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# Environmental Management Plan

The construction, operation, maintenance and decommissioning of the proposed Walvis Bay Independence Beach Promenade, Walvis Bay, Erongo Region



Co-funded by  
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# Environmental Management Plan

## THE CONSTRUCTION, OPERATION, MAINTENANCE AND DECOMMISSIONING OF THE PROPOSED WALVIS BAY INDEPENDENCE BEACH PROMENADE, WALVIS BAY, ERONGO REGION

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Signature

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## ABBREVIATIONS

AIDS	Acquired Immuno-Deficiency Syndrome
DR	Developer's Representative
EA	Environmental Assessment
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
GG	Government Gazette
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System

HIV	Human Immuno-deficiency Virus
I&APs	Interested and Affected Parties
NHC	National Heritage Council
Reg.	Regulation
S	Section
TB	Tuberculosis

## 1 INTRODUCTION

The development of a promenade at the beachfront is a significant urban planning initiative that holds the potential to transform the coastal areas into vibrant and sustainable spaces for both residents and tourists. A promenade is a pedestrian-friendly pathway along the beachfront, offering a range of recreational, social, and economic benefits to the community.

The Municipality of Walvis Bay in collaboration with the Municipality of Czerwonak, Poland is implementing a project termed “Erongo Sustainable Governance LAB” under the EU program: “Local Authorities Partnership for Sustainable Cities 2021”. The Municipality of Czerwonak is delighted to participate in this prestigious European Union project and is willing to share the experience of managing public services and building civic society with the Walvis Bay local government in Namibia.

The Municipality of Walvis Bay, Namibia, with the support of EU funds, will revitalize and refurbish the Independence Beach infrastructure in order to make it more accessible, attractive, sustainable and aligned with the citizens’ needs. The challenge in this project is engaging the residents in the decision-making process to build social responsibility and social interest in the town-planning initiatives.

A multifunction walkway measuring approximately 1.3km long and 3 to 4 meters wide will be included in the planned promenade. A variety of greenery will complement the walkway, including lawn, grass, palm trees, succulents, and canopy trees. In addition to the promenade, there will be two functional nodes to enhance it. Associated infrastructure will also be featured along the promenade, including an open-air gym, trading areas, restrooms, and beach sport facilities.

As part of this project, the construction of Walvis Bay Independence Beach Promenade will be realized as a model of promoting “Participatory urban Governance for resilient, safe, and inclusive multi-functional public spaces in Namibia”.

The proponent appointed Environam Consultants Trading cc (ECT) to undertake the Environmental Assessment (EA) in order to obtain an Environmental Clearance Certificate (ECC) for the activity from the Office of the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT).

The process will be undertaken in terms of the gazetted Namibian Government Notice No. 30 Environmental Impact Assessment Regulations (herein referred to as EIA Regulations) of the Environmental Management Act (No 7 of 2007) (herein referred to as the EMA). The EIA process will investigate if there are any potential significant bio-physical and socio-economic impacts associated with the proposed development and related infrastructure and services.

The EIA process would also provide an opportunity for the public and key stakeholders to provide comments and participate in the process. It will also serve the purpose of informing the proponent's decision-making, and that of MEFT.

An EMP is one of the most important outputs of the EA process as it synthesises all of the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. This EMP details the mitigation and monitoring actions to be implemented during the following phases of this development:

- Planning and Design - the period, prior to construction, during which preliminary legislative and administrative arrangements, necessary for the preparation of the land, are made and engineering designs are carried out. The preparation of construction tender documents forms part of this phase;
- Construction - the period during which the proponent, having dealt with the necessary legislative and administrative arrangements, appoints a contractor for the construction of services infrastructure, buildings as well as any other construction process(s) within the development areas;
- Operation and Maintenance - the period during which the development will be fully functional, operational and maintained.

The decommissioning of this development is not envisaged; however, in the event that this should be considered some recommendations have been outlined in 5.4.

## 2 ROLES AND RESPONSIBILITIES

Municipality of Walvis Bay as (the Developer) is ultimately responsible for the implementation of the EMP, from the planning and design phase to the decommissioning phase of this development, if the development is in future decommissioned. The developer will delegate this responsibility as the project progresses through its life cycle. The delegated responsibility for the effective implementation of this EMP will rest on the following key individuals:

- Developer's Representative;
- Environmental Control Officer; and
- Contractor (Construction and Operations and Maintenance).

## 2.1 DEVELOPER’S REPRESENTATIVE

The Developer should assign the responsibility of managing all aspects of this development for all development phases (including all contracts for work outsourced) to a designated member of staff, referred to in this EMP as the Developer’s Representative (DR). The Developer may decide to assign this role to one person for the full duration of the development, or may assign a different DR to each of the development phases - i.e. one for the planning and design phase, one for the construction phase and one for the operation and maintenance phase. The DR’s responsibilities are depicted in **Table 2-1** as follows:

**Table 2-1: DR’s responsibilities**

Responsibility	Project Phase
Making sure that the necessary approvals and permissions laid out in <b>Table 4-4</b> are obtained/adhered to	Throughout the lifecycle of this development
Making sure that the relevant provisions detailed in <b>Table 5-1</b> are addressed during planning and design phase.	Planning and design phase
Suspending/evicting individuals and/or equipment not complying with the EMP	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation and maintenance</li> </ul>
Issuing fines for contravening EMP provisions	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation and maintenance</li> </ul>

## 2.2 ENVIRONMENTAL CONTROL OFFICER

The DR should assign the responsibility of overseeing the implementation of the whole EMP on the ground during the construction and operation and maintenance phases to a designated member of staff, referred to in this EMP as the Environmental Control Officer (ECO). The DR/Developer may decide to assign this role to one person for both phases, or may assign a different ECO for each phase. During the operation phase the Developer may outsource the monitoring and evaluation of the EMP to an independent Environmental Consultant. The ECO will have the following responsibilities during the construction and operation and maintenance phases of these developments:

- Management and facilitation of communication between the Developer, DR, the contractors, and Interested and Affected Parties (I&APs) with regard to this EMP;

- Conducting site inspections (recommended minimum frequency is after every two months) of all construction and/or infrastructure maintenance areas with respect to the implementation of this EMP (monitor and audit the implementation of the EMP);
- Assisting the Contractor in finding solutions with respect to matters pertaining to the implementation of this EMP;
- Advising the DR on the removal of person(s) and/or equipment not complying with the provisions of this EMP;
- Making recommendations to the DR with respect to the issuing of fines for contraventions of the EMP; and
- Undertaking an annual review of the EMP and recommending additions and/or changes to this document.

