ECO shall ensure that any animals needing to be moved are released, and are not kept in captivity or as pets. • Prior to clearing of any natural vegetation, any microhabitats within the site (such as under rocks, logs, up trees, under dry bark) will be inspected by the ECO's staff to check for the presence of small fauna that can be safely captured and translocated to nearby and safe areas of similar habitat. • Records will be kept, including photographs, of any animals that are relocated through any of the above procedures. Where the identity or potential threat posed by an animal is uncertain, advice will be sought from competent specialists.
Monitoring and Auditing	• Routine inspections of undisturbed areas by the ECO to identify any evidence of vegetation disturbance and invasive plant infestation. • Inspections of planned disturbances to ensure that they comply with Flora Management Plan requirements. • Records will be maintained of fauna relocations or casualties. • The ECO will monitor site clearing to ensure that: - The minimum required areas for vegetation clearing are clearly defined in advance of any disturbance. - There is no unauthorised disturbance of the surrounding habitat area. - Compensatory shelter is established where necessary. - An animal relocation program is implemented where necessary.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • The ECO will report any incidents of disturbance, weed infestation

Terrestrial Ecology Management Plan	
	or occurrence of feral animals to the Engineer as necessary. • The following constitute an incident or failure to comply: - Unauthorised disturbance of vegetation outside defined areas. - Evidence of weed infestation. - Evidence of feral pests. - Animal retrieval program not implemented during site clearing activities. - Failure to release an animal located on site. - Failure to obtain a necessary permit.

6.2.3 Revegetation and Rehabilitation Management Plan

Revegetation and Rehabilitation Management Plan	
Policy	To restore, as far as reasonably practicable, land to its pre-existing condition.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	The Project Area extends over terrestrial habitats. These habitats and associated flora and fauna will be impacted on either directly or indirectly by the Project.
Responsibility	Contractor
Performance Criteria	• Rehabilitation area is stabilised with no significant erosion events. • Rehabilitation efforts are implemented until natural succession processes take over and restore the species composition to a natural state similar to surrounding vegetation. • No invasive plant species are introduced or pose a threat to adjacent areas. • Monitoring of rehabilitation effort occurs at a frequency necessary to maximise rehabilitation success.
Implementation Strategy	• The Chinhoyi • Rehabilitation of disturbed areas will be undertaken progressively. • Prior to the re-spreading of topsoil, the ground surface will be ripped to assist with binding of the soil layers, water penetration and revegetation. • Topsoil application will only take place after spreading of subsoil's. Topsoil's will be evenly spread and left with a slightly rough surface. • Seeding of long-term topsoil stockpiles will be carried out with an appropriately designed seed mix. • Topsoil will be respread prior to revegetation of areas to be rehabilitated at completion of site activities. • Where sufficient topsoil is available, topsoil will be re-spread to a minimum depth of 75 mm. • Activities will be timed with the expected rainfall and/or availability of irrigation so that prompt vegetation can occur. • Subsoils displaced and not utilised may be stockpiled in locations approved by the Developer for later use during use. • Indigenous vegetation will be respread over the area to assist in the distribution of seed stock and provide shelter for fauna. Distribution of vegetation will be controlled to ensure that any erosion or subsidence that may occur will not be concealed during subsequent monitoring inspections. • Native groundcover and shrubs will be encouraged to revegetate wherever appropriate to minimise habitat barrier effects in significant habitat areas.

	• Seeding will be utilised where rapid restoration is required (e.g. watercourse crossings and potential high erosion areas). • Where disturbed areas are to be re-planted or reseeded, preference will be given to locally indigenous species. • Locally indigenous trees and shrubs will be allowed to regenerate naturally on cleared areas not required to be kept tree free for the purpose of operation. • Fertilisers and soil supplements will be used only as necessary and with the agreement the ECO, and at concentrations that will not lead to contamination of aquatic environments. • Temporary access roads will be closed and rehabilitated to a condition compatible with the surrounding land use. • Specific vehicle access tracks will be defined, and driving vehicles off these tracks over freshly topsoiled areas will be prohibited. • Heavy grazing of recently revegetated areas will be controlled. • Fences or other barriers will be installed where appropriate to minimise unauthorised access. • Any Weed Control Program must avoid synthetic pesticide use when possible in favour of biological or environmental control methods. According to the World Bank OP 4.09, the following criteria apply to the selection and use of pesticides in Bank-financed projects: - They must have negligible adverse human health effects. - They must be shown to be effective against the target species. - They must have minimal effect on target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them. - Their use must take into account the need to prevent the development of resistance in pests.
Monitoring and Auditing	• Regular inspections will be undertaken during the revegetation period for subsidence, presence of weeds, revegetation success and stability. • Photo-monitoring points will be established within representative examples of the rehabilitated areas, with photographs of these sites taken on a monthly basis. • Until regrowth is established, significant (e.g. riparian zones) areas and any seeded areas will be monitored regularly to ensure growth and, if necessary, appropriate reapplication of seed will be carried out. • The success of restoration will be assessed by comparing the percentage cover and species diversity in the revegetated area with that of adjoining land. • Monitoring will also include an assessment of the effectiveness of invasive plant-control measures. • The process of monitoring and rehabilitation will conclude only once the site becomes stable. • The rehabilitation plan will include monitoring requirements post rehabilitation works.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be

Revegetation and Rehabilitation Management Plan	
	reported and corrective action initiated to prevent a recurrence of the incident. • Any sites not displaying stability (after 12 months) will undergo additional rehabilitation using a method approved by the relevant authority. • Non-compliant disturbance of rehabilitated sites (such as unauthorised driving, livestock grazing, burning, tree cutting or settlement) will be reported to the ECO and appropriate authorities. • Complaints will be recorded and appropriate actions implemented and closed out by the Developer.

6.3 SOCIAL MANAGEMENT PLANS

6.3.1 Tourism Management Plan

Tourism Management Plan	
Objective	To minimise the negative Project inceptions on the tourism industry and maximise possible positive impacts on the tourism industry in the Project Area.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Responsibility	Contractor
Aspect (Project Activity)	The rehabilitation of the plunge pool and visual obtrusiveness of general construction activities may result curiosity and/or aggravation with tourists visiting the Kariba Dam.
Performance Criteria	No recorded complaints against any aspect of the rehabilitation process by tourists and tourism operators. Recorded positive comments regarding the management of the rehabilitation activities so that it does not negatively affect the tourism industry.
Mitigation Measure	• A Grievance Procedure and Mechanism where complaints and positive comments can be recorded by tourists and tourist operators will be established. • Project information boards will be erected, which provide a brief description of the rehabilitation works, the Project Programme and the daily blasting schedule. These boards are to be placed in public viewing places at the Kariba Dam. • Project information will be pro-actively shared with tourism operators to include in their presentation to tourists. • Noise and dust abatement measures will be implemented as required (refer to *Section 6.1.2*). • Appropriate access restrictions and safety procedures will be put in place for tourist visiting and/or moving through the Project Area.
Monitoring and Auditing	• Monthly monitoring of possible reported grievances or positive comments as captured in the Grievance Mechanism. • Biannual auditing of grievance and positive comments records. • Suggest corrective actions if required.

Tourism Management Plan	
Reporting and Corrective Action	• An active grievance procedure and mechanism. • Monthly reporting by Contractor to the ZRA of monitoring information. • Biannual audit reports by the Contractor to the ZRA with presentation of audit outcome. • Regular presentations and interaction by the ZRA with tourist operators and other community representatives to report on the rehabilitation works process and share monitoring and audit findings with them.

6.3.2 Social Values Management Plan

Social Values Management Plan	
Objectives	• Ensure the Project does not constrain community lifestyles or access to amenities, and avoids damage to social values including local networks. • Ensure workers respect local social values and enact mitigation strategies. • Establish and maintain regular engagement with all key stakeholders throughout the Project Area.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	The Project will result in non-locals / local interaction. This interaction may result in: • Changes to cultural and social values. • Changes to formal and informal support structures.
Responsibility	• ZRA • Contractor
Performance Criteria	• Community satisfaction with management of impacts on amenity and local values throughout the Project Area, during rehabilitation works, measured through successful resolution of queries and complaints, and survey for corporate reporting. • Positive, productive relationships with community members and organisations throughout the duration of rehabilitation works, as evidenced in satisfaction surveys and local media.
Mitigation Measures	• Develop a comprehensive Community Engagement Management Plan, to include: - Community engagement plans for the Project Area. - Community participation in monitoring. - Community enquiries and complaints resolution process. • Consult with local leaders to ensure the Project is fulfilling commitments to local participation including in training, employment, community benefits package, and monitoring activities and outcomes. • Ensure community relations plans detail responsibilities falling on the Contractor to the same standard as for the Developer's performance. • Develop a detailed community grievance procedure to ensure that individuals are able to easily contact the company and have their concern promptly addressed. • Ensure a high standard of environmental management and monitoring, including participative monitoring with community groups, where practical. • The Project will clearly communicate information on safety standards and practices, and respond quickly to community

Social Values Management Plan	
	questions as they arise. • Maintain a focus on protection of recreational, community and, tourism in Project execution planning and contracts. • Train all workers in Camp and Town Rules and Code of Conduct, and standardise disciplinary and safety procedures for all Contractors and subcontractors.
Monitoring and Auditing	• Community and environmental group participation in monitoring projects and review of results. • Successful resolution of community complaints and grievances. • Minutes of all community meetings.
Reporting and Corrective Action	• Community relations report, including minutes of all meetings held with community leaders and other stakeholders. • Corrective action as required including reviewing social investment and labour force behaviour management strategies. • Non-compliance and Incident Reporting will be closed out by the Developer to ensure prompt rectification and change management as required. • The Contractor will maintain records of all monitoring and auditing activities and report results to the ECO and Developer at agreed intervals. • Recommendations and corrective actions arising from audits and reviews will be implemented. • Regular liaison with government officials to monitor the effectiveness of the management plan and review as required.

6.3.3 Community Health and Safety Management Plan

Community Health and Safety Management Plan	
Objectives	• Reduce and offset demand on health and social services from workers. • Ensure worker behaviour and the Project avoids impacts on community health, and protects and enhances community safety. • Avoid worker and Project traffic impact on local businesses and sensitive receptors.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	Interactions between the workforce and local communities.
Performance Criteria	• Onsite health services meet all workers' primary health care needs and demand for general practitioners. • Established partnership with an independent entity such as an NGO (whose mandate covers both the workers and communities in the Project Area) for implementation of HIV/AIDS awareness and prevention programmes. • No offences against the person attributable to Project employees or contractors for the duration of the Project. • No traffic accidents attributable to Project employees or contractors.
Mitigation Measures	• Develop and implement an Emergency Preparedness Plan (refer to Emergency Preparedness Plan in *Section 6.4.5* and Dam Safety Plan in *Section 6.4.6*). • Provide safety induction to all personnel and contractors working on the Project, including traffic safety and community safety, with failure to adhere to these procedures leading to disciplinary measures. • Ensure all personnel understand that they are responsible for

Community Health and Safety Management Plan	
	ensuring the safety of themselves and any other people who may be affected by their actions. • The Contractor will partner up with an NGO that is working for HIV/AIDs initiative in the Kariba and Siavonga Districts. This partnership will ensure that the Project assists in HIV/AIDs awareness initiatives in the Project Area of Influence. • Clearly communicate information on safety standards and respond quickly to community questions as they arise. • Provide onsite health professionals at site, and ensure access to a medical practitioner for workers resident in construction camps. • Ensure workers are aware of Project-provided, community-provided and government-provided support services in the region. • Support pedestrian and traffic safety education initiatives through knowledge-sharing (refer to *Section 6.3.8*).
Monitoring and Auditing	• The number of incidents or complaints received in relation to community health and safety will be monitored and compiled. • Regular audits and reviews will be undertaken and recommendations and corrective actions will be implemented. • Community Liaison personnel will work alongside the rehabilitation work activities and will ensure the social mitigation measures outlined are implemented.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • All incidents including near-misses and deaths need to be reported through the incident reporting system within 24-hours of the incident occurring. • Community complaints will be recorded and closed out by the Developer. • Review Emergency Preparedness Plan, annually.

6.3.4 Employment and Training Management Plan

Employment and Training Management Plan	
Objectives	• To develop a Recruitment and Employment Policy with the aim of maximising employment and training opportunities for local job seekers. • To optimise employment opportunities, firstly for job seekers from the Project Area and secondly for job seekers from Zambia and Zimbabwe.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	Employment opportunities associated with the Project are estimated to be – • Plunge Pool – 100 unskilled, 40, skilled and 20 highly skilled. • Spillway - 160 unskilled, 75, skilled and 30 highly skilled.
Responsibility	• ZRA • Contractor
Performance Criteria	• The number, type and duration of employment opportunities for people from the Project Area and from Zimbabwe and Zambia. • The total monthly wage and salary bill of employees originating

Employment and Training Management Plan	
	from the Project Area and from Zimbabwe and Zambia. • The number of employment opportunities for marginalised/vulnerable groups such as the disabled and women.
Mitigation Measures	• Develop a Local Employment Program including: - Skills audits, including local people, young people and woman. - A program of up-skilling, training and development to increase local availability of those trades with a local shortage. - Job readiness training program. - Women's training and employment program. - Participate in events where potential employees can meet Project staff, learn about the Project, and register their interest for training and employment. - Provide a program of up-skilling, training and development to increase local availability of those trades with a local shortage. - Recruitment and retention programs and strategies to attract skilled trades and supervision personnel from the local area. - Local content strategy focusing on the Project Area, based on an accurate understanding of current and potential future business capacity. • Project specific Recruitment Policies will be developed by the ZRA as well as the Contractor. • Targets will be set to maximise the number of Zambian and Zimbabwean nationals, local, female, disabled, unskilled, skilled and highly skilled employees from the Project Area. • Local Employment targets will form part of the Conditions of Contract with the Contractor. • Target skills development and recruitment programs to unemployed, young people and woman, to enhance capacity and resilience of disadvantaged people. • Employment opportunities will be publically advertised in appropriate newspapers, public libraries, the District Offices and in all relevant languages. • The Contractor will establish a recruitment office for the purpose of keeping a record of available prospective employees, their skills levels and contact details. Registration of job seekers with the Recruitment Office will be free of charge. • No employment will take place at the entrance to the site. Only formal channels for employment will be used.
Monitoring and Auditing	• Monthly monitoring of achievement against contractual employment targets. • Preparation of monthly and cumulative employment statistics reports for submission to the ZRA. • Conduct an annual audit of employment statistics based on which an incentive for achieving employment targets can be considered.
Reporting and Corrective Action	• Monthly reporting by the Contractor to the ZRA on achievement of contractual employment targets and suggested corrective actions if needed. • The ZAR will comply with Zambian and Zimbabwean regulations pertaining to reporting requirements related to recruitment. • The ZRA will report to the World Band and African Development Bank as per their agreed reporting schedule. • Twice annually progress reporting to interested and affected parties from the Project Area regarding achievement of employment targets and corrective actions if so required.

6.3.5 *Social Infrastructure Management Plan*

Social Infrastructure Management Plan	
Objective	• Avoid net increase in demand on community services from Project workers. • Mitigate impacts on community resources. • Support the capacity of health and community service providers to maintain quality service provision and strong community networks.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	The Project may result in additional pressure to social infrastructure in the Project Area and surrounds.
Responsibility	Contractor
Performance Criteria	• Community services capacity not exceeded as a result of the Project.
Mitigation Measures	• Develop consultative relationships between the Developer and key social infrastructure providers (Health, Education & Training, Police, Dept Communities, and Regional Councils). • Identify appropriate Corporate Social Investment Initiatives that support social infrastructure and services.
Monitoring and Auditing	• Direct and cumulative impacts on social and health infrastructure will be closely monitored, with corrective action such as re-allocations of community investment as required.
Reporting and Corrective Action	• Community relations report including relevant metrics quarterly during the duration of rehabilitation works. • Corrective action as required including reviewing workforce behaviour management strategies.