### 2.3 CONTRACTOR

Contractors appointed by the Developer are automatically responsible for implementing all provisions contained within the relevant chapters of this EMP. Contractors will be responsible for the implementation of this EMP applicable to any work outsourced to subcontractors. **Table 5-2** applies to contractors appointed during the construction phase and **Table 5-3** to those appointed during the operation and maintenance phase. In order to ensure effective environmental management, the aforementioned chapters should be included in the applicable contracts for outsourced construction, operation and maintenance work.

The tables in **Chapter 5** detail the management measures associated with the roles and responsibilities that have been laid out in this chapter.

## 3 ASSUMPTIONS AND LIMITATIONS

This EMP has been drafted based on the scoping-level Environmental Assessment (EA) conducted for the proposed development as represented by the proponent. ECT will not be held responsible for the potential consequences that may result from any alterations to the initial layout/designs.

It is assumed that construction labourers will be sourced mostly from the Walvis Bay area and that migrant labourers (if applicable) will be housed within the town of Walvis Bay.

## 4 APPLICABLE LEGISLATION

Legal provisions that have relevance to various aspects of this development are listed in the tables below. The legal instrument and applicable corresponding provisions are provided.



Table 4-1: EMA Legislation applicable to the proposed development

Environmental Impact Assessment Regulation 2012 GRN Gazette No. 4878	
Activity	Applicability to the project
8.8 Construction and other activities in water courses within flood lines.	The development takes place along the shoreline.
8.9 Construction and other activities within a catchment area.	The activity takes place in a catchment.
10.1(a) The construction of- oil, water, gas and petrochemical and other bulk supply pipelines.	Pipelines will be constructed for water supply.
11.2 Construction of cemeteries, camping, leisure and recreation sites.	The project involves provision of leisure and recreation amenities.

**Table 4-2: National Policy and Legal framework governing the project**

Policy/Legislation	Provisions	Applicability to the Project
<p><b>The Namibian Constitution</b></p>	<p>The Namibian constitution is the supreme law of the country which is committed to sustainable development. Article 95(1) of the Constitution of Namibia states that: - “The State shall actively promote and maintain the welfare of the people by adopting policies aimed at ... The maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future”.</p>	<p>Undertake an Environmental Assessment to protect the environment and maintain the marine and terrestrial ecological systems.</p>
<p><b>The Environmental Management Act (No. 7 of 2007)</b></p>	<p>The Environmental Management Act (No. 7. of 2007) aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters. The act provides a list of activities that may not be undertake without an environmental clearance certificate.</p>	<p>The project must abide by the statutory requirement of EMA the EIA regulation. Carry out an EIA and develop an EMP for the project.</p>
<p><b>Draft Pollution Control and Waste Management Bill</b></p>	<p>This Bill serves to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management. The Bill will repeal the Atmospheric Pollution Prevention Ordinance (11 of 1976) when it comes into force. The</p>	<p>Management of waste, and any pollutant or chemicals that may have effect on humans etc.</p>

Policy/Legislation	Provisions	Applicability to the Project
	<p>Bill also provides for noise, dust or odour control that may be considered a nuisance. Further, the Bill advocates for duty of care with respect to waste management affecting humans and the environment and calls for a waste management licence for any activity relating to waste or hazardous waste management.</p>	
<p><b>The Occupational Safety and Health Act No. 11 of 2007;</b></p>	<p><b>Safety:</b></p> <p>A safety risk is a statistical concept representing the potential of an accident occurring, owing to unsafe operation and/or environment. In the working context “SAFETY” is regarded as “free from danger” to the health injury and to properties.</p> <p><b>Health:</b></p> <p>Occupational Health is aimed at the promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupations. This is done by ensuring that all work-related hazards are prevented and where they occur, managed.</p>	<p>During construction, accidents are bound to happen if the working environmental is not safe.</p> <p>The project should maintain good and healthy standards, at the work place, cleanliness, adequate sanitary facilities, protection against dangerous substances.</p>

Policy/Legislation	Provisions	Applicability to the Project
<b>Public and Environmental Health Act of 2015</b>	The Act serves to protect the public from nuisance and states that person may not cause a health nuisance or may not permit to exist on a land or premises owned or occupied by him or her, or of which he or she is in charge, a health nuisance or other condition liable to be injurious or dangerous to health.	The construction of infrastructure will take place across public places along the sea. The proponent should ensure that the site is off limits from public during construction to avoid incidences.
<b>Water Resources Management Act (2004)</b>	This Act provides a framework for managing water resources based on the principles of integrated water resources management. It provides for the management, development, protection, conservation, and use of water resources. Furthermore, any watercourse on/or in close proximity to the site and associated ecosystems should be protected in alignment with the listed principles.	The ocean should be protected from any harmful activities.
<b>Petroleum Product and Energy Act No, 13 of 1990</b>	This Act provides a framework for handling and distribution of petroleum products which may include purchase, sale, supply, acquisition, possession, disposal, storage or transportation thereof.	During construction, there would be handling of fuel and hydrocarbons for heavy vehicles. Hence the act compels the proponent to handle hydrocarbons safely.
<b>Labour Act No. 6 of 1992</b>	This Act aims to regulate labour in general and includes the protection of the health, safety and welfare of employees. The	Ensure that labour laws are followed.

Policy/Legislation	Provisions	Applicability to the Project
	1997 Regulations relating to the Health and Safety of employees at work sets out the duties of the employer, welfare and facilities at the workplace, safety of machinery, hazardous substances, physical hazards, medical provisions, construction safety and electrical safety.	
<b>Regional Council Act, 1992 (Act No. 22 of 1992)</b>	The Regional Councils Act legislates the establishment of Regional Councils that are responsible for the planning and coordination of regional policies and development. The main objective of this Act is to initiate, supervise, manage and evaluate development at regional level.	The area is in the jurisdiction of Erongo Regional Council. All relevant laws must be abided to.
<b>Soil Conservation Act No. 76 of 1969</b>	This act promotes the conservation of soil, prevention of soil erosion.	Improper planning of construction can cause soil degradation and erosion through earth works.
<b>National Heritage Act No. 27 of 2004</b>	The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. Part V Section 46 of the Act prohibits removal, damage, alteration or excavation of heritage sites or	Scrapping and excavation may unearth archaeological material.

Policy/Legislation	Provisions	Applicability to the Project
	remains, while Section 48 sets out the procedure for application and granting of permits such as	
<b>International Best Practises</b>	<p><b>Precautionary Approach Principle</b></p> <p>This principle is worldwide accepted when there is a lack of sufficient knowledge and information about the possible threats to the environment.</p> <p><b>Polluter Pays Principle</b></p> <p>This principle ensures that proponents take responsibility for their actions. Hence, in cases of pollution, the proponent bears the full responsibility to clean up the environment.</p>	<p>Although not envisioned, the proponent is urged to apply great precaution in an event of uncertainty.</p> <p>In the event of pollution, the proponent shall incur the clean-up cost.</p>

**Table 4-3.** The World Bank Environmental and Social Standards (ESS)

No	ESS	Description	Requirements
1.	Assessment and Management of Environmental and	This ESS sets out the borrower’s responsibility to identify, assess, manage and monitor environmental and social risks and impacts associated with each stage of the project. Three important	a) Use the WB ESF

No	ESS	Description	Requirements
	Social Risks and Impacts	<p>annexes form part of this standard and set out specific requirements in more details:</p> <ul style="list-style-type: none"> <li>- Annex 1: Environmental and Social Assessment</li> <li>- Annex 2: Environmental and Social Commitment Plan (ESCP)</li> <li>- Annex 3: Management of Contractors</li> </ul>	<ul style="list-style-type: none"> <li>b) Conduct an environmental and social assessment process, including stakeholder engagement</li> <li>c) Undertake stakeholder engagement and disclose appropriate information</li> <li>d) Develop an ESCP and implement all measures and actions set out in the ESCP</li> <li>e) Conduct monitoring and reporting on environmental and social performance of project against ESS</li> </ul>
2.	1. Labour and Working Conditions	<p>a) This ESS recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions</p>	<p>Requirements prescribed for:</p> <ul style="list-style-type: none"> <li>a) Working conditions and management of worker relationships</li> <li>b) Protecting the work force</li> <li>c) Grievance mechanism</li> <li>d) Occupational Health and Safety</li> <li>e) Contracted Workers</li> <li>f) Community Workers</li> <li>g) Primary Supply workers</li> </ul>

No	ESS	Description	Requirements
3.	2. Resource Efficiency and Pollution Prevention and Management	<p>b) This ESS recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, eco-system services and the environment at the local, regional, and global levels.</p> <p>c) It sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life cycle.</p>	<p>Requirements prescribed for:</p> <p>a) Resource efficiency (Energy use, Water use, Raw materials use)</p> <p>b) Pollution prevention and management</p>
4.	3. Community Health and Safety	<p>This ESS recognises that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. Communities that are already subjected to impacts of climate change may experience intensification of impacts due to project activities.</p> <p>d) It addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to vulnerable people</p>	<p>Requirements prescribed for:</p> <p>a) Community health and Safety</p> <ul style="list-style-type: none"> <li>- Infrastructure and equipment design and safety</li> <li>- Safety of Services</li> <li>- Traffic and road safety</li> <li>- Ecosystem services</li> <li>- Community exposure to health issues</li> <li>- Emergency preparedness and response</li> <li>- Management and safety of hazardous materials</li> </ul> <p>b) Security personnel</p>



No	ESS	Description	Requirements
5.	4. Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	<p>This ESS applies to permanent or temporary physical and economic displacement resulting from land acquisition or restrictions on land use undertaken or imposed in connection with project implementation.</p> <p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>- To avoid or minimise involuntary resettlement</li> <li>- To avoid forced evictions</li> <li>- To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use</li> </ul>	<p>a) General requirements:</p> <ul style="list-style-type: none"> <li>- Eligibility classification</li> <li>- Project design</li> <li>- Compensation and benefits for affected persons</li> <li>- Community Engagement</li> <li>- Grievance mechanism</li> <li>- Planning and implementation</li> </ul> <p>b) Displacement</p> <ul style="list-style-type: none"> <li>- Physical displacement</li> <li>- Economic displacement</li> </ul>
6.	5. Biodiversity Conservation and Sustainable Management of Living Natural Resources	<p>e) The requirements of this ESS are applied to all projects that potentially affect biodiversity or habitats, either positively or negatively, directly or indirectly, or that depend upon biodiversity for their success.</p> <p><b>f) Objectives:</b></p> <ul style="list-style-type: none"> <li>- To protect and conserve biodiversity and habitats</li> <li>- To apply the mitigation hierarchy and precautionary approach in the design and implementation</li> </ul>	<p>a) Assessment of risks and impacts</p> <p>b) Conservation of biodiversity and habitats</p> <p>c) Legally protected and internationally recognised areas of high biodiversity value</p> <p>d) Invasive alien species</p> <p>e) Sustainable management of living natural resources</p>

No	ESS	Description	Requirements
		<ul style="list-style-type: none"> <li>- To promote the sustainable management of living natural resources</li> <li>- To support livelihoods of local communities and adoption of practices that integrate conservation needs and development priorities</li> </ul>	
7.	6. Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	g) This ESS contributes to poverty reduction and sustainable development by ensuring that projects supported by the Bank enhance opportunities for Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities <sup>1</sup> to participate in, and benefit from, the development process in ways that do not threaten their unique cultural identities and well-being	<ul style="list-style-type: none"> <li>a) Avoidance of adverse impacts</li> <li>b) Mitigation and development benefits</li> <li>c) Meaningful consultation tailored to indigenous peoples/Sub-Saharan African historically underserved traditional local communities</li> <li>d) Obtain Free Prior and Informed Consent (FPIC)</li> <li>e) Establish grievance mechanism</li> </ul>
8.	7. Cultural Heritage	h) This ESS sets out general provisions on risks and impacts to cultural heritage from project activities. The term ‘cultural heritage’ encompasses tangible and intangible heritage, which may be recognized and valued at a local, regional, national or global level, as:	<ul style="list-style-type: none"> <li>i) Stakeholder consultation and identification of cultural heritage</li> <li>j) Legally protected cultural heritage areas</li> <li>k) Provisions for specific types of cultural heritage</li> <li>l) Commercial use of cultural heritage</li> </ul>