6.3.6 *Procurement of Goods and Services Management Plan*

Procurement Management Plan	
Objectives	• Promote procurement of goods and services by the Project in the Project Area as well as in Zimbabwe and Zambia. • Maximise opportunities for local suppliers to participate in the Project's supply chain. • Provide training courses and support to service providers (in the Project Area and in-countries) who are seeking to supply goods and services to the Project. Specific training needs will be identified with in consultation with service providers.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	The Project will require the purchase of equipment and other goods and services. The majority of these will be for highly specialised and technical goods and will be provided by specialist providers; however, it is anticipated that some potential exists for local /and regional businesses to meet at least some of the procurement needs of the Project.
Responsibility	• ZRA • Contractor
Performance Criteria	• Number of businesses from the Project Area and from Zambia and Zimbabwe that benefit from Project procurement. • Value of sales against total value of procured goods and services on the Project.
Mitigation Measures	This ESMP will form part of the tender documents for potential

Procurement Management Plan	
	contractors during the bidding process. This will allow bidders to adequately factor in the costs associated with compliance to this plan into the overall costing. The Contractor will develop and implement Procurement Strategies. To the extent possible, the Procurement Strategies will provide for: • The establishment of a service provider database by the Contractor. The database will reflect the name, type, location, contact details and capacity of the businesses as a minimum. • The unbundling of contracts into smaller and more manageable packages so that in-country and possibly less experienced local and regional suppliers have a better chance of being selected. • Setting procurement targets for different business categories e.g. per sector or in terms in-country or women ownership and or management of the business. • Basic capacity building support to in-country businesses to assist them with responding to tender opportunities and meeting administrative requirements of written communication, invoicing and reporting. • Advertising of procurement opportunities according to a specific, agreed and well–communicated method and medium.
Monitoring and Auditing	• Monthly monitoring of achievement against contractual procurement targets. • Monthly monitoring of the value of procurement in the Project Area and in Zimbabwe and Zambia against Project's total procurement value. • Preparation and submission of monthly and cumulative procurement figure reports for submission to the ZRA. • Conduct an annual audit of procurement figures based on which an incentive for achieving procurement targets can be considered. Monthly monitoring achievement against procurement targets. • Monthly monitoring of procurement training courses in terms of type of training, number of participants, duration of training and value of training.
Reporting and Corrective Action	• Monthly reporting by the Contractor to the ZRA on the achievement of contractual procurement targets and suggested corrective actions to reach targets if needed. • Monthly reporting by the Contractor to the ZRA regarding training courses presented and attended. • Monthly reporting on value of procurement in Project Area as well as in Zimbabwe and Zambia. • Regular progress reporting to Government and other interested and affected parties regarding procurement matters.

6.3.7 Road Safety Management Plan

Road Safety Management Plan	
Objectives	• Design and implementation of measures to curb the increased risk of traffic accidents due to increased road traffic numbers and road users. • Increased awareness through training of safe road traffic and pedestrian behaviour on site and in the Project Area.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project	Vehicles and traffic associated with the Project and the interaction of

Road Safety Management Plan	
Activity)	these with surrounding communities.
Responsibility	Contractor
Performance Criteria	• Maximum number of accident free hours driven by Project vehicles and Project related traffic. • Number of staff to successfully conclude road traffic safety awareness training.
Mitigation Measures	Implement a Vehicle and Traffic Programme that includes: • Fitting all construction vehicles with tracking devices capable of checking speed driven at and routes followed. Should drivers not adhere to agreed speed limits and approved routes, disciplinary. measures will be implemented according to an agreed system. • Construction vehicles will be subjected to regular maintenance checks and maintained in good operating condition. • All drivers will hold a valid licence issued to him in respect of motor vehicles of the class concerned. • All motor vehicles will have adequate motor vehicle insurance against third party. • Where necessary, drivers driving outside of the borders of their origin will have the appropriate international driving permit. • Safe operating speeds for loaded and empty haulage vehicles will be defined, particularly on public roads. • Unauthorized passenger transport is prohibited. No members of the public may be transported in construction vehicles. • Alcohol and drug use immediately before and during operations of construction vehicles is prohibited. • Cellular telephone use during driving of construction vehicles is prohibited. • A Grievance Procedure will be developed and implemented whereby members of the public can raise road traffic related incidences and grievances for management by the Project authorities. • A Damage Compensation Policy and Procedure will be developed and implemented in the event that traffic accidents lead to injury and death as a result of negligence on the part of the Project. • Permitting approval of abnormal loads will be agreed in advance with the relevant authorities.
Monitoring and Auditing	• The number of incidents or complaints received in relation to community health and safety will be monitored and reported. • Regular audits and reviews will be undertaken and recommendations and corrective actions will be implemented. • Community Liaison personnel will work alongside the rehabilitation work activities and will ensure the social mitigation measures outlined are implemented.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • All incidents including near-misses and deaths need to be reported through the incident reporting system within 24-hours of the incident occurring. • All incidents to be reviewed by the ECO and the ZRA. • Community complaints will be recorded and closed out by the ZRA. • Review Emergency Preparedness Plan, annually.

Road Safety Management Plan	
	• Regular liaison with community representatives to monitor the effectiveness of the management plan and review as required.

6.3.8 *Traffic and Transport Management Plan*

Traffic and Transport Management Plan	
Objective	To minimise impacts associated with traffic generated by the Project and transport of abnormal loads to the Project Area.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	Vehicles and traffic associated with the Project and the interaction of these with surrounding communities.
Responsibility	Contractor
Performance Criteria	• No traffic-related incidents and minimal complaints. • Minimise impacts on road pavements.
Mitigation Measures	• Development and implementation of a traffic management strategy for transport of rehabilitation work materials and equipment to the site, including abnormal loads. • Clear signs and signals will be installed on-site and along access and haul roads to guide traffic movement and increase traffic safety. • Vehicles will observe site traffic regulations (i.e. speed limits). Vehicles must to adhere to speed limits on site, and not exceed 30km/hr on site. • The transport of oversize loads will be restricted to non-peak periods where possible and deliveries will be restricted to periods of least risk to other road users where possible. • Necessary approvals for the transport of oversize loads will be obtained from the relevant authorities prior to transporting the loads. • All vehicles transporting goods to the Project Area (both local and foreign vehicles) will need to obtain the appropriate licenses and have certificate of fitness. • Rail will be used, where feasible to transport Project components from the port to the site.
Monitoring and Auditing	• The number of incidents or complaints received in relation to project traffic will be monitored. • Potential transport network shortcomings will be reported to the relevant authorities and appropriate action taken in agreement with those authorities. • Road conditions will be monitored on a regular basis. • Transport companies will be audited to ensure compliance with Traffic Management Plan.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the ZRA at agreed intervals. • Recommendations and corrective actions arising from audits will be recorded. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • The occurrence of any traffic incidents or complaints will be recorded by the ECO and reported to the Developer. • All traffic incidents involving Project personnel will be thoroughly investigated. • All incidents including near-misses and deaths need to be reported through the incident reporting system within 24-hours of the

Traffic and Transport Management Plan	
	incident occurring. • In the event of a complaint/incident or failure to comply with requirements, relevant corrective action will be taken.

6.3.9 *Worker Health and Safety Management Plan*

Worker Health and Safety Management Plan	
Objectives	• Creating a fair and safe working environment to contribute to the health and welfare of the Project labour force.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	• Exposure of workforce to health and safety standards incidents. • Exposure of workforce to insufficient labour and working standards.
Responsibility	• Contractor
Performance Criteria	• No recorded unfair and unsafe working condition incident. • No worker health and safety incidents. • Correct use and maintenance of Personal Protective Equipment (PPE) • Established partnership with an independent entity such as an NGO (whose mandate covers both the workers and communities in the Project Area) for implementation of HIV/AIDS awareness and prevention programmes. • Maximum number of hours worked without the reporting of unfair or unsafe employment conditions.
Mitigation Measures	• All foreign employees will have the correct travel permits/documents associated with entry into Zambia/Zimbabwe. • Ensure all dangerous work areas, quarries and borrow pits are fenced off. • Develop and implement a site access plan to regulate transport routes to and from the dam site to defined areas with clear reporting conditions. • Strictly enforce and monitor road safety standards. • Provide the Facilities and procedures for Emergency Response. • Appropriate Personal Protective Equipment (PPE) must be worn by all construction personnel. This shall include the use of ear protection in areas where the 8-hour ambient noise levels exceed 75dBA. • A PPE programme will be developed. The program will address the hazards present; the selection, maintenance, and use of PPE; the training of employees; and monitoring the program to ensure its ongoing effectiveness. • To ensure that the Contractor will follow legally regulated employment practices and health and safety practices, the ZRA will assess the robustness of proposed human resource and health and safety policies and plans as part of the tender evaluation process. This will include aspects such as workers' working conditions, living conditions and health and safety. Non-compliance with legislative requirements will result in penalties, the form of which must be determined by the ZRA. • A HIV/AIDs prevention programme for the workforce will be developed and implemented through an entity such as an NGO, whose mandate shall cover workers and communities around the Project Area. • A Workforce Code of Conduct will be developed and implemented and will include:

	- Zero tolerance of illegal activities by all personnel. - Forbidding the use of prostitution. - Forbidding the illegal sale or purchase of alcohol. - Forbidding the sale, purchase or consumption of drugs. - Forbidding gambling and fighting. • Sufficient capacity and capability to care and treat any HIV-positive employees will be ensured. • Access to free condoms (including female condoms) at the worker camp to promote safe sexual practices will be ensured. • Information, education and communication campaigns around safe sexual practices and transmission of STIs and HIV/AIDS will be undertaken. • Women's empowerment and education programmes to promote women's rights and safe sexual practices (including the use of condoms and female condoms) and support will be supported in partnership with local government. • The Contractor will have a robust Grievance Policy and Procedure available to employees so that unfair and possible unsafe practices are reported and investigated. • Conduct an annual audit of grievance and safety statistics. • Establish a protocol for medical evacuation arrangements.
Monitoring and Auditing	• Monthly monitoring of achievement against stated performance criteria of maximum number of hours worked without reporting of an unfair or unsafe employment condition. • Preparation of monthly and cumulative performance statistics reports on this matter for submission to the ZRA. • Conduct an annual audit of performance statistics based on which an incentive for achieving no recorded unfair or unsafe conditions can be considered by the ZRA. • The Contractor will host regular engagement sessions with their employees to assess whether there are grievances or safety issues to address pro-actively. This can be done as part of the regular Toolbox Talk practise.
Reporting and Corrective Action	• The contractor will implement a system whereby workers can report any observed unsafe and/or remarkably safe practices and conditions. Such a system can be setup through site logs, which will be reviewed by the Project Management team. • Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • All incidents including near-misses and deaths need to be reported through the incident reporting system within 24-hours of the incident occurring. • Any worker found in violation of the Workforce Code of Conduct will face disciplinary hearing which will potentially result in dismissal. • All incidents to be reviewed by the ECO and Developer. • Review Emergency Preparedness Plan, annually.

6.3.10 *Grievance Management and Incident Reporting Plan*

Grievance Management and Incident Reporting Plan	
Objectives	To have a process whereby all incidents and complaints can be lodged and responded to in an appropriate manner.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	The Project may result in local community complaints.
Responsibility	Contractor
Performance Criteria	• Record all complaints and responses in an incidents and complaints register. • Respond appropriately to all incidents and complaints.
Mitigation Measures	• The contractor will develop a robust IEC (Information, Education and Communication) strategy whereby communities will be educated and kept informed of the Project, associated positive and negative impacts and management/mitigation commitments. The strategy will be implemented throughout the Project and can involve communication and education through the development of posters, flyers, brochures and focused engagement sessions. The strategy will– - Have a clear set of objective - Be structured in a way that ensures understanding for a target a specific audience - Address specific problems / misunderstandings regarding the Project (for example employment expectations, retrenchment issues, fears regarding plunge pool works and the possibility of dam failure, water quality issues to downstream water flows, etc.) • Contact names and numbers and mechanisms for lodging grievances will be clearly communicated to affected communities. • All incidents and grievances will be recorded in a database, with corrective actions assigned and followed up by the responsible person for a particular incident or grievance. • The complaints form will document at least the following information: - Time, date and nature of complaint. - Type of communication (telephone, letter, email, visit). - Name, contact address and contact number (if provided). - Response and investigation undertaken as a result of the complaint. - Action taken and signature of person investigating complaint. • Each complaint will be investigated as soon as practicable and, where appropriate, action taken to remedy the cause of the complaint. If ZEMA or EMA advises alleged nuisance, it will be investigated and ZEMA or EMA will be advised of any action proposed or undertaken, and records will be kept of all complaints.
Monitoring and Auditing	• The Contractor will maintain the complaints register and ensure all complaints are resolved. The complaint form will be checked by the ECO within two weeks of complaint receipt to ensure follow-up action has been taken to resolve the issue. • If complaints cannot be resolved the Contractor will inform the ECO and Engineer who in turn will inform ZRA. • Where required, the relevant authorities will be informed of complaints.
Reporting and Corrective Action	• All complaints and incidents are to be reported to the ECO. • Should further incidents occur or complaints be received in relation to previous occurrences, an appropriate selection of the following

Grievance Management and Incident Reporting Plan	
	corrective actions will be undertaken. • Additional environmental awareness training of the labour force with respect to the procedures to be followed for environmental incidents or complaints. • Investigation into why the incident/complaint was not addressed within the specified timeframe. • Incident/complaint follow-up according to the results of the investigation. • Where required, work place practices will be reviewed. • Regular liaison with community representatives to monitor the effectiveness of the management plan and review as required.

6.3.11 Cultural Heritage Management Plan

Cultural Heritage Management Plan	
Objectives	Avoid or mitigate impacts on indigenous cultural values Avoid or mitigate impacts on indigenous culture and sites of cultural heritage significance.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	It is not anticipated that there are any cultural heritage sites located in the Project Area; however, there may be sub-surface archaeological resources that could fall within the footprints of proposed ground disturbing activities.
Responsibility	Contractor
Performance Criteria	• Compliance with the Chance Find Procedures. • Compliance with community expectations regarding protection and management of cultural heritage.
Mitigation Measures	• Should any archaeological materials be uncovered or exposed during earthworks or excavations, the following Chance Find Procedure will be followed: - Inform site supervisor/foreman. - Install temporary site protection measures (warning tape and stakes, avoidance signs). - Inform all personnel of the Chance Find if access to any part of the work area is restricted. - Establish a localized no-go area needed to protect the Chance Find. - The local qualified cultural heritage/archaeological specialist will confer and perform a preliminary evaluation to determine whether the Chance Find is cultural heritage and if so, whether it is an isolate or part of a larger site or feature. - Artefacts will be left in place when possible; if materials are collected they will be placed in bags and labelled by the specialist and transported to the Zambian National Heritage Conservation Commission headquarters, or the Zimbabwean National Museums and Monuments headquarters. No Project personnel are permitted to take or keep artefacts as personal possessions. - Document find through photography, notes, GPS coordinates, and maps (collect spatial data) as appropriate. - If the Chance Find proves to be an isolated find or not cultural heritage, the local specialist will authorize the removal of site protection measures and activity in the

Cultural Heritage Management Plan	
	vicinity of the site can resume. - If the specialists confirm the Chance Find is a cultural heritage site they will inform the Zambian National Heritage Conservation Commission or Zimbabwean National Museums and Monuments and initiate discussions with the latter about treatment. - Prepare and retain archaeological monitoring records including all initial reports whether they are later confirmed or not. The record will include coordinates of all observations to be retained within the project's GIS system (*viz*. ArcGIS). - Develop and implement treatment plans for confirmed finds using the services of the specialist. - If a Chance Find is a verified cultural heritage site, prepare a final Chance Finds report once treatment has been completed. • While investigation is ongoing, co-ordinate with on-site personnel keeping them informed as to status and schedule of investigations, and informing them when the rehabilitation works may resume.
Monitoring and Auditing	• Ensure detailed design and rehabilitation work planning avoids or mitigates impacts on sites of cultural heritage significance. • Record of all artefacts or cultural heritage aspects identified during the duration of rehabilitation works.
Reporting and Corrective Action	• New indigenous heritage sites identified during rehabilitation works will be reported to the relevant heritage authorities. Notify the Police if human remains are discovered to determine whether the remains are ancient and/or indigenous. If determined to be indigenous, the former procedure on the discovery, handling and management of human remains under the provisions of the heritage authorities will apply.