No	ESS	Description	Requirements
		<ul style="list-style-type: none"> <li>- Tangible cultural heritage (includes immovable objects, sites, structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance</li> <li>- Intangible cultural heritage (includes practices, representations, expressions, knowledge, skills and cultural spaces associated with that community.</li> </ul>	
9.	8. Financial Intermediaries (FIs)	<p><i>m)</i> FIs are required to monitor and manage the environmental and social risks and impacts of their portfolio and FI subprojects, and monitor portfolio risk, as appropriate to the nature of intermediated financing.</p> <p>Objectives:</p> <ul style="list-style-type: none"> <li>- To set out how the FI will assess and manage environmental and social risks and impacts associated with the subprojects it finances</li> <li>- To promote good environmental and social management practices in the subprojects the FI finances</li> <li>- To promote good environmental and sound human resources management within the FI</li> </ul>	<ul style="list-style-type: none"> <li><i>a)</i> Environmental and social procedures</li> <li><i>b)</i> Environmental and social policy</li> <li><i>c)</i> Organisational capacity and competency</li> <li><i>d)</i> Monitoring and reporting</li> <li><i>e)</i> Stakeholder engagement</li> </ul>

No	ESS	Description	Requirements
109.	Stakeholder Engagement and Information Disclosure	<p><i>n)</i> This ESS recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of international best practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation</p>	<p><i>a)</i> Stakeholder identification and analysis  <i>b)</i> Establish a Stakeholder Engagement Plan  <i>c)</i> Provide Information disclosure  <i>d)</i> Undertake meaningful consultations  <i>e)</i> Continue engagements during project implementation and external reporting  <i>f)</i> Establish and implement a grievance mechanism  <i>g)</i> Organisational capacity and commitment</p>

**Table 4-4: The Equator Principles**

Equator Principle	Description
1. Review and Categorisation	<p>A project proposed for financing is categorised based on the magnitude of potential environmental and social risks and impacts, including those related to Human Rights, climate change, and biodiversity. The Categories are based on the International Finance Corporation (IFC)’s environmental and social categorisation process”</p> <ul style="list-style-type: none"> <li>- Category A- Projects with significant adverse environmental and social risks that are irreversible or unprecedented</li> <li>- Category B- Projects with potential limited adverse environmental and social risks that are largely reversible and can be addressed through mitigation measures</li> <li>- Category C- Project with minimal or no adverse environmental risks or impacts</li> </ul>
2. Environmental and Social Assessment	<p>Clients are required to conduct appropriate assessments to address environmental and social risks and the scale of impacts of the proposed project. The assessment should include measures to minimise, mitigate, compensate/offset for risks and impacts to those affected.</p>
3. Applicable Environmental and Social Standards	<p>The Environmental and Social Assessments should first address compliance with the relevant laws, regulations and permits pertaining to environmental and social issues of the host country.</p>
4. Environmental and Social Management System and Equator Principles Action Plan	<p>For all Category A and Category B projects, clients are required to develop and maintain an Environmental and Social Management System (ESMS) to address issues raised in the assessment process.</p>

Equator Principle	Description
5. Stakeholder Engagement	For all Category A and Category B projects, clients are required to demonstrate effective stakeholder engagement as an ongoing process, in a structures and culturally appropriate manner with all affected parties.
6. Grievance Mechanism	As part of the ESMS, for all Category A and B projects, clients are required to establish effective grievance mechanisms that are designed for use by all affected parties
7. Independent Review	For all Category A and B projects, an independent Environmental and Social Consultant will carry out an independent review of the assessment including the ESMPs, ESMS and stakeholder engagement process to assess due diligence and compliance to the EP.
8. Covenants	<p><i>o)</i> For all Projects, where a client is not in compliance with its environmental and social covenants, the EPFI will work with the client on remedial actions to bring the Project back into compliance.</p> <p><i>p)</i> If the client fails to re-establish compliance within an agreed grace period, the EPFI reserves the right to exercise remedies, including calling an event of default, as considered appropriate.</p>
9. Independent Monitoring and Reporting	<i>q)</i> To assess Project compliance with the Equator Principles after Financial Close and over the life of the loan, the EPFI will require independent monitoring and reporting
10. Reporting and Transparency	<i>r)</i> The EPFI will, at least annually, report publicly on transactions that have reached Financial Close and on its Equator Principles implementation processes and experience

## 5 MANAGEMENT ACTIONS

The aim of the management actions in this chapter of the EMP is to avoid potential impacts where possible. Where impacts cannot be avoided, measures are provided to reduce them.

The following tables provide the management actions recommended to manage the potential impacts rated in the scoping-level EA conducted for this development. These management actions have been organised temporally according to project phase:

- Planning and design phase management actions (**Table 5-1**);
- Construction phase management actions (**Table 5-2**);
- Operation and maintenance phase management actions (**Table 5-3**);

The responsible persons at the Developer's team have assessed these commitments in detail and have committed to the specific management actions, where indicated in the tables below.

## 5.1 PLANNING AND DESIGN PHASE

The DR should ensure that the management actions detailed below in **Table 5-1** are adhered to during the period before the construction of the infrastructure starts.

**Table 5-1:** Planning and design management actions

PLANNING AND DESIGN PHASE IMPACTS	
Impact	Mitigation Measures
Surface and ground water	<ul style="list-style-type: none"> <li>• Appoint professional engineers to develop a detailed storm water management design as part of the infrastructure service provision of the development.</li> <li>• The service infrastructure should be designed and constructed by suitably qualified engineering professionals.</li> <li>• Develop and implement a preventative maintenance plan for the service infrastructure.</li> <li>• Ensure that storage areas are paved with impermeable material to guarantee containment and prevent seepage into the underground. The paving to be designed by an independent engineer.</li> <li>• Conduct baseline sampling and testing of the underlying soil and groundwater.</li> <li>• No dumping of waste products of any kind in or in close proximity to any water bodies.</li> <li>• Ensure that surface water accumulating on-site are channelled and captured through a proper storm water management system to be treated in an appropriate manner before disposal into the environment.</li> <li>• Wastewater should not be discharged directly into the environment.</li> <li>• Disposal of waste from the development should be properly managed.</li> <li>• Hazardous waste and contaminated water and soil must be disposed of at an appropriately designated facility or by approved contractors. Hazardous waste disposal certificates must be kept on file.</li> <li>• All hazardous substances must be stored in a properly bunded area to prevent any spillages from entering the surrounding environment.</li> </ul>



PLANNING AND DESIGN PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>• Emergency response plans and spill contingency plans must be in place and include all fuels, chemicals or hazardous substances being handled.</li> <li>• Spill containment equipment such as absorbents must be readily accessible. Training in the use of these are paramount.</li> <li>• Any hazardous substance spill on the site must be cleaned and disposed of to prevent it from entering the ocean either by wind or water runoff.</li> <li>• Effluent must meet standards as per the effluent discharge permits and Water Quality Guidelines.</li> <li>• Use of reputable and well-trained contractors is essential.</li> </ul>
Fauna and flora	<ul style="list-style-type: none"> <li>• Report any extraordinary fauna sightings to the Ministry of Environment, Forestry and Tourism and / or Ministry of Fisheries and Marine Resources.</li> <li>• Ensure waste cannot be blown away by wind.</li> <li>• The destruction of habitats and of roosting and nesting sites for birds in the development area must be prevented where possible.</li> <li>• To prevent bird collisions with structures at night, all lights used at the site should be directed downwards to the working surfaces and only be switched on when and where necessary.</li> </ul>
Existing Service Infrastructure	<ul style="list-style-type: none"> <li>• Ensure professional design and construction of service infrastructure from qualified and registered engineers.</li> <li>• Ensure consultation and compliance with relevant authorities responsible for services, such as the Municipality and Erongo Red.</li> <li>• Developers must determine exactly where services amenities and pipelines are situated before construction / maintenance commences.</li> <li>• Designs and building materials should be as such to reduce dependency on artificial heating and cooling in order to limit the overall energy demand.</li> </ul>

PLANNING AND DESIGN PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>• Water saving mechanisms should be incorporated within the proposed development’s design and plans in order to further reduce water demands.</li> <li>• Train employees on the importance of water and energy savings.</li> <li>• Adhere to water quality guidelines.</li> <li>• Promptly detect and repair water pipe and tank leaks.</li> <li>• Users to conserve water e.g. by avoiding unnecessary toilet flushing.</li> <li>• Ensure taps are not running when not in use.</li> <li>• Install water conserving taps that turn-off automatically when water is not being used.</li> <li>• Switch off electrical equipment, appliances and lights when not being used.</li> <li>• Install occupation sensing lighting at various locations such as storage areas which are not in use all the time.</li> <li>• Install energy saving fluorescent tubes at all lighting points within the facility instead of bulbs which consume higher electric energy.</li> <li>• Monitor energy use during the operation of the project and set targets for efficient energy use.</li> <li>• Conduct regular inspections for drainage pipe blockages or damages and fix appropriately.</li> </ul>
Traffic	<ul style="list-style-type: none"> <li>• Ensure that road junctions have good sightlines.</li> <li>• Adhere to the speed limit.</li> <li>• Implement traffic control measures where necessary.</li> <li>• In cooperation with the relevant authority, erect clear signage regarding restricted areas and roads, access and exit points, speed limits etc.</li> <li>• Trucks should not be allowed to obstruct any traffic or access points to any other businesses and facilities.</li> <li>• If any extraordinary traffic impacts are expected, traffic management should be performed in conjunction with the local traffic department.</li> </ul>

PLANNING AND DESIGN PHASE IMPACTS	
Impact	Mitigation Measures
Safety	<ul style="list-style-type: none"> <li>Designate the “possible danger zone” north of Extension 20 area as a no-swimming zone pending any further technical studies.</li> </ul>

## 5.2 CONSTRUCTION PHASE

The management actions listed in **Table 5-2** apply during the construction phase. This table may be used as a guide when developing EMPs for other construction activities within this development area.

**Table 5-2:** Construction phase management actions

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
Fauna and flora	<ul style="list-style-type: none"> <li>Prevent contractors from collecting wood, veld food, etc. during the construction phase.</li> <li>Ensure waste cannot be blown away by wind.</li> <li>The destruction of habitats and of roosting and nesting sites for birds in the area must be prevented where possible.</li> <li>To prevent bird collisions with structures at night, all lights used at the site should be directed downwards to the working surfaces and only be switched on when and where necessary.</li> </ul>
Pressure on existing infrastructure	<ul style="list-style-type: none"> <li>Educate workforce on water saving measures.</li> <li>Ensure all potable water points are metered and regularly read.</li> <li>Promptly detect and repair water leaks.</li> <li>Ensure taps are not running when not in use.</li> <li>Ensure proper recycling of water from other uses for sprinkling dusty areas.</li> <li>Ensure that the workforce is provided with temporary toilets during the construction phase.</li> <li>Ensure electrical equipment, appliances and lights are switched off when not being used.</li> <li>Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy.</li> </ul>

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>• Conduct a baseline crack survey to address the potential of cracks in the surrounding structures due to vibrations from roller compactors.</li> </ul>
Surface and Ground Water Impacts	<ul style="list-style-type: none"> <li>• It is recommended that construction takes place outside of the rainy season in order to limit flooding on site and to limit the risk of ground and surface water pollution.</li> <li>• No dumping of waste products of any kind in or in close proximity to water bodies.</li> <li>• Heavy construction vehicles should be kept out of any surface water bodies and the movement of construction vehicles should be limited where possible to the existing roads and tracks.</li> <li>• Ensure that oil/ fuel spillages from construction vehicles and machinery are minimised and that where these occur, that they are appropriately dealt with.</li> <li>• Drip trays must be placed underneath construction vehicles when not in use to contain all oil spillages that might be leaking from these vehicles.</li> <li>• Contaminated runoff from the construction sites should be prevented from entering the surface and ground water bodies.</li> <li>• All materials on the construction site should be properly stored.</li> <li>• Disposal of waste from the site should be properly managed and taken to the Walvis Bay landfill site.</li> <li>• Construction workers should be given ablution facilities at the construction site, they should be located at least 30 m away from any surface water and should be regularly serviced.</li> <li>• Washing of personnel or any equipment should not be allowed on site.</li> <li>• Should it be necessary to wash construction equipment this should be done at an area properly suited and prepared to receive and contain contaminated waters.</li> </ul>
Health, Safety and Security	<ul style="list-style-type: none"> <li>• Construction personnel should not overnight at the site, except for security personnel.</li> <li>• Ensure that all construction personnel are properly trained depending on the nature of their work.</li> <li>• Provide for first aid kit and properly trained personnel to apply first aid when necessary.</li> <li>• Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and construction personnel must be trained to use the equipment.</li> <li>• Implement all necessary measures to ensure health and safety of workers and the general public during operation.</li> <li>• Firefighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas.</li> </ul>