6.4 *OTHER MANAGEMENT PLANS*

6.4.1 *Waste Management Plan*

Waste Management Plan	
Objective	• To minimise waste generation and maximise reuse and recycling of waste products. • To dispose of waste in a manner that does not cause contamination of soils, water or air or harm to human health.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	Wastes (general and hazardous) produced during the life cycle of the rehabilitation project.
Responsibility	Contractor
Performance Criteria	• No contamination of soil, air or water as a result of inappropriate waste management. • No loss of health to personnel or third parties as a result on inappropriate waste management practices. • All waste disposal to be carried out by a licensed waste contractor.
Mitigation Measures	• A waste inventory of waste streams (including hazardous wastes) will be developed and be reviewed for optimal, efficient and effective management. • Management strategies for specific waste streams will be developed before rehabilitation works commence. • All waste material will be removed from the workplace by an

appropriately licensed waste contractor. No wastes will be buried or disposed of on-site.

- Local authorities will be consulted about their capacity to receive waste.
- Wherever possible wastes will be reused or recycled and segregated and bins or storage areas labelled to ensure the correct items are disposed of appropriately.
- Recycling protocols will sort materials into the following categories:
  - Paper / cardboard;
  - Any packaging materials suitable for re-use;
  - Plastics;
  - Aluminium;
  - Metals (other than aluminium);
  - Wood;
  - Organic waste;
  - Glass; and
  - Clean Building Rubble.
- Perishable solid waste will be stored in covered, standard general waste containers to prevent odours and public health hazards, and disposed of by a licensed waste contractor.
- General rubbish, food wastes and non-recycled glass, paper, plastics and related materials will be disposed of in an appropriate waste disposal facility.
- Refuse containers will be located at each worksite.
- All personnel will be instructed in waste management practices and procedures as a component of the environmental induction process.
- A high emphasis will be placed on housekeeping and all work areas will be maintained in a neat and orderly manner.
- All equipment and facilities will be maintained in a clean and safe condition.
- Chemical wastes will be collected and appropriately labelled for safe transport to an approved chemical waste depot or collection by a liquid waste treatment service.
- Grease traps from each camp kitchen will be pumped out approximately once every month. Grease trap waste will be removed by a licensed waste transport company for disposal at appropriate waste disposal facilities.
- Containment bunds and/or sumps will be drained periodically to prevent overflow and subsequent pollution of the surrounding land and/or water body.
- All hazardous wastes will be appropriately stored in bunded areas away from watercourses.
- Hydrocarbon wastes, including lube oil, oil filters, oily rags will be collected for safe transport off-site for reuse, recycling, treatment or disposal at appropriate waste disposal facilities.
- Waste tracking applies to all regulated, controlled and hazardous wastes such as oil, spent oil filters, oily rags and spent oil absorbent. Correct waste-tracking forms will be obtained and used.
- Copies of the licenses of waste transporters, disposers and recyclers will be kept on site and up to date.
- Unknown substances must be identified prior to disposal. This may require off-site laboratory testing.
- When a new waste stream is identified, investigations will be conducted to determine the options to reuse, recycle, reclaim or reprocess the waste materials. Littering includes the loss of waste onto roads from a trailer or back of a vehicle and disposal of

Waste Management Plan	
	cigarette butts or other items thrown from cars, including cigarette butts thrown onto the ground outside offices or camp rooms. It will be obligatory for all waste items to be placed in the correct waste disposal receptacles. • Temporary waste storage area to be weather proof to prevent dispersion of waste through e.g. wind or rain. • A Method Statement shall be required for all wash areas where hydrocarbon and hazardous materials or other pollutants are expected to be used. This includes, but is not limited to, vehicle washing, workshop wash bays and paint equipment cleaning. Wash areas for domestic use shall ensure that the disposal of contaminated "grey" water is sanctioned by the Engineer.
Monitoring and Auditing	• Housekeeping checks will be conducted to ensure waste is being transferred and stored correctly and that no littering is occurring. • Regular inspections of waste disposal areas for compliance with waste management plans, Environmental Licence conditions and relevant legislation. • A complaints register will be maintained detailing complaints about waste management including litter, odour, soil or water contamination and visual amenity. • A record will be maintained of all impacts to health that are potentially attributable to waste management.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • All complaints due to waste management practices will be investigated.

6.4.2 *Dangerous Goods and Hazardous Substances Management Plan (Including Storage of Explosives)*

Dangerous Goods and Hazardous Substances Management Plan	
Objectives	To protect Project personnel, the public and the environment from harm due to the transport, storage or use of dangerous goods or hazardous substances.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	Dangerous goods and hazardous substances used during the life cycle of the rehabilitation project.
Responsibility	Contractor
Performance Criteria	• No unplanned release of dangerous goods or hazardous substances. • All transport, storage and handling of dangerous goods or hazardous and dangerous substances is performed in accordance with applicable – including – - The Zambian Explosives Act (No 10 of 1974) Regulations. - The Zimbabwean Explosives Act (Chapter 10:08). - The Zimbabwean Regulation 12 of 2007 Environmental Management Act (Hazardous Substances, Pesticides and other Toxic Substances). - The IFC PS 3 - Resource Efficiency and Pollution Prevention Performance Standard.

Dangerous Goods and Hazardous Substances Management Plan	
	- The African Development Bank Operational Safeguard (OS) 4 – Pollution Prevention and Control, Hazardous Materials and Resource Efficiency.
Mitigation Measures	• Training of personnel in the storage and handling of corrosive substances and hazardous materials. • Hazchem signage used where hazardous goods are being stored and hazardous materials to be clearly labelled. • Segregation of corrosive substances that are kept in bulk from incompatible goods and goods with which they may react dangerously. • Hazardous chemical substances used during rehabilitation works will be stored in secondary containers. The relevant Material Safety Data Sheets (MSDS) will be available on the site. Procedures detailed in the MSDS will be followed in the event of an emergency situation. • Implementation of clean-up procedures for spills. • Spill management materials will be provided at any fuel or chemical storage location. • Suitable compound drainage implemented. • Provision of compounds (bunded areas) for all above-ground bulk containers of corrosive substances. Bunds to be 110% volume of the largest storage vessel in the bund. • Ensuring there are no ignition sources in the vicinity of the bunded area. • Maintenance of spill kits including pumps and hoses for transferring spilt liquids. • Fuelling area to have containment for spills, and spill kits. • If potentially hazardous substances are to be stored on the site, the Contractor will provide a Method Statement detailing the substances/ materials to be used, together with the storage, handling and disposal procedures of the materials.
Monitoring and Auditing	• Dangerous goods locations inspected on a regular basis. • Record of all incidents involving dangerous goods. • Inspection of MSDS for all dangerous goods. • Inspection of training records for those handling dangerous goods.
Reporting and Corrective Action	• Records of all monitoring and auditing activities will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • Instances of release of dangerous goods followed up and corrective actions taken to minimise probability of reoccurrence. • Release of potential contaminants reported to relevant authorities as appropriate.

6.4.3 Environmental Induction and Training Management Plan

Environmental Induction and Training Management Plan	
Objective	To ensure that all Project personnel, including contractors, comply with the environmental requirements of all tasks.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and Spillway).
Aspect (Project Activity)	The Project will require a workforce that will have direct interaction with the physical, biological and social environments.

Environmental Induction and Training Management Plan	
Responsibility	Contractor
Performance Criteria	• All personnel undergo site inductions and, where necessary, additional training, that address environmental and social requirements of Project activities. • Full compliance with induction and training procedures.
Mitigation Measures	• Develop an induction training plan that explains environmental and social obligations, the purpose of the ESMP and any issues new starters, whether permanent or contractors, must be aware of. • All personnel will receive site inductions which will include environmental and social responsibilities. • Training programs will be conducted as required. • All site staff will be made aware of the ESMP, Project detailed management plans, Environmental Licence conditions, environmentally and socially sensitive areas and responsibilities. • As a minimum, everyone will have basic environmental and social training and be familiar with the ESMP, irrespective of their respective roles and responsibilities. • Identify and describe how, when and with whom specific skills training will occur. • Ensure a document exists that clearly lists who will require training, the frequency of training and the procedure to document training activities. Identify to what basic level or standard training will be targeted. • Environmental Awareness Training: - Environmental awareness training sessions shall be run for all personnel on the site. Two types of course shall be run, one for the Contractor's and Subcontractor's management and one for all site staff and labourers. Courses shall be run during normal working hours at a suitable venue provided by the Contractor. All attendees shall remain for the duration of the course and sign an attendance register on completion that clearly indicates participant's names, a copy of which shall be handed to the Engineer. - All staff are to attend an initial presentation of approximately 45 minutes, and approximately half an hour a month thereafter for the duration of the contract shall be allowed for employees to attend any follow-up lectures, should such follow-up lectures be deemed necessary by the ECO. In addition, all new staff and sub-contractors as well as employees that spend more than one day a week or four days in a month, to attend the environmental education session within one week of commencement of work on site. The Contractor shall supply the ECO with a monthly report indicating the number of employees that will be present on site during the following month and any changes in this number that may occur during the month. - No more than 30 people shall attend each course and the cost, venue and logistics for this/ these course/s shall be for the Contractors responsibility. The ECO shall keep a register of all personnel attending the Environmental awareness training sessions. - Notwithstanding the specific provisions of this clause, it is incumbent upon the Contractor to convey the sentiments of the ESMP to all personnel involved with the works. - Training for management and foremen: o The environmental awareness training session for management shall include all management and foremen. The session, which will be presented by the

Environmental Induction and Training Management Plan	
	ECO, will be of approximately one-hour duration. The initial session shall be undertaken not less than seven days prior to commencement of work on the site. Subsequent sessions shall be held as and when required. - Training course for site staff and labour: o The environmental awareness training session for the site staff and labour shall be presented by the ECO. The course will be approximately 45 minutes long. The course shall be run not more than seven days after commencement of work on site with sufficient sessions to accommodate all available personnel. Subsequent sessions shall be held as and when required.
Monitoring and Auditing	• The success of the training programs will be assessed and documented. • Non-compliance with training will be recorded. • All training records will be reviewed.
Reporting and Corrective Action	• In the event of a staff member not being adequately trained or inducted, training activities will be undertaken as necessary. • The training or induction programme will be revised accordingly.

6.4.4 Blasting Management Plan

Blasting and blasting management will form a key component of the engineering design with regards to dam safety. As a result, blasting with regards to dam safety is not covered in the ESMP with the dam safety aspects referred to in *Section 6.4.6*. This *Section* covers the environmental and social aspects associated with blasting rather than the dam safety issues.

Blasting Management Plan	
Objective	Undertake blasting activities with no health and safety incidents. Undertake blasting activities in an environmentally and socially sensitive manner.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool only).
Aspect (Project Activity)	Rehabilitation of the Plunge Pool will require the removal of rock through the use of blasting.
Responsibility	Contractor
Performance Criteria	• No health and safety incidents. • No complaints from residents, landholders users of the Kariba Dam.
Mitigation Measures	• Local residents and communities will be advised of the planned blasting schedule ahead of time. • Monitor the effects of blasting activities up- and downstream of the blast zone. • Ammonium-nitrate based explosives will not be used due to the production of toxic by-products. • The explosives storage area will be designed and constructed by an accredited and approved professional engineer. • Explosives will be stored in such a way so as to avoid uncontrolled reactions or conditions resulting in fire or explosion. This will be achieved through: - Storing explosives in separate areas, away from main work areas. In addition, storage will be designed so as to prevent

Blasting Management Plan	
	explosion situations form affecting main work areas. - Searching all employees entering the explosives storage area. Persons entering the explosives storage area will not possess tobacco, matches, cigarettes, lighters or other devices capable of generating heat or spark sources. Moreover, no radio transmitters or cellular telephones will be permitted in the explosives storage area. - The storage area will be fenced and will contain a guarded entrance. • The handling of explosives will be undertaken as follows: - All explosives handled will be free of foreign material. - All reasonable precautions will be taken to prevent the spillage of explosives during their handling. - Explosives will be conveyed as soon and as carefully as possible and precautions will be taken that will effectively guard against any accidental ignition or explosion. - Only containers provided for the conveyance of explosives will be used for transporting explosives. These containers will at all times be kept clean, free from grit and in a good state of repair. - Vehicles containing explosives will only be left unattended in designated areas. - Except for drying purposes, the use of planned explosive activity or testing, explosives will not be exposed to direct rays of the sun or to rain. - The transport of explosives from the storage area to the site of planned detonation must be undertake. - Vehicles carrying the explosives will be washed in a designated area as the water could contain elevated ammonia concentrations from residual ammonium nitrate and is unsuitable for the direct discharge into a receiving water body. This water will be collected (e.g. in a sump) and treated in the appropriate manner. The target water quality range for acceptable nitrate levels 0 to 6 mg/N. • No person will use any explosive material for blasting purposes unless that person is trained and authorised to use blasting material. • An emergency preparedness plan will be developed and will include provisions associated with the storage and handling of explosives. • No person will bury, dump, hide or abandon any explosive.
Monitoring and Auditing	• All complaints from residents or landholders will be audited on a regular basis. • Adherence to the blasting schedule will be monitored.
Reporting and Corrective Action	• Records of blasting monitoring will be kept, with results reported to the Developer at agreed intervals. • Recommendations and corrective actions arising from audits, inspections and reviews will be implemented. • All activities that deviate from normal operating conditions will be reported and corrective action initiated to prevent a recurrence of the incident. • All complaints regarding blasting activities will be reported on and all complaints addressed by the Contractor.

6.4.5 *Emergency Preparedness Plan*

PLEASE NOTE:

This does not replace the need for an Emergency Preparedness Plan that allows for catastrophic failure of the dam wall. The ZRA will provide this document and it will be included as an Annex to the ESMP

Emergency Preparedness Plan	
Objective	To ensure that Project personnel can respond effectively and efficiently in the event of an environmental incident to ensure no long-term adverse impacts on health, safety or the environment.
Timeframe	Construction (i.e. rehabilitation activities associated with the Plunge Pool and/or Spillway).
Aspect (Project Activity)	The Project may result in process upset, accidental, and emergency situations for operations and activities during rehabilitation of the Plunge Pool and Spillway.
Responsibility	Contractor
Performance Criteria	• Emergency Preparedness Plan. • Zero incidents.
Mitigation Measures	A detailed Emergency Preparedness Plan will be prepared, kept up to date and will include but not be limited to the following: • Response procedures in the event of a fire, chemical release, spill, leak, explosion, equipment failure, natural disaster (including severe storm and flood events) or any other likely emergency. • Communication arrangements and contact details. • Roles and responsibilities of relevant personnel. • Emergency controls and alarms. • Evacuation procedures. • Emergency response equipment. • Leak detection and control points. • Training requirements. • Site access and security. • Notification and reporting to ZEMA and EMA. • Spill-containment procedure. • The safe recovery of spillage. • Clean-up and rehabilitation. • Incident investigation. • Emergency response training. • Monitoring and detection systems. • Callout contact lists. • Measures to halt spills. • Requirements for remediation or disposal of contaminated soil. • Personnel responsibilities. • Equipment requirements. • Location, storage, maintenance and transport of equipment to site. Communications and logistics.
Monitoring and Auditing	• The effectiveness of the Emergency Preparedness Plan will be tested at least annually and audited.
Reporting and Corrective Action	• The Contractor will be responsible for compiling the results of testing and auditing programs. These results will be reported to the ZRA. • The following constitute incidents or failure to comply:

Emergency Preparedness Plan	
	- Emergency Preparedness Plan is not prepared or implemented. - Emergency response equipment is not provided. - Emergency response training is not undertaken. - Emergency response procedures not followed in the event of an incident. • In the event of an incident or failure to comply, a selection of the following actions will be undertaken, as appropriate: - Prepare or implement the Emergency Preparedness Plan. - Provide the necessary equipment or training. - Investigate why the emergency response procedures were not followed and implement mitigating measures.

6.4.6 Dam Safety

ZRA have an existing Emergency Preparedness Plan (as included in Annex A: Kariba Dam and Reservoir Standing Operations Procedure dated Jan 2013) (please note this is included as *Annex D* in *Part I* of the ESIA). Apart from this Dam Safety Inspection Reports are periodically compiled on.

The overall rehabilitation of the Kariba Dam plunge pool and sluices is inherently a dam safety issue that needs to be carefully considered as part of the overall Kariba Dam Emergency Preparedness Plan (included in the ZRA Kariba Dam and Reservoir Standing Operations Procedure dated Jan 2013). The updating the preparedness plan will be the highest priority. The key to such an update is a well-developed communication plan that has been thoroughly vetted and tested.