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>• Regular inspection and servicing of the equipment must be undertaken by a competent service provider and records of such inspections maintained.</li> <li>• Fire escape routes and assembly point to be marked.</li> <li>• A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases and Covid-19.</li> <li>• Provide free condoms in the workplace throughout the construction phase.</li> <li>• Facilitate access to Antiretroviral medication for construction personnel.</li> <li>• Conform to the stipulated protocols related to Covid-19.</li> <li>• Restrict unauthorised access to the site and implement access control measures.</li> <li>• Clearly demarcate the construction site boundaries along with signage of no unauthorised access.</li> <li>• Clearly demarcate dangerous areas and no-go areas on site.</li> <li>• Signs such as “NO SMOKING” must be prominently displayed within the premises, especially in parts where inflammable materials are stored.</li> <li>• Staff and visitors to the site must be fully aware of all health and safety measures and emergency procedures.</li> <li>• The contractor/s must comply with all applicable occupational health and safety requirements. The workforce should be provided with all necessary Personal Protective Equipment where appropriate.</li> </ul>
Traffic	<ul style="list-style-type: none"> <li>• Limit and control the number of access points to the site.</li> <li>• Ensure that road junctions have good sightlines.</li> <li>• Construction vehicles need to be in a road worthy condition and maintained throughout the construction phase.</li> <li>• Transport the materials in the least number of trips as possible.</li> <li>• Adhere to the speed limit.</li> <li>• Implement traffic control measures where necessary, especially from and onto Independence Avenue.</li> <li>• Minimise the movement of heavy vehicles during peak time.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• No amplified music should be allowed on site.</li> <li>• Inform neighbouring communities and companies of construction activities to commence and provide for continuous communication between them and contractor.</li> </ul>

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>• Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.</li> <li>• Sensitise construction drivers to avoid unnecessary running of vehicle engines or hooting especially when passing through sensitive areas such as residential areas.</li> <li>• Ensure that construction machinery is kept in good condition to reduce noise generation.</li> <li>• Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures to minimize ambient noise levels.</li> <li>• Limit construction times to acceptable daylight hours.</li> <li>• Install technology such as silencers on construction machinery.</li> <li>• Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure.</li> <li>• Provide protective equipment such as ear muffs, masks and ear plugs to workers.</li> </ul>
Air quality	<ul style="list-style-type: none"> <li>• All loose material should be kept on site for the shortest possible time.</li> <li>• It is recommended that dust suppressants such as Dustex be applied to all the construction clearing activities to minimise dust.</li> <li>• Construction vehicles to only use designated roads.</li> <li>• During high wind conditions the contractor must make the decision to cease works until the wind has calmed down.</li> <li>• Vehicle idling time shall be minimised.</li> <li>• Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained.</li> <li>• Sensitise truck drivers to avoid unnecessary running of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points.</li> <li>• Cover any stockpiles with plastic to minimise windblown dust.</li> <li>• Ensure construction vehicles are well maintained to prevent excessive emission of smoke.</li> </ul>
Waste	<ul style="list-style-type: none"> <li>• It is recommended that waste from the temporary toilets be disposed of at the Walvis Bay Wastewater Treatment Works, on a regular basis.</li> </ul>

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>• A sufficient number of waste bins should be placed around the site for the soft refuse.</li> <li>• A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site.</li> <li>• The waste containers should be able to be closed to prevent birds and other animals from scavenging.</li> <li>• Adopt the waste management hierarchy i.e. prevention, minimisation, reuse, recycling, energy recovery, and lastly disposal.</li> <li>• If disposal is the only option, it should take place at a designated landfill in Walvis Bay.</li> <li>• Ensure accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials.</li> <li>• Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of.</li> <li>• Ensure that damaged or wasted construction materials including pipes, doors, plumbing and lighting fixtures, marbles will be recovered for refurbishing and use in other projects.</li> <li>• Donate recyclable/reusable or residual materials to local community groups, institutions.</li> <li>• Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.</li> <li>• Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements.</li> <li>• Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste.</li> </ul>
Hazardous Substances	<ul style="list-style-type: none"> <li>• All chemicals and other hazardous substances must be stored and maintained in accordance with the Hazardous Substances Ordinance (No. 14 of 1974), with all relevant licences and permits to be obtained where applicable.</li> <li>• Given the potential harm to human health during handling and use of any of hazardous substances it is essential that all staff be trained with regards to the proper handling of these substances as well as First Aid in the case of spillage or intoxication.</li> <li>• Storage areas for all substances should be bunded and capable to hold 120% of the total volume of a given substance stored on site.</li> </ul>

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
Social	<ul style="list-style-type: none"> <li>• Ensure locals enjoy priority in terms of job opportunities, to the extent possible, for skills that are available locally.</li> <li>• Ensure local procurement where commodities are available locally.</li> </ul>
Archaeological	<ul style="list-style-type: none"> <li>• Prevent damage to any archaeologically significant sites in the construction area.</li> <li>• In the event of a chance find, implement the following Archaeological Chance Finds Procedure:</li> </ul> <p><b>Action by person (operator) identifying archaeological or heritage material:</b></p> <ol style="list-style-type: none"> <li>a) If operating machinery or equipment: <b>stop work</b></li> <li>b) Identify the site with flag tape</li> <li>c) Determine GPS position if possible</li> <li>d) Report findings to foreman</li> </ol> <p><b>Action by foreman:</b></p> <ol style="list-style-type: none"> <li>a) Report findings, site location and actions taken to superintendent</li> <li>b) Cease any works in immediate vicinity</li> </ol> <p><b>Action by superintendent:</b></p> <ol style="list-style-type: none"> <li>a) Visit site and determine whether work can proceed without damage to findings</li> <li>b) Determine and mark exclusion boundary</li> <li>c) Site location and details to be added to AH GIS for field confirmation by archaeologist</li> </ol> <p><b>Action by archaeologist:</b></p> <ol style="list-style-type: none"> <li>a) Inspect site and confirm addition to AH GIS</li> <li>b) Advise NHC and request written permission to remove findings from work area</li> <li>c) Recovery, packaging and labelling of findings for transfer to National Museum</li> </ol> <p><b>In the event of discovering human remains:</b></p> <ol style="list-style-type: none"> <li>a) Actions as above</li> <li>b) Field inspection by archaeologist to confirm that remains are human</li> </ol>



CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>c) Advise and liaise with NHC and Police</li> <li>d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.</li> </ul>

### 5.3 OPERATION AND MAINTENANCE PHASE

The management actions included in **Table 5-3** below apply during the operation and maintenance phase of this development.

**Table 5-3:** Operation and maintenance management actions

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
Visual and Sense of Place	<ul style="list-style-type: none"> <li>• It is recommended that more ‘green’ technologies be implemented within the architectural designs and building materials of the development where possible in order to minimise the visual prominence of such a development within the more natural surrounding landscape.</li> <li>• Natural colours and building materials such as wood and stone should be incorporated.</li> <li>• Visual pollutants can further be prevented through mitigations such as keeping existing vegetation, introducing indigenous plants; keeping structures unpainted and minimising large advertising billboards.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Follow Labour Act Regulations - Noise Regulations (Regulation 197), and / or WHO guidelines on maximum noise levels (Guidelines for Community Noise, 1999), to prevent hearing impairment for workers on site and a nuisance for nearby residential areas / neighbours.</li> </ul>

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>• Minimize or prevent noise producing activities and plan to restrict these to daytime as far as practically possible.</li> <li>• All machinery must be regularly serviced to ensure minimal noise production.</li> <li>• The use of low frequency white noise or flashing lights should be considered instead of audible high frequency warning signals for moving forklifts or trucks.</li> <li>• Erect temporary or permanent noise barriers / sound baffles, should the need arise.</li> <li>• Placement of noise producing equipment, e.g. compressors, in such a way that noise is directed away from receptors and / or are attenuated.</li> <li>• Where possible, use infrastructure to act as noise barriers to sensitive environments.</li> <li>• Hearing protectors as standard PPE for workers in situations with elevated noise levels.</li> </ul>
Air quality	<ul style="list-style-type: none"> <li>• Manage activities that generate emissions or dust.</li> <li>• Minimise the movement of vehicles in the area.</li> <li>• The development needs to be controlled and managed as required by the Public Health Act (Act No. 36 of 1919) and Atmospheric Pollution Prevention Ordinance (No. 11 of 1976).</li> <li>• It is advised to pave the internal roads and individual properties.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• The area will be kept free of waste, except in designated waste storage areas.</li> <li>• Any wastes distributed by winds will be regularly cleaned up.</li> <li>• A sufficient number of waste bins should be placed around the site for the soft refuse.</li> <li>• A sufficient number of skip containers for the heavy waste should be provided for around the site.</li> <li>• Categorise waste into various types such as hazardous, general and recyclable.</li> <li>• Hazardous waste to be disposed of at the appropriate facilities of the Walvis Bay Municipality.</li> <li>• Adopt the waste management hierarchy i.e. prevention, minimisation, reuse, recycling, energy recovery, and lastly disposal.</li> <li>• If disposal is the only option, it should take place at a designated landfill in Walvis Bay.</li> </ul>

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
Quality of life	<ul style="list-style-type: none"> <li>• The proponent must employ local Namibians where possible.</li> <li>• If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.</li> <li>• Deviations from this practice must be justified.</li> <li>• Procurement should be done locally, then regionally, and nationally in that order where goods and services are available.</li> </ul>

## 5.4 DECOMMISSIONING PHASE

It is not envisaged to decommission the development in the immediate future. However, should this be considered at the end of its useful life, the development will be dismantled so as to restore the area to *ante operam* conditions. A full decommissioning plan should be developed prior to the commencement of the decommissioning.

## Appendix A - Water Quality Guidelines

# ANNEXURE

## Water Quality Standards for Effluent

<b>Effluent to be discharged or disposed of in areas with potential for drinking water source contamination; international rivers and dams and in water management and other areas</b>				
			<b>Special Standard</b>	<b>General Standard</b>
<b>DETERMINANTS</b>	<b>UNIT</b>	<b>FORMAT</b>	<b>95 percentile requirements</b>	
<b>PHYSICAL REQUIREMENTS</b>				
Temperature	° C		Not more than 10°C higher than the recipient water body	
Turbidity	NTU		< 5	< 12
pH			6,5-9,5	6,5-9,5
Colour	mg/litre Pt		< 10	< 15
Smell			No offensive smell	
Electric conductivity 25 °C	mS/m		< 75 mS/m above the intake potable water quality	
Total Dissolved Solids	mg/litre		< 500 mg/litre above the intake potable water quality	
Total Suspended Solids	mg/litre		< 25	< 100
Dissolved oxygen	% saturation		>75	>75
Radioactivity	units		below ambient water quality of the recipient water body	
<b>ORGANIC REQUIREMENTS</b>				
Biological Oxygen Demand	mg/litre	BOD	< 10	< 30
Chemical Oxygen Demand	mg/litre	COD	< 45	< 100
Detergents (soap)	mg/litre		< 0.2	< 3
Fat, oil & grease, individual	mg/litre	FOG	nil	< 2.5
Phenolic compounds	µg/litre	as phenol	< 0.01	< 0.10
Aldehyde	µg/litre		< 50	< 100
Adsorbable Organic Halogen	µg/litre	AOX	< 50	< 100
<b>INORGANIC MACRO DETERMINANTS</b>				
Ammonia (NH <sub>4</sub> – N)	mg/litre	N	< 1	< 10
Nitrate (NO <sub>3</sub> - N)	mg/litre	N	< 15	< 20
Nitrite (NO <sub>2</sub> - N)	mg/litre	N	< 2	< 3
Total Kjeldahl Nitrogen (TKN)	mg/litre	N	< 18	< 33
Chloride	mg/litre	Cl	< 40 mg/litre above the intake potable water quality	< 70 mg/litre above the intake potable water quality
Sodium	mg/litre	N	< 50 mg/litre above the intake potable water quality	<90 mg/litre above the intake potable water quality
Sulphate	mg/litre	SO <sub>4</sub>	< 20 mg/litre above the intake potable water quality	< 40 mg/litre above the intake potable water quality
Sulphide	µg/litre	S	< 0.05	< 0.5
Fluoride	mg/litre	F	1,0	2,0
Cyanide (Free)	µg/litre	CN	< 30	< 100
Cyanide (recoverable)	µg/litre	CN	< 70	< 200
Soluble Ortho phosphate	mg/litre	P	< 0.2	3,0
Zinc*	mg/litre	Zn	1	5