In addition to the above, the ZRA will ensure that the updating of the existing Kariba Dam Emergency Preparedness Plan be done in a way that –

- The plan is updated in consultation with the relevant stakeholders (stakeholder mapping and identification to be done as part of the updating process).

- The contact details of those individuals included in the chain of command and communication procedure should be provided in the plan and kept up to date.

- Downstream communities affected by such an emergency should be identified and contact details for applicable community heads should be provided and kept up to date.

- Clarifies the need to put a national disaster response mechanism in place for downstream reaches in the event of a catastrophic incident.

The ZRA have contracted a third party to conduct a comprehensive assessment of the potential consequences of a partial or full dam breach (Dam

Break Analysis - DBA) within the Zambezi River Basin. The specific objectives of the DBA are to:

- Analyse potential flood hydrographs from plausible dam breach scenarios for the existing dams in Zambezi and Kafue rivers;

- Route such floods through the downstream river stretches to assess impacts and potential sub-sequent damage or breach of downstream dams;

- Identify the need for, and carry out, additional detailed topographical surveys for selected river stretches and flood-prone areas; and

- Produce flood inundation maps and characteristics for floods generated through malfunctioned dam operations or dam failures.

The DBA will be used to update the Kariba Dam Emergency Preparedness Plan.

Moreover, copies of the final amended Kariba Dam Emergency Preparedness Plan should be made available to –

  - The Offices of the President
  - The Disaster Management and Mitigation Unit
  - The Civil Protection Unit

- Periodically undertake Kariba Dam emergency preparedness drills to test the emergency plan.

The rehabilitation of the Kariba Dam plunge pool and spill way will be carried out in compliance with the OP/BP 4.37 with the Project aimed at ensuring appropriate measures are implemented and sufficient resources provided to ensure the continued safety of the dam. As per OP/BP 4.37 an independent Panel of Experts will be appointed to review the investigations, design, and implementation of the rehabilitation works.

7 MONITORING PLANS

This *Section* details the specific monitoring plans provided in the Environmental and Social Management Plans included in *Section 6*.

Table 7.1 Kariba Dam Rehabilitation Monitoring Plan

Management Plan	Monitoring Method	Monitoring Location	Monitoring Frequency	Responsibility	Relevant Standard	Reporting Requirements	Additional Information
Noise and Vibration Management Plan	• Inspection of vehicle maintenance record. • Noise monitoring only if significant complaints received.	At the nearest sensitive receptor.	If significant complaints are received.	Contractor	IFC General EHS Guidelines 1.7 – Noise.	• Complaints register. • Equipment/machinery maintenance reports.	-
Air Quality and Dust Management Plan	• Inspection of vehicle maintenance record. • Visual inspection.	• Areas of high construction traffic where roads are not surfaced. • Active work areas.	On ad *hoc* basis during dry conditions of no rain.	Contractor	IFC General EHS Guidelines 1.1 - Air Emissions and Ambient Air Quality. Section 37, 46 and 96 – The Air Pollution Control (Licensing and Emission Standards) Regulations, S.I. 141 of 1996	• Record of high dust incidents and corrective actions taken. • Complaints register. • Equipment/machinery maintenance reports.	-
Soil Erosion and Sediment Control Management Plan	Visual inspections of all erosion and sediment control structures.	At specific areas susceptible to erosion and sediment control structures.	Weekly and after major rain events.	Contractor	None	Records of ineffective control measures and corrective actions taken.	-
Waste Management Plan	• Visual inspection of waste storage facilities. • Review of waste manifestos. • Review of contractor licenses. • Review of waste inventory.	Waste disposal sites.	On *ad hoc* weekly basis.	Contractor	IFC General EHS Guidelines 1.6 – Waste Management. Zimbabwean Effluent and Solid Waste Disposal Regulations SI 6, 2007. Zimbabwean Hazardous Waste Management Regulations SI 10, 2007. Zimbabwean Environmental Management (Hazardous Waste Management) Regulation 10 of 2007.	Records of ineffective control measures and corrective actions taken.	-
Dangerous Goods and Hazardous Substances Management Plan	• Dangerous goods locations inspected on a regular basis for compliance with relevant management plans. • Inspection of MSDS for all dangerous goods. • Inspection of training records for those handling dangerous goods.	Dangerous goods store.	Monthly	Contractor	IFC General EHS Guidelines 1.5 – Hazardous Materials Management. African Development Bank Operational Safeguard (OS) 4 – Pollution Prevention and Control, Hazardous Materials and Resource Efficiency. Zimbabwean Regulation 12 of 2007 Environmental Management Act (Hazardous Substances, Pesticides and other Toxic Substances).	Records of ineffective control measures and corrective actions taken.	-

Management Plan	Monitoring Method	Monitoring Location	Monitoring Frequency	Responsibility	Relevant Standard	Reporting Requirements	Additional Information
Surface Water Quality Management Plan	• Water quality monitoring downstream of the cofferdam. • Monitoring of watercourses near activities involving rehabilitation works. • Audit of control measures to minimise impacts on surface water.	• Downstream of the cofferdam. • Water courses near to active working areas.	• Weekly/monthly water quality monitoring downstream of the cofferdam. • Regular monitoring of activities involving rehabilitation works in or near watercourses. • Annual audit of controls to minimise impacts on surface water at all facilities and infrastructure.	Contractor	IFC General EHS Guidelines 1.3 –Waste Water and Ambient Water Quality. Zambian Water Resources Management Act, No 21 of 2011. Zambian Water Supply and Sanitation Act, No 28 of 1997. Zimbabwean Water Act, 2003 (Chapter 20:24).	• Records of all monitoring and auditing activities. • Records of recommendations and corrective actions arising from audits.	Refer to detailed monitoring plan included in *Annex C*.
Aquatic Ecology Management Plan	• Water quality and turbidity monitoring downstream of the cofferdam. • Biomonitoring. • Recording fish casualties.	• Downstream of the cofferdam. • Plunge pool.	• Weekly/monthly water quality monitoring downstream of the cofferdam. • *Ad hoc* inspection of fish kills.	Contractor	DWAF. (1996) South African Water Quality Guidelines (second edition). Volume 7: Aquatic Ecosystems, Pretoria, South Africa. Zambian Fisheries Act, No 22 of 2011. Zambian National Policy on Wetlands Conservation, September 2001. Zimbabwean GN 380 of 2013 (Protection of Wetlands) per Section 113 of the Environmental Management Act.	• Records of all monitoring and auditing activities. • Records of recommendations and corrective actions arising from audits. • Quarterly biomonitoring reports during the duration of rehabilitation works. • Biannual biomonitoring reports over a period of two years following the completion of rehabilitation works. • Fish mortality records.	Refer to detailed monitoring plan included in *Annex C*.
Revegetation and Rehabilitation Management Plan	• Regular inspections will be undertaken during the revegetation period for subsidence, presence of weeds, revegetation success and stability. • Regular inspection of any seeded areas until regrowth is established or once the site becomes stable. • Regular inspection of weed control measures.	Areas where revegetation has taken place.	On *ad hoc* monthly basis.	Contractor	Zambian Forests Act, Cap 199. Zimbabwean Forest Act, 1948 (Chapter 19:05). Environmental Management Act, [Chapter 20:27]. Statutory instrument 6 of 2007.	Reporting on success of revegetation and weed control programme.	-
Social Values Management Plan	• Attendance of community meetings. • Maintenance of complaints registers.	Across the site and surrounding communities.	Regular community meetings and ongoing monitoring of complaints.	Contractor	None.	• Minutes of meetings. • Record of complaints and corrective actions.	

Management Plan	Monitoring Method	Monitoring Location	Monitoring Frequency	Responsibility	Relevant Standard	Reporting Requirements	Additional Information
Procurement of Goods and Services Management Plan	• Monitoring of achievement against contractual procurement targets. • Monitoring of the value of procurement in the Project Area and in Zimbabwe and Zambia against Project's total procurement value. • Monitoring of procurement training courses in terms of type of training, number of participants, and duration of training and value of training.	-	• Monitoring to be conducted on a monthly basis. • Conduct an annual audit of procurement figures based on which an incentive for achieving procurement targets can be considered.	Contractor	None.	• Monthly reporting to the ZRA on – - The achievement of contractual procurement targets and suggested corrective actions. - Training courses presented and attended. - Value of procurement in Project Area as well as in Zimbabwe and Zambia. • Regular progress reporting to Government and other interested and affected parties regarding procurement matters. • Preparation and submission of monthly and cumulative procurement figure reports for submission to the ZRA.	-
Road Safety Management Plan	The number of incidents or complaints received in relation to road safety.	Across the site and surrounding communities.	• Ongoing monitoring of complaints. • Regular audits and reviews will be undertaken regarding road safety.	Contractor	IFC General EHS Guidelines 3.4 – Traffic Safety.	• Record of complaints and corrective actions. • Regular audits and reviews will be undertaken and recommendations and corrective actions will be implemented.	-
Social Infrastructure Management Plan	Monitoring of complaints associated with cumulative impacts on social and health infrastructure.	Across the site and surrounding communities.	• Ongoing monitoring of complaints. • Direct and cumulative impacts on social and health infrastructure will be closely monitored on an ongoing basis, with corrective action such as re-allocations of community investment as required.	Contractor	None	• Record of complaints and corrective actions. • Community relations report including relevant metrics quarterly during the duration of rehabilitation works, with corrective action such as re-allocations of community investment as required.	-
Community Health and Safety Management Plan	Monitoring of the number of incidents or complaints received from community.	Across the site and surrounding communities.	• Ongoing monitoring of complaints received. • Regular audits and reviews will be undertaken and recommendations and corrective actions will be implemented.	Contractor	IFC General EHS Guidelines 3 – Community Health and Safety.	• Record of complaints, monitoring and audits and corrective actions taken. • All incidents including near-misses reported through the incident reporting system.	-
Traffic and Transport Management Plan	• Monitoring of number of community complaints received relating to Project traffic and transport systems. • Monitoring of road connection. • Monitoring of contracted transport companies.	Across the site and surrounding communities	• Ongoing monitoring of complaints received and number of incidents in relation to traffic. • Ongoing monitoring of road conditions and transport network shortcomings. • *Ad hoc* quarterly monitoring of transport companies.	Contractor	IFC General EHS Guidelines 3.4 – Traffic Safety.	• Records of all monitoring and auditing activities will be kept, with results reported to the ZRA at agreed intervals. • Recommendations and corrective actions arising from audits will be recorded.	-

Management Plan	Monitoring Method	Monitoring Location	Monitoring Frequency	Responsibility	Relevant Standard	Reporting Requirements	Additional Information
Worker Health and Safety Management Plan	Monitoring of worker health and safety against national requirements and international standards.	The Kariba Dam Rehabilitation Project.	• Regular engagement sessions with employees to assess grievances or safety issues. This can be done as part of the regular Toolbox Talk practise. • Monthly monitoring of achievement against stated performance criteria of maximum number of hours worked without reporting of an unfair or unsafe employment condition. • Annual audit of performance statistics based on which an incentive for achieving no recorded unfair or unsafe conditions can be considered by the ZRA.	Contractor	IFC General EHS Guidelines 2 – Occupational Health and Safety. African Development Bank Operational Safeguard (OS) 5 – Labour Conditions, Health and Safety. Factories Act (Chapter 441 of the Laws of Zambia) (as amended by Statutory Instrument (S.I.) No. 165 of 1989, No. 75 of 1990, and Act No. 13 of 1994). Labour Act (Chapter 28:01) as amended by Labour Act [Chapter 28:01] amended 2006 and the Labour Amendment Act, 2005 (Act 7/2005).	• Records of all monitoring and auditing activities will be kept, together with corrective actions. • All incidents including near-misses to be reported through the incident reporting system.	-
Employment and Training Management Plan	Monitoring employment and training achievements against contractual employment and training targets.	The Kariba Dam Rehabilitation Project.	• Monthly monitoring of achievement against contractual employment targets. • Conduct an annual audit of employment statistics.	Contractor	None.	• Monthly reporting by the Contractor to the ZRA on achievement of contractual employment targets and suggested corrective actions if needed. • The ZARA will comply with Zambian and Zimbabwean regulations pertaining to reporting requirements related to recruitment. • The ZRA will report to the World Band and African Development Bank as per their agreed reporting schedule. • Twice annually progress reporting to interested and affected parties from the Project Area regarding achievement of employment targets and corrective actions if so required.	-
Tourism Management Plan	Monitoring of tourists and tourism operators perceptions on the Project.	Individual tourists visiting the Kariba Dam and local tourism operators.	• Monthly monitoring of possible reported grievances or positive comments as captured in the Grievance Mechanism. • Biannual auditing of grievance and positive comments records. • Regular presentations and interaction by the ZRA with tourist operators and other community representatives to report on the rehabilitation works process and share monitoring and audit findings with them.	Contractor	None.	• Monthly reporting by Contractor to the ZRA of monitoring information. • Biannual audit reports by the Contractor to the ZRA with presentation of audit outcome.	None.

Management Plan	Monitoring Method	Monitoring Location	Monitoring Frequency	Responsibility	Relevant Standard	Reporting Requirements	Additional Information
Cultural Heritage Management Plan	There are no immediate monitoring requirements associated with cultural heritage management.	Active work areas and immediate surrounds.	Record of all artefacts or cultural heritage aspects identified during the duration of rehabilitation works.	Contractor	WB (OP) 4.11 IFC Performance Standard (PS) 8 - Cultural Heritage. Zambian National Heritage and Conservation Act, 1989. Zimbabwean National Museums and Monuments Act (Chapter 25:11).	New indigenous heritage sites identified during rehabilitation works will be reported to the relevant heritage authorities. Notify the Police if human remains are discovered to determine whether the remains are ancient and/or indigenous.	-
Grievance Management and Incident Reporting Plan	The monitoring of grievances will be undertaken by maintaining a complaints register and ensuring that all complaints are resolved.	Across the site and surrounding communities.	• The complaint form will be checked by the ECO within two weeks of complaint receipt to ensure follow-up action has been taken to resolve the issue. • All *ad hoc* complaints and incidents are to be reported to the ECO.	Contractor	IFC Performance Standard (PS) 1 - Assessment and Management of Environmental and Social Risks and Impacts. African Development Bank Operational Safeguard (OS) 1 – Environmental and Social Assessment.	Record of complaints and corrective actions taken.	-
Environmental Induction and Training Management Plan	Monitoring effectiveness of environmental induction and training.	Kariba Dam Rehabilitation Project.	• Non-compliance with training will be recorded. • The success of the training programs will be assessed and documented on a biannual basis.	Contractor	None.	• All training records will be maintained. • The success of the training programs will be documented.	-
Blasting Management Plan	• Monitoring of adherence to blasting schedule. • Monitoring of the number of complaints received relating to blasting.	• Kariba Dam Rehabilitation Project • Across the site and surrounding communities	• All complaints from residents or landholders will be audited on a bimonthly basis. • Adherence to the blasting schedule will be monitored on a bimonthly basis.	Contractor	Explosives Act (No 10 of 1974) Regulations are in draft stage. Explosives Act (Chapter 10:08)	• Record of complaints and corrective actions taken. • Monthly reporting by Contractor to the ZRA of monitoring information.	-
Emergency Preparedness Plan	Monitoring the effectiveness of the Emergency Preparedness Plan.	Kariba Dam Rehabilitation Project.	The effectiveness of the Emergency Preparedness Plan will be tested at least annually and audited.	Contractor	IFC General EHS Guidelines 3.7 – Emergency Preparedness and Response.	• The Contractor will be responsible for compiling the results of testing and auditing programs. These results will be reported to the ZRA.	-
Dam Safety Management Plan	Monitoring dam safety during the rehabilitation of the Kariba Dam.	The rehabilitation of the Kariba Dam plunge pool and spill way will be carried out in compliance with the OP/BP 4.37 with the Project aimed at ensuring measures are implemented and sufficient resources provided to ensure the continued safety of the dam. As per OP/BP 4.37 an independent Panel of Experts will be appointed to review the investigations, design, and implementation of the rehabilitation works. A copy of the existing Emergency Preparedness Plan is attached as *Annex D* in *Part II* of the ESIA.					

8 COSTS OF MITIGATION

This *Chapter* includes an estimate of the costs of implementing the Environmental and Social Management Plans included in *Section 6* and associated monitoring, including all capital, recurrent operating and training costs.

The total estimated cost for implementation of environmental and social management commitments (including monitoring) is estimated at US$ 2,225,000.00 (refer to *Table 8.1*):

Table 8.1 Costs of Social and Environmental Management

Management Aspect	Estimated Cost (US$) Over 8 Years
Noise and Vibration Management	**40,000.00**
Implementation of management measures (silencing devices, communication of blasting schedule to communities, etc.)	30,000.00
Monitoring, auditing and reporting	10,000.00
Air Quality and Dust Management	**15,000.00**
Implementation of management measures (watering, covering of stockpiles etc.)	5,000.00
Monitoring, auditing and reporting	10,000.00
Soil Erosion and Sediment Control Management	**35,000.00**
Implementation of management measures (installation of sediment basins, stabilization of cleared areas, erosion control systems, etc.)	30,000.00
Monitoring, auditing and reporting	5,000.00
Waste Management	**250,000.00**
Implementation of management measures (development of waste inventory, systems to ensure soring and segregation of wastes, waste storage receptacles, etc.)	230,000.00
Monitoring, auditing and reporting	10,000.00
Training	10,000.00
Dangerous Goods and Hazardous Substances Management	**20,000.00**
Implementation of management measures (storage of corrosive / hazardous substances, clean-up procedures for spills, purchase and maintenance of spill kits, etc.)	10,000.00
Monitoring, auditing and reporting	5,000.00
Training	5,000.00
Surface Water Quality Management	**300,000.00**
Aquatic Ecology Management	
Implementation of management measures (involvement of universities in fish capture and research, etc.)	50,000.00
Monitoring, auditing and reporting	250,000.00
Terrestrial Ecology Management	**70,000.00**
Implementation of management measures (applications for vegetation removal, demarcation of areas to be cleared, processing of cleared vegetation, implementation of an invasive plant control programme, pre-clearance site surveys, relocation of potentially dangerous fauna, etc.)	55,000.00
Monitoring, auditing and reporting	10,000.00

Management Aspect	Estimated Cost (US$) Over 8 Years
Training	5,000.00
Revegetation and Rehabilitation Management	**400,000.00**
Implementation of rehabilitation management measures (soil ripping, top-soiling, seeding of stockpiles, respreading of indigenous vegetation, application of fertilisers, etc.)	390,000.00
Monitoring, auditing and reporting	10,000.00
Social Values Management	**40,000.00**
Implementation of management measures (development of a community engagement plan, consultation with communities, etc.)	25,000.00
Monitoring, auditing and reporting	10,000.00
Training	5,000.00
Procurement Management Plan	**80,000.00**
Implementation of management measures (development and implementation of procurement strategies)	65,000.00
Monitoring, auditing and reporting	15,000.00
Traffic and Transport Management	**50,000.00**
Implementation of management measures (development and implementation of a traffic management strategy, placement of signs and signals, obtaining transport approvals / licenses, etc.)	30,000.00
Monitoring, auditing and reporting	10,000.00
Training	10,000.00
Social Infrastructure Management (this excludes any Corporate Social Investment initiatives)	**10,000.00**
Implementation of management measures (development of a consultative relationship with key social infrastructure providers and identification of corporate social investment initiatives)	10,000.00
Monitoring, auditing and reporting costs will be included in the Community Health and Safety Plan budget	N/A
Community Health and Safety Management Plan	**100,000.00**
Implementation of management measures (partnering up with independent entities such as NGOs for HIV/AIDS initiatives, engagement with communities, etc.)	80,000.00
Monitoring, auditing and reporting	10,000.00
Training (including induction training for employees)	10,000.00
Workforce Health and Safety Management	**250,000.00**
Implementation of management measures (ensuring a safe working environment, development and implementation of a site access plan, PPE, workforce HIV/AIDS awareness and prevention programme, workforce code of conduct, education programmes, etc.)	200,000.00
Monitoring, auditing and reporting	30,000.00
Training	20,000.00
Employment and Training Management	**130,000.00**
Implementation of management measures (development of a local employment programme, project specific recruitment policies, advertising of employment opportunities, establishment of a recruitment office, etc.)	120,000.00
Monitoring, auditing and reporting	10,000.00

Management Aspect	Estimated Cost (US$) Over 8 Years
Tourism Management	**50,000.00**
Implementation of management measures (implementation of a tourist grievance mechanism, project information boards and other project information, access restrictions and safety procedures)	40,000.00
Monitoring, auditing and reporting	10,000.00
Cultural Heritage Management (this excludes any additional work associated with a chance find)	**15,000.00**
Implementation of management measures (development of a chance find procedure)	10,000.00
Monitoring, auditing and reporting	5,000.00
Grievance and Incident Reporting Management	**160,000.00**
Implementation of management measures (development and implementation of and IEC and grievance management system)	140,000.00
Monitoring, auditing and reporting	20,000.00
Environmental and Induction Training Management	**150,000.00**
Implementation of management measures (development and implementation of various other training programmes including induction training programme, ESMP training, environmental awareness training.)	140,000.00
Monitoring, auditing and reporting	10,000.00
Blasting Management	**40,000.00**
Implementation of management measures (engagement with communities, explosive handling and storage management, etc.)	25,000.00
Monitoring, auditing and reporting	15,000.00
Emergency Preparedness Management (this cost excludes the cost associated of emergency response and containment)	**20,000.00**
Implementation of management measures (development and implementation of a detailed Emergency Preparedness Plan)	10,000.00
Monitoring, auditing and reporting	10,000.00
Dam Safety	**Cots to be included as part of engineering studies**
TOTAL	**2,225,000.00**

Annex A

Method Statement Guidance

A1.1 METHOD STATEMENTS

Any Method Statement required by the Engineer or the Environmental Specification shall be produced within such reasonable time as the Engineer shall specify or as required by the Specification. The Contractor shall not commence the activity until the Method Statement has been approved and shall, except in the case of emergency activities, allow a period of two weeks for approval of the Method Statement by the Engineer. Such approval shall not unreasonably be withheld.

The Engineer or ECO may request a Method Statement for any activity they believe may impact on the environment. The Engineer in consultation with the ECO may also require changes to a Method Statement if the proposal does not comply with the Specification or, if in the reasonable opinion of the Engineer, the proposal may result in, or carry a greater than reasonable risk of, damage to the environment in excess of that permitted by the Specifications. Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. The Contractor shall carry out the Works in accordance with the approved Method Statement. Approval of the Method Statement shall not absolve the Contractor from any of his/her obligations or responsibilities in terms of the Contract.

The following Method Statements shall be provided by the Contractor and submitted to the Engineer and ECO at least 7 working days before site establishment:

A1.1.1 Temporary Construction Camp and Site Division

The location, layout and method of establishment of the temporary construction camp (including all buildings, offices, lay down yards, vehicle washing areas, fuel storage areas, batching areas and other infrastructure required for the construction of the project).

A1.1.2 Vegetation Clearing

Method of vegetation clearing during site establishment and disposal procedure for cleared material.

A1.1.3 Topsoil

Method of clearing topsoil and location of topsoil stockpiles including erosion protection.

A1.1.4 Access/Haul Routes

Details, including a drawing, showing where and how the access points and routes will be located and managed, including traffic safety measures.

A1.1.5 Fuel Storage and Use

The design, location and construction of the fuel storage area, for the filling and dispensing from storage tanks and management of drip trays.

A1.1.6 Solid Waste Management

Expected solid waste types, quantities, methods of recycling to be employed, monitoring and record keeping procedures, staff responsible for the oversight of waste management and recycling and frequency of collection and disposal of the non-recycled component, as well as location of disposal sites.

A1.1.7 Contaminated Water

Methods of minimising, controlling, collecting and disposing of contaminated water.

A1.1.8 Hazardous Substances

Details of any hazardous substances / materials to be used, together with the transport, storage, handling and disposal procedures for the substances.

A1.1.9 Cement and Concrete Batching

Location, layout and preparation of cement/ concrete mixing areas including the methods employed for the mixing of concrete, and particularly the containment of runoff water from such areas, as well as the method of transportation of concrete.

A1.1.10 Emergency Procedures

Emergency procedures for fire and accidental leaks and spillages of hazardous substances (including fuel and oil). Include details of risk reduction measures to be implemented, such as fire fighting equipment, fire prevention procedures and spill kits (materials and compounds used to reduce the extent of spills and to breakdown or encapsulate hydrocarbons).

Other Method Statements required by the Engineer and ECO during the course of construction are to be provided by the Contractor a minimum of 14 working days prior to commencement of the works or activities to which they apply (these activities may not commence on site before these Method Statements have been approved except in the case of emergency activities).

A1.1.11 Erosion and Sedimentation Control

The proposed methods of Sedimentation and Erosion Control for bulk earthworks in particular and the remainder of the construction period, in order to ensure the prevention of sedimentation of water courses and storm-water infrastructure.

METHOD STATEMENT

CONTRACT: **DATE**: _____

PROPOSED ACTIVITY (give title of method statement and reference number from the ESMP):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:	End Date:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated maps and plans where possible):

Note: please give too much information rather than too little. Please ensure that issues such as emergency procedures, hydrocarbon management, wastewater management, access, individual responsibilities, materials, plant used, maintenance of plant, protection of natural features etc are covered where relevant

DECLARATIONS

1) RESPONSIBLE OFFICER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____ _____

(signed) (print name)

Dated:._____

2) PERSON UNDERTAKING THE WORKS (Contractor)

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ECO will audit my compliance with the contents of this Method Statement. I understand that this method statement does not absolve me from any of my obligations or responsibilities in terms of the Contract.

_____ _____

(signed) (print name)

Dated: _____

3) EMPLOYER (*i.e.* Developer/ Owner/Project manager)

The works described in this Method Statement are approved.

_____ _____ __ _____

(signed) (print name) (designation)

Dated: _____

Resettlement Policy Framework for the Kariba Dam Rehabilitation Project (Zambia and Zimbabwe) on the Zambezi River

Zambezi River Authority

March 2015

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Delivering sustainable solutions in a more competitive world

Resettlement Policy Framework for the Kariba Dam Rehabilitation Project (Zambia and Zimbabwe) on the Zambezi River

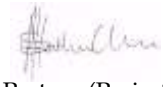
March 2015

Reference: 0264743

Prepared by: Environmental Resources Management Southern Africa (Pty) Ltd. (ERM)

For and on behalf of
Environmental Resources Management

Approved by: Stuart Heather-Clark

Signed: 

Position: Partner (Project Director)

Date: March 2015

CONTENTS

GLOSSARY

Concept	Definition
Affected person/ household	Any person/ household who, as a result of the Project activities, loses the right to own, use or otherwise benefit from an asset or a resource, either in full or in part and either permanently or temporarily.
Compensation	Payment in cash or in kind for an asset or a resource that is acquired or affected by the Project.
Cut-off date	The date before which individuals must be occupying or otherwise using / owning an asset / resource in order to be eligible for compensation and / or resettlement assistance.
Economic displacement	Loss of income sources or means of livelihood resulting from Project induced land acquisition or obstructed access to natural resources.
Eligibility	Entitlement to compensation due to pending subjection to physical and / or economic displacement.
Host communities	People living in or around areas to which people physically displaced by the project will be resettled who, in turn, may be affected by the resettlement.
Involuntary resettlement	The occurrence of resettlement in instances where affected people do not have the right to refuse land acquisition. This occurs in cases of: (i) lawful expropriation or restrictions on land use based on state needs; and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with affected people fail.
Livelihood restoration	Restoration of wage-based or enterprise-based livelihoods.
Physical displacement	Loss of shelter and associated assets resulting from Project induced land acquisition, which necessitates affected people to move to another location.
Replacement cost	The market value of affected people's land/ assets plus transaction costs.
Resettlement	The overarching process that describes physical and economic displacement, but also the subsequent rehabilitation activity, through which the welfare of affected people is improved, or at least restored, to pre-Project levels.
Resettlement Action Plan (RAP)	A document specifying the procedures that a resettlement should follow and the actions that will be taken to compensate affected people and communities.
Surveyed Households:	Households included in the household survey for this study. These households are located in close proximity to the Project footprint and, in most cases, are the same as the Project affected households.

Concept	Definition
Vulnerable groups	In the Social Study Area, the broad categories of people who should be considered to have some level of vulnerability are: **Women** are generally regarded as vulnerable in the African social context as they are often expected to fulfil traditional roles of women i.e., taking care of the household and raise children rather than seek formal employment. In many cases women also lack education, mostly having attained only primary school level education. As such local women are unlikely to seek employment with project because of family duties. **The elderly** are generally recognised as being vulnerable. The elderly remain in high social standing as long as they are productive; however, they lose this standing once they become dependent on the younger generations for assistance in meeting their basic needs (e.g., housing, water, food). The elderly are usually not in a position to take advantage of the benefits typically associated with large projects such as the Kariba rehab project. **Youths** For the purposes of this assessment, youth are quantitatively defined as persons aged approximately 15 to 24 or, recognising variations by cultural context, qualitatively defined by their degree of independence with respect to their obtainment of a livelihood, relationship status (i.e., marriage, children), and living arrangements. Youth can be recognised as vulnerable, though in a way distinct from other categories listed above. Being at their physical prime but often facing an unknown future, youth may be seen as both empowered and disempowered. Youth are vulnerable in the sense that they are between dependence (childhood) and independence (adulthood) and, without access to resources and support to enable their transition to adulthood, youth may face a large degree of instability in their lives. Youth only inherit land once they have reached full adulthood and marriage, and until then are dependent on their parents. Another characteristic of youth is that it is a time when individuals are developing their identities and questioning societal norms; when youth perceive that their economic and social prospects are poor, they may engage in antisocial behaviour. **Disabled or Chronically Ill Persons***:* Disabled persons should be recognised as vulnerable as they are unlikely to be able to access the project benefits but would be vulnerable to change brought about by the project. People living with HIV/AIDS and TB can be considered to be disabled as their ability to remain healthy and maintain their livelihoods is often compromised by their illness.

1 INTRODUCTION

This Resettlement Policy Framework (RPF) has been prepared by Environmental Resources Management (ERM) for the Zambezi River Authority (ZRA) as part of the Environmental and Social Impact Assessment for the proposed rehabilitation of the plunge pool and the spillway of the Kariba Dam.

This RPF outlines the principles, procedures, and organizational requirements that should be considered by the ZRA should the implementation of the Project result in any physical or economic displacement.

The RPF has been developed bearing in mind Zimbabwean and Zambian requirements as well as IFC Performance Standard 5 - *Land Acquisition and Involuntary Resettlement (IFC PS5)* and African Development Bank (AfDB) Operational Safeguard (OS) 2 – *Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation*.

1.1 OBJECTIVES AND SCOPE OF THE RPF

IFC PS5 and OS2 require a Resettlement Action Plan (RAP) for any project that results in physical or economic displacement of people. Where the exact nature or magnitude of the land acquisition or restrictions on land use related to the project is unknown due to the stage of project development, it is normally recommended that the proponent develop a Resettlement Policy Framework (RPF) as a precursor to a full RAP at a later stage.

Therefore the objective of the RPF is to provide a framework within which possible future displacement will be conducted..

1.2 Project OVERVIEW

The Kariba Dam is a double curvature concrete arch dam located at 16°31′18″S 28°45′41″E in the Kariba Gorge of the Zambezi River Basin between Zambia and Zimbabwe (*Figure 1.1*). The arch dam was constructed between 1956 and 1959 together with two separate hydropower plants one on the Zambian side and one on the Zimbabwean side of the Zambezi River.

Water is released from the reservoir through six sluice gates located approximately 80 m above the river level downstream of the dam. In the first 20 years after the dam was constructed there were sustained heavy spillage episodes resulting in erosion of the bedrock to 80 m below the normal water level. This area is known as the 'Plunge Pool'. The plunge pool represents a risk to the stability of the dam wall and therefore risk of a flood event and reduced operating capacity of the dam.

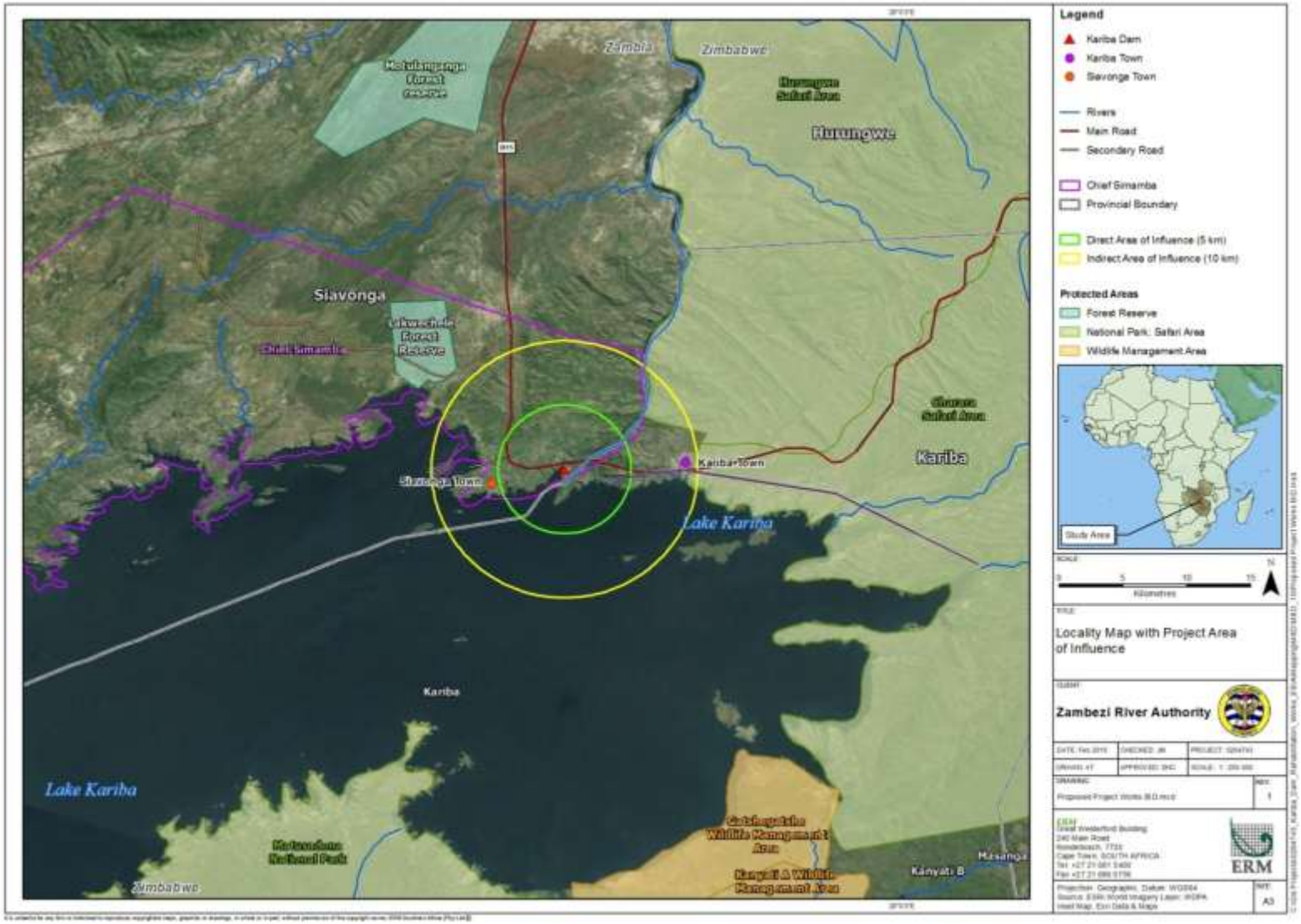
Failure to implement remedial measures to the plunge pool will result in the failure to operate the reservoir as expected (i.e. at a reduced capacity) and an increase in the risk of dam wall failure. A scenario where the dam wall fails will release a flood event of a total 273 km^3 resulting in a major loss of life as the flood plain is home to approximately three million people; loss of livelihoods (socio-economic activities); environmental degradation; and a loss of main source of power to the region. Therefore it is necessary to implement the remedial action to avoid such an event.

Apart from the need to reshape the plunge pool, there is also a need to rehabilitate the six sluice gates that make up the spillway. The work needed within the sluices is associated with the refurbishment of the concrete surface of all sluices which have been distorted over the years due to an advanced alkali-silica reaction. Without functional sluices the reservoir level cannot effectively be maintained to take into account the flood regime of the Zambezi River. Without the ability to release water from the reservoir, there is a danger of the reservoir being too full prior to a flood event, and the subsequent flood event causing over topping of the dam wall which could lead to dam failure.

The aim of the Kariba Dam Rehabilitation Works is to improve the stability of the plunge pool through reshaping its profile. This will limit the preferential erosion towards the foundations of the dam along zones of weak rock. The project also aims to rehabilitate the six sluice gates of the spillway, enabling the ongoing use of the spillway function to manage the reservoir levels.

The two key components of the rehabilitation works, namely the reshaping of the plunge pool reshaping and the spillway rehabilitation, are discussed in more detail in the next sections.

Figure 1.1 Locality of the Kariba Dam Rehabilitation Works



1.2.1 Reshaping of the Plunge Pool

Key Works

The reshaping of the plunge pool is made up of a number of activities. These include the following:

- Establishment of general construction site, including construction camp for workers, workshops, lay down area, batching plants etc.;
- Transport of construction materials to the site;
- Management of spill before and during the rehabilitation works;
- Construction of an access road into the plunge pool area;
- Construction of the access road to construct the cofferdam;
- Construction of the cofferdam;
- Pumping of water from the cofferdam downstream;
- Blasting and excavation of the plunge pool;
- Removal of rock from the plunge pool via blasting and loading to trucks;
- Transport of waste rock from plunge pool to waste rock dumpsite;
- Disposal of waste rock; and
- Site clean-up and rehabilitation.

Timing of Plunge Pool Reshaping

The schedule will depend on the spillage duration governed by the specific hydrological conditions during the works. The preferred option is to allow a three phase works schedule, known as Alternative Scenario 3 (Tractebel Engineering (France) and Coyne et Bellier, 2012). Based on this alternative scenario the on-site works to reshape the plunge pool are estimated to take about three and a half years to complete. This will be finalised during the Scoping Phase.

1.2.2 Rehabilitation of the Spill Way

Apart from the need to reshape the plunge pool, there is also a need to rehabilitate the six sluice gates that make up the spillway. The work needed on the sluices is associated with the refurbishment of the concrete surface of all sluices. The surfaces have been distorted over time due to an advanced alkali-silica reaction. Without functional sluices the reservoir level cannot effectively be maintained to take into account the flood regime of the Zambezi River. Without the ability to release water from the reservoir there is a danger of the reservoir being too full prior to a flood event. Therefore if a flood event occurs causing over topping of the dam wall, the potential for dam failure exists.

Key Works

Refurbishment of the sluice gates will include the following activities:

- Establishment of a general construction site, including construction camp for workers, workshops, lay down area, batching plants etc.;
- Upgrade of access road to slipway;
- Transport of construction materials to the site;
- Dredging of material to deepen the slipway channel below the water level and disposal of the dredge material;
- Upgrade of the slipway to allow for the assembly of the cofferdam required for the refurbishment;
- Assembly of the cofferdam and floating to and installation on the dam wall;
- Dewatering of sluice gate and concrete works within the sluice gate chambers;
- Waste management; and
- Site clean-up and rehabilitation.

Timing of the Spillway Rehabilitation

The schedule will depend on the spillage duration governed by the specific hydrological conditions during the works. The on-site works to refurbish the spillway will be performed after the plunge pool reshaping.

The works will start with the site installations, the upgrading of the slipway and the associated access roads. The refurbishment of one sluice takes one year from the installation of the temporary cofferdam to its removal. The cofferdam is successively transferred from one sluice to the adjacent one. It expected that total works will take eight years to complete.

1.3 STRUCTURE OF THE RPF

The remainder of the RPF is structured as follows:

- *Section 3: Regulations and Requirements;*
- *Section 4: Resettlement Action Plan (RAP) Requirements;*
- *Section 5: Stakeholder Consultation;*
- *Section 6: Institutional Arrangements*;
- *Section 7: Grievance Mechanism;*
- *Section 8: RAP Schedule;*
- *Section 9: RAP Funding and Budget;*
- *Section 10: Monitoring and Reporting; and*
- *Section 11: Conclusion*.

This RPF has been prepared bearing in mind the applicable Zimbabwean and Zambian legislation as well as international standards. In the event of discrepancies between in-country legislation and international good practice, the latter will prevail.

2.1 NATIONAL REQUIREMENTS

Table 2.1 below provides a summary of the land acquisition related legislation for both Zimbabwe and Zambia.

Table 2.1 Summary of Land Acquisition related Legislation: Zambia and Zimbabwe

Category	Zimbabwe	Zambia
Land Management	Land management in Zimbabwe is the responsibility of the Ministry of Lands and Rural Resettlement. The land rights in Zimbabwe are embedded in four systems of land tenure, namely freehold (private) land, state land, communal land and leasehold (resettlement) land systems. **Communal Land Act (Chapter 20:04)** Act concerns Communal land. Part III of the Act deals with occupation and use of communal land; while Section 7 states that no person shall occupy communal land unless he/ she acquired the rights to do so before 1st of February 1983, or has obtained a permit to do so, or is related to a person who occupies or uses communal land.	**Lands Act, Cap 173, 1995** The Act guarantees peoples' right to land while enhancing development. The Act recognises the holding of land under customary tenure and the Chief's role is legally recognised, such that land cannot be converted or alienated without approval of the Chief.
Land Acquisition	**Land Acquisition Act (Chapter 20:10)** The Act empowers the President or other authorities to acquire land and other immovable property compulsorily where it is reasonably necessary in the interest of defence, public safety, public order, public morality, public health, town and country planning or for a utilization that is beneficial to the public generally. The acquisition does not include any minerals which are the subject of rights or any other rights. An acquiring authority is under the duty to pay 'fair compensation'.	**Land Acquisition Act No. 2 of 1970** The Act sets out regulations for compulsory acquisition of land and property and compensation for such acquisition.

Category	Zimbabwe	Zambia
Land Use and Planning	**Regional Town and Country Planning Act (Chapter 29:12)** Part VII of this Act details the acquisition, expropriation and disposal of land owned by the local authorities under Sections 45 to 49. In turn, Part VIII details the liability, Determination, exclusion/ or inclusion, and claims for compensation in Sections 50 to 53.	**Town and Country Planning Act, Cap 283, 1962, as amended** Provides for the appointment of planning authorities whose main responsibilities are the preparation, approval and revocation of development plans. It also provides for the control of development and subdivision of land.
Title Deeds	**Deeds Registry Act (20:05)** This Act principally makes provision for the making and registration of deeds regarding land and other real rights, for rights in land such as lease and servitude and for the transfer of land.	**Lands Conversion of Titles Act Lands and Deeds Registry Act, Cap 174** Provides for alienation, transfer, dispossession and charge of land.

The above legislation facilitates the following resettlement activities:

- The payment of compensation where land and land rights are acquired for project purposes;
- The compensation for loss of, or damage to, productive assets and crops, be it temporary or permanent; and
- The right to appeal and other judicial avenues for the resolution of disputes.

2.2 *INTERNATIONAL REQUIREMENTS*

It is proposed that the ZRA will follow the requirements of IFC Performance Standard 5 - *Land Acquisition and Involuntary Resettlement (IFC PS5)* and African Development Bank Operational Safeguard (OS) 2 – *Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation* in the event that displacement and resettlement is triggered by the Project. The main objectives of both include:

2.2.1 *IFC PS5 - Land Acquisition and Involuntary Resettlement*

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs;
- To avoid forced eviction;
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected;

- To improve, or restore, the livelihoods and standards of living of displaced persons; and

- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

2.2.2 *AfDB OS 2 – Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation*

- Avoid involuntary resettlement where feasible, or minimize resettlement impacts where involuntary resettlement is deemed unavoidable after all alternative project designs have been explored;

- Ensure that displaced people are meaningfully consulted and given opportunities to participate in the planning and implementation of resettlement programmes;

- Ensure that displaced people receive significant resettlement assistance under the project, so that their standards of living, income-earning capacity, production levels and overall means of livelihood are improved beyond pre-project levels;

- Provide explicit guidance to borrowers on the conditions that need to be met regarding involuntary resettlement issues in AfDB operations to mitigate the negative impacts of displacement and resettlement, actively facilitate social development and establish a sustainable economy and society; and

- Guard against poorly prepared and implemented resettlement plans by setting up a mechanism for monitoring the performance of involuntary resettlement programmes in Bank operations and remedying problems as they arise.

This *Section* describes a high-level approach towards the preparation and implementation of a Resettlement Action Plan (RAP).

Please Note
It is not foreseen that the Project will require the acquisition of additional land above that already within its boundaries. However, the ZRA has requested the preparation of an RPF in case of unplanned events resulting in displacement.

Should any un-planned events result in displacement; the ZRA have indicated that they will firstly attempt to minimize the displacement impact by exploring alternative Project designs. And secondly, where displacement is unavoidable, the ZRA, jointly with the Governments of Zimbabwe and Zambia will plan and execute a RAP process as broadly set out below.

3.1.1 Step 1 - Identify Project Impacts and Affected Populations

The first activity when planning a RAP is to identify all people affected by the project and all beneficial and adverse impacts on their livelihoods associated with the project's land acquisition. Consultation with officials of local government, community leaders, and other representatives of the affected population is essential to gaining a comprehensive understanding of the types and degrees of project effects.

Affected populations and impacts should be identified through a series of steps, namely:

- Develop and analyse maps of the affected area;
- Undertake a social census to identify the affected people and register them according to location;
- Develop an inventory of lost and affected assets at a household and community level;
- Conduct a socio-economic survey of the affected people; and
- Consult with affected people regarding proposed mitigation measures and development opportunities.

3.1.2 Step 2 – Develop a Detailed Legal Framework for Land Acquisition and Compensation

The RAP will outline a legal framework describing all laws, decrees, policies and regulations relevant to the resettlement activities associated with the Project. The legal framework described in this RPF lays the foundation for the development of a more detailed legal framework that will include:

- The scope of the compulsory acquisition of land and the nature of compensation associated with it, both the procedures for assessing compensation values and the schedule for making compensation payments.
- Applicable legal and administrative procedures, including appeals processes and the timeframe of such procedures.
- Land titling and registration procedures.
- Laws and regulations related to implementing resettlement, compensation of land, consolidation of land, land use practices, the environment, water use and social welfare.

3.1.3 Step 3 – Develop a Compensation Framework

The RAP compensation framework will specify all forms of asset ownership or user rights among the affected people and the project's strategy for compensating them for partial or complete loss of assets. The compensation framework will include a description of the following:

- Compensation guidelines by host governments.
- In the absence of guidelines, the valuation method of assets of the Project Proponent.
- The proposed types and levels of compensation to be paid.
- Compensation and assistance eligibility criteria.
- Schedule of compensation payments.

3.1.4 Step 4 – Describe the Resettlement Assistance and Restoration of Livelihood Activities

The RAP will make provision for providing affected people with the necessary assistance during the physical movement to possible resettlement sites. The date and time of movement, the logistics of transport of people and belongings as well as the arrangements for temporary shelter, if required, should be known in advance. Provision must also be made for possible

vulnerable groups (such as handicapped people or the aged who may require special assistance during relocation).

Where resettlement affects the income-earning capacity of the affected people, the Project Proponent is encouraged to undertake resettlement as a sustainable development initiative in order to contribute to the restoration of livelihoods of the affected people.

3.1.5 Step 5 – Describe a Detailed Budget and an Implementation Schedule

The RAP will specify all resettlement costs by categories of impact, entitlement, and other resettlement expenditures including training, project management, and monitoring. The budget will illustrate the expenditures over the life of the project.

Ordinarily, payment of compensation and resettlement assistance allowances will be done either by the Government or by the Project Proponent. In the event that either the Zimbabwean or Zambian Governments assume responsibility for the payment of compensation and resettlement assistance allowances, the ZRA should collaborate with the responsible government agency to ensure that payments are made on schedule. If the Project Proponent is financing government resettlement efforts, it is proposed that it should do so in instalments and link disbursement of funds to performance-based milestones. Where the Project Proponent assumes sole responsibility for resettlement funding, it must describe its arrangements to ensure the timely disbursement of funds.

It is further proposed that the RAP budget is to be linked to a detailed implementation schedule for all key resettlement and rehabilitation activities. This schedule should be linked with the project's civil works construction schedule.

3.1.6 Step 6 – Describe the Organizational Responsibilities

The RAP will identify and provide details on the roles and responsibilities of all organizations that will be responsible for the planning and implementation of resettlement activities. Depending on the scale of resettlement associated with the Project, it may be appropriate to create a resettlement advisory group (or steering committee, or task force) to co-ordinate the implementation of the RAP.

This advisory group will probably comprise representatives from the ZRA, relevant government representatives, community organizations, NGOs involved in support of resettlement activities as well as representatives of the communities affected by the project, including possible host communities.

The advisory group will convene at regular intervals during the design and implementation phases of the RAP to ensure the regular exchange of

information among all parties and the co-ordination of all resettlement activities.

3.1.7 Step 7 – Develop a Framework for Public Consultation, Participation, and Development Planning

Consultation with people affected by the resettlement is mandatory. Early consultation helps to manage public expectations concerning the impact of a project and its expected benefits. Subsequent consultations provide opportunities for the Project Proponent and representatives of people affected by the project, to negotiate compensation packages and eligibility requirements, resettlement assistance, and the timing of resettlement activities. The RAP will define a Consultation Plan comprising a wide range of project stakeholders.

3.1.8 Step 8 – Develop a Grievance Mechanism for Resettlement Issues

The establishment of a grievance mechanism is a RAP requirement. The grievance mechanism must keep track and manage grievances and the feedback associated with it to ensure that appropriate actions are taken timeously and resolutions achieved. Corrective actions must be implemented sensitively and complainant(s) must be informed of the outcome. A typical grievance mechanism and procedure is described in *Section 6.*

3.1.9 Step 9 - Develop A Framework for Monitoring, Evaluation and Reporting

A framework for monitoring and reporting on the progress and effectiveness of RAP implementation must be developed. This framework will specify types of monitoring, monitoring objectives and monitoring duration as well as proposed monitoring mechanisms.

4 STAKEHOLDER CONSULTATION

One of the central processes required for a RAP is engagement and consultation with affected communities. In RAP processes a range of key stakeholders are consulted, including the Project Proponent, the affected community and Government. Other stakeholders who may form part of the broader consultation and information sharing process are possible host communities, non-governmental organisations (NGOs), community-based organisations (CBOs), as well as education and training institutions.

The objective of RAP consultations is to secure the participation of all people affected by the project in resettlement planning and implementation, particularly in the following areas:

- Alternative project design;
- Assessment of project impacts;
- Resettlement strategy;
- Compensation rates and eligibility for entitlements;
- Choice of resettlement site and timing of relocation;
- Development opportunities and initiatives;
- Development of procedures for redressing grievances and resolving disputes; and
- Mechanisms for monitoring and evaluation and for implementing corrective actions.

The consultation process will be structured as an inclusive consultation plan to ensure that all affected parties are provided with the opportunity to exchange information with the purpose of understanding and contributing to the implementation process. It is an iterative process which must continue at varying levels of intensity for the duration of the RAP.

As part of the consultation process, all information disclosure and stakeholder consultation will be documented. This documentation should identify who was consulted, when and where they were consulted, what was discussed, what actions were taken and when follow-up is required.

This *Section* will provide an overview of the institutional structure required for RAP implementation. It is proposed that a Resettlement Unit must be established within the overall management structure of the Project to co-ordinate, manage and monitor the implementation of all displacement activities. To achieve this, the ZRA and the Governments of the two host countries will have to collaborate to ensure that outcomes consistent with IFC Standards are achieved. *Table 5.1* illustrates the roles and responsibilities within such a Resettlement Unit.

Table 5.1 Resettlement Unit Roles and Responsibilities

Roles	Responsibilities
Resettlement Manager (RM)	Responsible for overall planning, coordination and management of displacement activities and staff.
Community Liaison Officer (CLO)	Responsible for managing high level negotiation and consultation with affected communities, facilitates public meetings and monitors Resettlement Officers.
Resettlement Officers (RO)	Responsible for providing explanation of compensation policy and resettlement activities, monitoring grievances and communicating Project problems to Resettlement Manager and Community Liaison Officer.
Community Resettlement Committee (CRC)	Comprises representatives from affected villages and host communities including traditional leaders, women, community associations and community members. This committee serves as a channel for grievances between the affected villages and the Resettlement Unit.

6 GRIEVANCE MECHANISM

The management of grievances is a vital component of stakeholder management and an important aspect of risk management for a project. Grievances can be an indication of growing stakeholder concerns both real and perceived.

The grievance mechanism will keep track of and manage grievances, and the feedback associated with it to ensure that appropriate actions are taken and resolutions achieved. Feedback must be scheduled appropriately to ensure that issues are addressed timeously. Corrective actions must be planned and implemented in consultation with the aggrieved party where possible and such party should be informed of the outcome of implementing the corrective actions.

As a general policy, the ZRA will work pro-actively towards the prevention of grievances through the implementation of impact mitigation measures defined in the ESIA and addressing any grievances in a timely and effective manner.

6.1 KEY PRINCIPLES

The IFC standards outline requirements for an effective grievance redress mechanism. The IFC states that concerns should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to affected communities, at no cost and without retribution. It notes that such mechanism should be appropriate to the scale of impacts and risks presented by a project and should be beneficial for both the Project Proponent and stakeholders.

Further, the UN Guiding Principles on Business and Human Rights (Foundational Principle 31, "Access to Remedy") provides a list of key principles that may also underpin a non-judicial grievance mechanism. The principles outlined in *Box 6.1*provide guidance for designing, revising or assessing a grievance mechanism to help ensure that it is effective in practice.

Box 6.1 ***UN Guiding Principles on Business and Human Rights***

In order to ensure its effectiveness, a non-judicial grievance mechanism should be:

- **Legitimate:** the mechanism must be "trust-worthy", if it is not, stakeholders are unlikely to choose to use it.
- **Accessible:** Barriers to access may include a lack of awareness of the mechanism, language, literacy, costs, physical location and fears of reprisal.
- **Predictable**: Stakeholders' trust for and utilisation of the grievance mechanism is enhanced through the public provision of information about the procedure it offers.
- **Equitable:** Affected stakeholders usually have less access to information and expert resources than business enterprises, and often lack the financial resources to pay for them.
- **Transparent:** Regular communication with affected parties about the progress of individual grievances is essential to retaining confidence in the process, and the provision of statistics, case studies and more detailed information about the handling of certain cases, can be important to demonstrate its legitimacy and retain broad trust. Simultaneously, the mechanism should ensure confidentiality of the dialogue between parties and of individuals' identities.
- **Rights-compatible**: Grievances are frequently not framed in terms of human rights, nor do they initially raise human rights concerns; where outcomes have implications for human rights, care should be taken to ensure that they are in line with internationally recognized standards.
- **Continuous learning:** Regular analysis of the frequency, patterns and causes of grievances, should be conducted in order to ascertain how policies, procedures or practices may be altered to prevent future harm.
- **Engagement and dialogue:** engaging with affected stakeholder groups (potentially through a third party) about the design and performance of the grievance mechanism can help to ensure that it meets their needs, that they will use it in practice, and that there is a shared interest in ensuring its success.

6.2 PROPOSED GRIEVANCE PROCEDURE

The proposed Grievance Procedure for the Kariba Dam Rehabilitation Project is divided into six key steps. These are as follows:

- **Step 1**: Receive and Log Grievance;
- **Step 2**: Acknowledge Grievance;
- **Step 3**: Assess and Prioritise Grievance and Forward to Relevant Department;
- **Step 4**: Investigate and Resolve Grievance;
- **Step 5**: Sign-off on Grievance; and
- **Step 6**: Monitor.

The six steps are described in more detail below.

Step 1: Receive and Log Grievance

- The grievance is received by the ZRA or a Contractor representative. Regardless of who receives the grievance, it needs to be forwarded to the official CLO for his/her attention.

- The CLO logs the grievance using an official Grievance Log Form and ensures that it is captured in a consultation tracker in order to monitor actions taken to resolve the grievance. Refer to *Box* 6.2 for a typical lay-out of a Grievance Log Form

- It is important that the process of reporting a grievance is easily accessible and un-intimidating to any stakeholder.

Box 6.2 Content of a Grievance Log

The grievance log will contain a record of the complainant and will record implementation dates for the following actions:

- Date the complaint was made;
- Information on proposed corrective action sent to complainant (if appropriate);
- Date response sent to complainant, and
- The date the complaint was closed out.

Each complaint will be assigned an individual number, to ensure that it is appropriately tracked and closed out.

Step 2: Acknowledge Grievance

- The CLO will acknowledge receipt of the grievance in writing and provide information on the proposed steps and the anticipated timeframes to resolving the grievance.

- This acknowledgement should be provided to the complainant within 5 days of receiving the grievance.

- If the grievance is not well understood or if additional information is required, clarification will be sought from the complainant.

Step 3: Assess and Prioritise Grievance and Forward to Relevant Department

- The CLO will assess the grievance, and assign it a risk rating (see *Box* 6.3*)*. The outcome of the risk rating has implications for how high within the Company the complaint is reported, and the seniority of management oversight required.

- Once the grievance has been rated, the grievance will be forwarded to the relevant department Manager to be addressed (e.g. Human Resources, Production, Procurement, HSE etc.).

- The grievance will be escalated to senior management if necessary and an Incident Investigation Team (overseen by the CLO) will be assigned within 10 days of receipt of the grievance, if deemed necessary. The Incident Investigation Team is comprised of staff from the relevant department to which the grievance applies.

Box 6.3 Criteria for Prioritising Grievances/Complaints

The following criteria will be used as a basis for the prioritisation of different levels of complaints received.

1. A **Risk Level 1** grievance is one which is isolated, or "once-off" (within a given reporting period), and essentially local in nature, and has little potential to cause long term damage to stakeholder relations locally and nationally.
2. A **Risk Level 2** grievance is one which is widespread and repeated, has resulted in attention from the media at local / regional level, and has the potential to cause damage to stakeholder relations locally and nationally.
3. A **Risk Level 3** grievance is one which is both widespread and / or repeated and which, in addition, has resulted in a serious breach of Company policies, or the law and / or has led to negative national / international media attention, *or* is judged to have the potential to generate negative comment from the media, or other key stakeholders. A Risk Level 3 complaint also has the potential to cause major damage to stakeholder relations, locally, nationally and internationally.

Repeated or continuous Level 1 or 2 complaints must be escalated to the next level up, if the cause is not rectified within an acceptable period of time. This categorisation provides an indication of the severity of the complaint, and has implications for how high within the Company the complaint is reported, and the seniority of management oversight required.

Step 4: Investigate and Resolve Grievance

- The Incident Investigation Team will be tasked with seeking resolution to the grievance. This may entail a dialog or series of dialogs between affected parties to find a solution to the grievance. Alternatively, it may entail investigating the underlying cause of the grievance and action any changes required to internal systems to prevent a recurrence of a similar grievance.

- An Incident Investigation Report will be completed within 28 days.

- During the 28 days of dialog or investigation, the CLO will co-ordinate conflict resolution activities necessary to contain and resolve any actual or potential conflicts arising from the reported grievance.

Step 5: Sign-off on Grievance

- The CLO will seek sign-off from the stakeholder that the grievance has been resolved.

- In instances where the stakeholder is not satisfied with actions taken, the grievance will either be escalated through the CLO to senior management and a decision will be taken either to implement supplementary actions or

to consider initiating an appeal process or approaching the host country's judiciary to further address the grievance.

- Following this process, the CLO will again approach the stakeholder to obtain sign-off on actions implemented.

- All grievances to be signed off at an appropriate level of seniority of staff. In this regard, it may be suitable that:

    - All grievances with a Level 1 risk rating will be signed off by the CLO.

    - All grievances with a Level 2 risk rating will be forwarded to senior management for sign-off (i.e. HSE Manager).

    - All grievances with a Level 3 risk rating will be forwarded to the site manager for his / her attention and sign-off. Whilst it may not be necessary to involve the HSE Manager in signing off complaints of low significance (e.g. Level 1), they should be involved in periodic reviews of actions taken for such grievances, to ensure their correct handling and classification.

- The staff member who signs off the complaint should have sufficient knowledge about the topic to provide assurance.

- Once sign-off has occurred, this should be recorded in the Grievance Log.

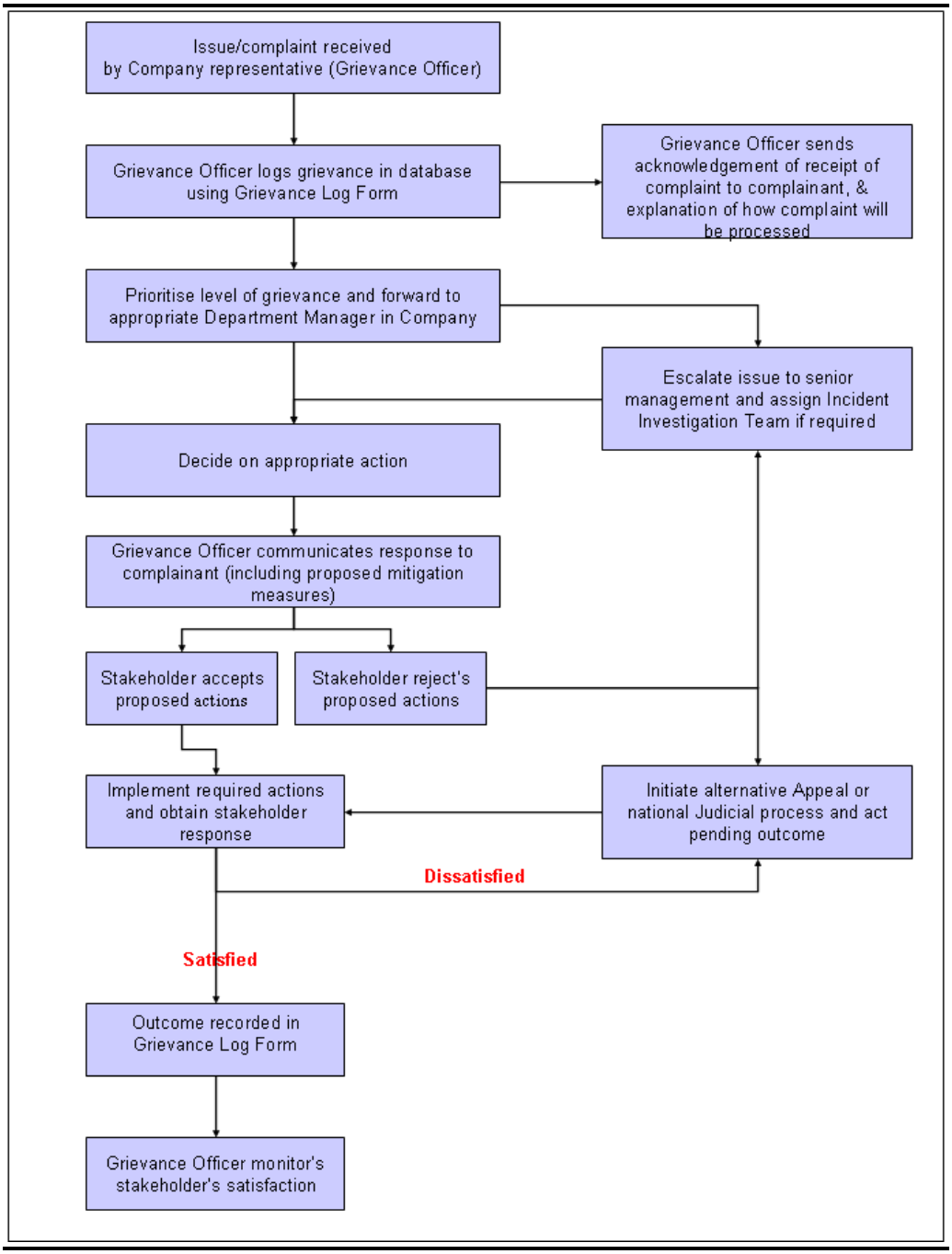
Step 6: Monitor

- The CLO will monitor the satisfaction of the stakeholder and project personnel following sign-off (this will take place in the 28 days after sign-off).

- Any grievances not signed-off as resolved will be further investigated and the CLO will seek agreement from the stakeholder to maintaining contact in order to determine what further action is required to resolve the grievance.

A Grievance Procedure flow diagram is provided below in *Figure 6.1.*

Figure 6.1 Grievance Procedure Flow Chart



7 RAP SCHEDULE

This *Section* provides an overview of RAP development and implementation activities synchronized with a projects activities; see *Table 7.1.* Linking schedules in this way creates an imperative for co-ordinating resettlement with other project activities throughout the chain of project management.

Table 7.1 An Example of a RAP Implementation Schedule

Year	2015				2016				2017				2018			
RAP Steps	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Pre-Construction																
Development of Draft RAP																
Step 1 - Identify project impacts and affected populations																
Step 2 – Develop a detailed legal framework for land acquisition and compensation																
Step 3 – Develop a compensation framework																
Step 4 – Describe the resettlement assistance and restoration of livelihood activities																
Step 5 – Describe a detailed budget and an implementation schedule.																
Step 6 – Describe the organizational responsibilities																
Step 7 – Develop a framework for public consultation, participation, and development planning issues																
Step 8 – Develop a grievance mechanism for resettlement																
Step 9 - Develop a framework for monitoring, evaluation and reporting																
Approval of Draft RAP																
Construction																
Undertake Community Consultation Program as described in Step 7.																
Confirmation of Relocation Sites																

Year	2015				2016				2017				2018			
RAP Steps	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Agreement of Entitlements																
Payment of Compensation																
Establishment of Links with Government Programs																
Implementation of Grievance Mechanism																
Movement of Project Affected People to New Sites or allocation of new land for agriculture																
RAP Monitoring																
External Evaluations																

8 RAP FUNDING AND BUDGET

Funding requirements of a RAP is determined by relevant in-country legislation (in this instance either Zimbabwe or Zambia) as well as international standards.

The purpose of a RAP is broadly to ensure that all affected parties are fairly compensated and assisted in restoring their livelihoods. For this to happen, the RAP implementation process must be funded adequately. The funding component of a RAP is usually seen as being an integral part of the total project budget.

The primary aim of securing adequate RAP funds is to ensure the implementation of all compensation and mitigation measures required due to project impacts on the affected community. Both direct and indirect impacts must be compensated and or mitigated. This includes direct losses of agricultural land and grazing land, crops, economic trees as well as improvements on land such as housing and business structures (shops).

Importantly, funding for a RAP will provide for the mitigation of more indirect project impacts on vulnerable groups such as children or the elderly who might not have the ability to absorb project impacts as successfully as other impacted groups. Mitigation of vulnerable groups may include support during the physical process of moving or assistance with financial planning with compensation funds.

According to international standards, a RAP implementation process should be seen as an opportunity to enhance development in the project area. This necessitates the design and funding of development programmes in line with regional and local development opportunities that could also contribute to the restoration of livelihoods and stimulation of the local economy.

Other aspects of RAP implementation that will need funding are internal and external monitoring and evaluation of the RAP as well as the establishment and management of a Grievance Mechanism and Procedure.

All of the mentioned compensation and mitigation components must be translated into a single integrated RAP budget. This will provide the Project Proponent with a clear understanding of the financial implications of the RAP implementation process.

The following categories should be considered during the budgeting, however the budgets required will depend on the extent of the displacement:

- Development and implementation of an engagement and communication system;

- Implementation of a grievance mechanism;
- Detailed household surveys of affected households;
- Development of eligibility and entitlement matrix;
- Design of resettlement options and site selection process;
- Payment of compensation;
- Development and implementation of a livelihoods restoration programme; and
- Monitoring and evaluation.

In line with international standards, projects that induce displacement are required to monitor and report on the effectiveness of RAP implementation. This includes progress with the physical and economic displacement and restoration of livelihood activities, the disbursement of compensation, the effectiveness of consultation and participation activities by the affected communities and the sustainability of livelihood restoration and development efforts. The monitoring mechanism provides the basis to assess the success of the resettlement process and the effectiveness of the various implementation processes and measures.

Monitoring can be done via a wide range of mechanisms including primary and secondary data collection methods. The most commonly used methods are interviews with displaced people, review and analysis of secondary project sources such as minutes and reports and key stakeholder and focus group interviews such as with government representatives and NGOs. Site visits and inspections as well as compliance audits are typically used to verify compliance with RAP implementation measures and progress toward desired outcomes.

The monitoring mechanism will typically provide for two types of monitoring, namely internal monitoring and external monitoring. Internal monitoring is usually conducted by the RAP implementing body (the Project Proponent) as an internal project management tool with the purpose of ensuring that implementation measures are resulting in desired outcomes and if not, to define and implement corrective measures immediately.

External monitoring is usually conducted by an independent third party with the express purpose of gauging whether implementation is compliant with the approved compensation and mitigation measures as captured in the RAP. In the event that stated monitoring objectives and outcomes are not achieved, the external monitor makes recommendations to rectify this.

Both internal and external monitoring requires the following:

- The design of a monitoring plan and procedure;
- The identification of key monitoring objectives; and
- An overview of the roles and responsibilities of all parties involved in monitoring activities.

Examples of performance milestones could include:

- Number of Public meetings held;
- Census, assets inventories, assessments, and socio-economic studies conducted;
- Grievance redress procedures in place and functioning;

- Compensation payments disbursed;
- Housing lots allocated;
- Housing and related infrastructure completed;
- Relocation of people completed;
- Income restoration and development activities initiated; and
- Monitoring and evaluation reports submitted.

Finally, it is required that monitoring results are well documented, that suggested corrective and preventive actions are implemented, and that there is follow-up on these actions to ensure their effectiveness.

10 CONCLUSION

In conclusion, although the proposed Kariba Dam Rehabilitation Project will not result in any resettlement at this stage, if needed, a RPF (this document) outlining the general principles to be followed if any physical or economic displacement were to occur has been produced.

While host governments often take responsibility for the resettlement of project affected people, the Project Proponent still remains with the responsibility to ensure that the outcomes of the resettlement is consistent with IFC's performance standards on involuntary resettlement.

Therefore, this RPF was developed to provide the ZRA with an understanding of the principles, procedures and organisational arrangements that will be required from the Governments of Zimbabwe and Zambia as well as from the Project Proponent during implementation.

Annex C

Surface Water and Aquatic Monitoring Plan

C1 SURFACE WATER AND AQUATIC MONITORING PLAN

C1.1 MONITORING PARAMETERS

The parameters selected for surface water quality monitoring include:

- **On Site Measurements** – pH, electrical conductivity, turbidity, dissolved oxygen saturation, temperature.
- **Major Ions** – calcium, chloride, magnesium potassium, sodium, sulphate and alkalinity.
- **Nutrients** – inorganic nitrogen and phosphorus.
- **Common Trace Elements** – aluminium, arsenic, cadmium, chromium, copper, cyanide, fluoride, iron, lead, manganese, mercury, selenium and zinc.

Instream biomonitoring (aquatic) include variation in:

- **Diatoms** – specific Pollution Index- SPI, Biological Diatom Index-BDI and % Pollution Tolerant Valves- %PTV.
- **Aquatic Macroinvertebrates** – cumulative sensitivity scores and Average Score Per Taxa (ASPT).
- **Fish** – Shannon-wiener diversity scores.

C1.2 MONITORING FREQUENCY

The following monitoring frequencies are stipulated for:

- **On Site Measurements** – weekly during rehabilitation works, with the exception of dissolved oxygen saturation which should be monitored daily during construction.
- **Chemical Analyses of Water Quality** – monthly during construction.
- **Biomonitoring** – quarterly during construction.

C1.3 MONITORING LOCATIONS

The following locations are stipulated:

- For all **Water Quality Monitoring**, surface samples should be taken at the power station intakes, or immediately above the dam for control purposes.

Three test sites recognises a blending zone downstream of the coffer dam and include monitoring points, of surface water, at 200m, 500m and 1,000m from the discharge point.

- **Biomonitoring** points encompass the gorge and represent a total hydrological unit and all habitat types associated with the gorge. Baseline conditions at these points are represented in the aquatic ecology report for site ZR1 (approximately 500 m from the dam wall), ZR2 (located in the middle of the gorge) and ZR3 (located and the end of the gorge) (refer to the location of these sampling points in *Table 1.1*).

C1.4 DATA QUALITY

The monitoring program should apply to internationally approved methods for sample collection, preservation and analysis. Sampling should be conducted by or under the supervision of trained individuals. Analysis should be conducted by entities permitted or certified for this purpose. Sampling and Analysis Quality Assurance/Quality Control (QA/QC) plans should be prepared and, implemented. QA/QC documentation should be included in monitoring reports.

C1.5 REFERENCES

DWAF. (1996) *South African Water Quality Guidelines* (second edition). Volume 7: Aquatic Ecosystems, Pretoria, South Africa.

EPA. (1986). *Quality Criteria for Water*. Office of Water Regulation and Standards, Washington DC, 26460.

IFC & World Bank (2007) *Environmental Health and Safety Guidelines: 1.3 - Waste Water and Ambient Water Quality*.

Table 1.1 Surface Water Quality and Aquatic Monitoring Plan

Monitoring Type and Parameter	Location/s	Frequency and Duration	Threshold Values	Adaptive Action
Water quality (*in situ*) (ON SITE MEASUREMENTS)				
pH	• Control site (power station intake) • Test sites:200,- 500- and 1000 m downstream of coffer dam or dewatering point	Weekly during construction.	Between 5-6.5 and 8.5-9 (at any of the monitoring points)	Increase monitoring frequency to once every 4 hours. If values persist for longer than 24 hours, identify cause and stop activity or treat with acid or base addition.
			Values <5 or >9 (at 1000 m monitoring point)	Stop activity immediately. Identify source and or treat with acid base addition.
Electrical Conductivity			150-250 µs/cm (at any of the monitoring points)	Increase frequency of monitoring to daily. If values do not return to <150 µs/cm within 7 days, stop activity, identify source and treat by isolation and evaporation, crystallisation or reverse osmosis.
			>250 µs/cm (at 1000 m monitoring point)	Stop activity immediately, identify source and treat as above. Continue monitoring daily till values return below 150 µs/cm.
Turbidity			10-15% increase compared to control site for < 24 hours (at any of the downstream monitoring points)	Increase monitoring frequency to hourly identify source of increased turbidity.
			>15% increase compared to control site for >24 hours (at 1000 m monitoring point)	Identify source stop activity, mitigate with sedimentation basin or increase size of sump system.
Temperature			>2 ˚C from background average daily temperature or more than 10%, whichever is more conservative, for any period of time at any monitoring point.	Identify the reason for the temperature variation and treat with surface aeration and or flow equalisation.
Dissolved Oxygen (% Saturated)		Daily during	7 day mean of	Identify source and facilitate

Monitoring Type and Parameter	Location/s	Frequency and Duration	Threshold Values	Adaptive Action
		construction	measurements taken at dawn over 7 days. Should not be < 80 or >120% saturated at any of the monitoring points.	oxygenation through rapid mixing, oxidation, absorption or size exclusion.
Water quality (*Major ions*)				
Calcium	• Control site (power station intake) • Test sites: 200, - 500- and 1000 m downstream of coffer dam or dewatering point.	Monthly during construction	<150 mg/L	Identify source, stop activity and treat through isolation, concentration and or size exclusion.
Chloride			150 mg/L	
Magnesium			70 mg/L	
Potassium			400 mg/L	
Sodium			100 mg/L	
Sulphate			500 mg/L	
Alkalinity (as $CaCO_3$)			Should not be reduced to less than 20 mg/L	Identify source, stop activity treat through adding $CaCO_3$.
Water quality (*Nutrients*)				
Nitrogen (inorganic)	• Control site (power station intake) • Test sites: 200, - 500- and 1000 m downstream of coffer dam or dewatering point.	Monthly during construction	0.5-2.5 mg/L (mesotrophic)	Increase monitoring frequency to once weekly. If mesotrophic condition persist for more than a month seize activity and treat through isolation, biological nutrient removal, chemical treatment or ion exchange
			2.5-10 mg/L (eutrophic)	Identify source, stop activity and treat through isolation, biological nutrient removal, chemical treatment or ion exchange. Continue monitoring at weekly intervals
Phosphorus (inorganic)			5-25 mg/L (mesotrophic)	Increase monitoring frequency to once weekly. If mesotrophic condition persist for more than a month seize activity and treat through isolation, biological nutrient removal, chemical treatment or ion exchange
			25-250 mg/L (eutrophic)	Identify source, stop activity and treat through isolation, biological nutrient removal, chemical treatment or ion exchange. Continue monitoring at weekly intervals

Monitoring Type and Parameter	Location/s	Frequency and Duration	Threshold Values	Adaptive Action
Water quality (*trace elements*)				
Aluminium	• Control site (power station intake) • Test sites: 200, - 500- and 1000 m downstream of coffer dam or dewatering point.	Monthly during construction	0.01 mg/L	Identify source of contamination and stop activity. Treatment options may include: flash mixing with settling, filtration, chemical oxidation, thermal oxidation, activated carbon, reverse osmosis and evaporation.
Arsenic			0.01 mg/L	
Cadmium (if $CaCO_3$ <60 mg/L)			0.00015 mg/L	
Cadmium (if $CaCO_3$ <60-119 mg/L)			0.00025 mg/L	
Cadmium (if $CaCO_3$ <120-180 mg/L)			0.00035 mg/L	
Cadmium (if $CaCO_3$ >180 mg/L)			0.0004 mg/L	
Chromium (VI)			0.007 mg/L	
Chromium (III			0.012 mg/L	
Copper (if $CaCO_3$ < 60 mg/L)			0.0003 mg/l	
Copper (if $CaCO_3$ 60-119 mg/L)			0.0008 mg/L	
Copper (if $CaCO_3$ 120-180 mg/L)			0.0012 mg/L	
Copper (if $CaCO_3$ >180 mg/L)			0.0014 mg/L	
Cyanide			0.001 mg/L	
Fluoride			0.75 mg/L	
Iron			Should not vary more than 10% from background levels at any time.	
Lead (if $CaCO_3$ < 60 mg/L)			0.0002 mg/L	
Lead (if $CaCO_3$ 60-119 mg/L)			0.0005 mg/l	
Lead (if $CaCO_3$ 120-180 mg/L)			0.001mg/L	
Lead (if $CaCO_3$ >180 mg/L)			0.0012 mg/L	
Manganese			0.18 mg/L	
Mercury			0.00004 mg/L	
Selenium			0.002 mg/L	
Zinc			0.002 mg/L	
Biomonitoring				
Diatoms SPI	ZR1: S 16.51631, E 28.76754	Quarterly during construction	Should exceed 9	Identify driver of change in instream aquatic communities. Do not interoperate response metrics in isolation and make sure that measured variation may not be attributed to sampling effort or season.
Diatoms BDI			Should exceed 9	
Diatoms %PTV			Should not exceed 40 %	
Diatoms SPI	ZR2: S 16.45229, E 28.81691		Should exceed 13	
Diatoms BDI			Should exceed 13	
Diatoms %PTV			Should not exceed 20 %	
Diatoms SPI	ZR3: S 16.36638, E 28.84965		Should exceed 13	

Monitoring Type and Parameter	Location/s	Frequency and Duration	Threshold Values	Adaptive Action
Diatoms BDI			Should exceed 13	Address the activity (and driver variable) that resulted in an instream response (i.e. change in water quality, flow or sediment regime). Given the background level of transformation, diatoms will be more likely to effectively monitor an instream response to changes in water quality. While changes in invertebrate and fish assemblages maybe equally be attributed to changes in flow, sediment or water quality. Biomonitoring frequency should be increased to 6 weekly if threshold values are not met or when water quality thresholds are exceeded. The frequency can be decreased to quarterly once instream responses have recovered.
Diatom %PTV			Should not exceed 20 %	
Aquatic macroinvertebrates (Sensitivity score)	ZR1: S 16.51631, E 28.76754		Should exceed 14	
Aquatic macroinvertebrates (ASPT)			Should exceed 2	
Aquatic macroinvertebrates (Sensitivity score)	ZR2: S 16.45229, E 28.81691		Should exceed 74	
Aquatic macroinvertebrates (ASPT)			Should exceed 3.9	
Aquatic macroinvertebrates (Sensitivity score)	ZR3: S 16.36638, E 28.84965		Should exceed 41	
Aquatic macroinvertebrates (ASPT)			Should exceed 3.4	
Fish (diversity score)	Z1: S 16.51631, E 28.76754		Should exceed 1.28	
Fish (diversity score)	Z2: S 16.45229, E 28.81691		Should exceed 1.68	
Fish (diversity score)	Z3: S 16.36638, E 28.84965		Should exceed 1.84	