<b>Effluent to be discharged or disposed of in areas with potential for drinking water source contamination; international rivers and dams and in water management and other areas</b>				
			<b>Special Standard</b>	<b>General Standard</b>
<b>DETERMINANTS</b>	<b>UNIT</b>	<b>FORMAT</b>	<b>95 percentile requirements</b>	
<b>INORGANIC MICRO DETERMINANTS</b>				
Aluminium	µg/litre	Al	< 25	< 200
Antimony	µg/litre	Sb	< 5	< 50
Arsenic	µg/litre	As	< 50	< 150
Barium	µg/litre	Ba	< 50	< 200
Boron	µg/litre	B	< 500	< 1000
Cadmium*	µg/litre	Cd	< 5	< 50
Chromium, (hexavalent)	µg/litre	Cr	< 10	< 50
Chromium, Total*	µg/litre	Cr	< 50	< 1000
Copper*	µg/litre	Cu	< 500	< 2000
Iron	µg/litre	Fe	< 200	< 1000
Lead*	µg/litre	Pb	< 10	< 100
Manganese	µg/litre	Mn	< 100	< 400
Mercury*	µg/litre	Hg	< 1	< 2
Nickel	µg/litre	Ni	< 100	< 300
Selenium	µg/litre	Se	< 10	< 50
Strontium*	µg/litre	Sr	< 100	< 100
Thallium	µg/litre	Tl	< 5	< 10
Tin*	µg/litre	Sn	< 100	< 400
Titanium	µg/litre	Ti	< 100	< 300
Uranium*	µg/litre	U	< 15	< 500
*Total for Heavy Metals (Sum of Cd,Cr,Cu,Hg,Pb)	µg/litre	Cd,Cr,Cu, Hg & Pb	< 200	< 500
<b>UNSPECIFIED COMPOUNDS FROM ANTHROPOGENIC ACTIVITIES</b>				
Agricultural chemical compounds	µg/litre		Any in-/organic compound recognized as an agro-chemical is to be avoided or reduced as far as possible. Maximum acceptable contaminant levels will be site specific, dependent on chemical usage and based the water quality of the recipient water body	
Industrial and mining chemical compounds, including unlisted metals and persistent organic pollutants	µg/litre		Any in-/ organic compound recognized as an industrial chemical including unlisted metals is to be avoided or reduced as far as possible. Maximum acceptable contaminant levels will be site specific dependent on chemical usage and based the water quality of the recipient water body	
Endocrine Disruptive Compounds (EDC)	µg/litre		Any chemical compound that is suspected of having endocrine disruptive effects is to be avoided as far as is possible. Maximum acceptable contaminant levels will be site specific dependent on chemical usage and based the water quality of the recipient water body.	
Hydrocarbons (Benzene, Ethyl Benzene, Toluene and Xylene)	µg/litre		Below detection level	Below detection level
Organo-metallic compounds: methyl mercury, tributyl tin (TBT), etc.	µg/litre		Below detection level	Below detection level
<b>DISINFECTION</b>				
Residual chlorine	mg/litre		< 0.1 Dependent on recipient water body	< 0.3 Dependent on recipient water body

<b>Effluent to be discharged or disposed of in areas with potential for drinking water source contamination; international rivers and dams and in water management and other areas</b>				
			<b>Special Standard</b>	<b>General Standard</b>
<b>DETERMINANTS</b>	<b>UNIT</b>	<b>FORMAT</b>		
<b>BIOLOGICAL REQUIREMENTS (Algae and parasites)</b>				
Further treatment of the effluent dependent on: <ol style="list-style-type: none"> <li>1. the water quality of the recipient water body if any</li> <li>2. the distance from any point of potable water abstraction</li> <li>3. an acceptable maximum contaminant level downstream of the point of discharge</li> <li>4. the exposure to human and animal consumption downstream of the point of discharge</li> <li>5. any reuse option that may be implemented.</li> </ol>				
<b>MICROBIOLOGY</b>				
Further treatment of the effluent are dependent on: <ol style="list-style-type: none"> <li>1. the water quality of the recipient water body if any</li> <li>2. the distance from any point of potable water abstraction</li> <li>3. an acceptable maximum contaminant level downstream of the point of discharge</li> <li>4. the exposure to human and animal consumption downstream of the point of discharge</li> <li>5. any water reuse option that may be implemented.</li> </ol>				



# ANNEXURE

Table 1. Water Quality Guidelines and Standards for Potable Water

Specifications for water quality intended for human consumption from the source and piped water supply					
Status				Ranges and upper limits	
Interpretation				(Ideal guideline)	(Acceptable Standard)
DETERMINANTS	Unit	Format	Concern	95 Percentile Requirement	
<b>PHYSICAL AND ORGANOLEPTIC REQUIREMENTS</b>					
Temperature	° C		E	Ambient temperature	
Colour	PTU	or mg/litre	E	10	<15
Taste			O,E	No objectionable taste	
Odour			O,E	No objectionable odour	
Turbidity (treated surface water)	NTU	or TU	H,I	< 0,3	< 0,5
Turbidity (groundwater)	NTU	or TU	H,I	< 0,5	<2
pH @ 20 °C	pH		I	6.0 to 8,5	6 to 9
Electric Conductivity @ 25 °C	mS/m***	E.C.	H,I	< 80	< 300
Total Dissolved Solids	mg/litre		H,I	< 500	< 2 000
<b>INORGANIC MACRO DETERMINANTS</b>					
Ammonia	mg/litre	N	H	< 0.2	< 0.5
Calcium	mg/litre	Ca	I	< 80	< 150
Chloride	mg/litre	Cl	H,I	< 100	< 300
Fluoride	mg/litre	F	H	< 0.7	< 2,0
Magnesium	mg/litre	Mg	H	< 30	< 70
Nitrate	mg/litre	N	H	< 6	< 11
Nitrite	mg/litre	NO <sub>2</sub>	H	< 0.2	< 0.5
Potassium	mg/litre	K	H	< 25	< 100
Sodium	mg/litre	Na	H,I	< 100	< 300
Sulphate	mg/litre	SO <sub>4</sub>	H,O	100	< 300
Asbestos (fibres longer than 10 µm)	Fibres/litre		H	<500 000	< 1000 000
<b>INORGANIC MICRO DETERMINANTS</b>					
Aluminium	µg/litre	Al	H	< 25	< 100
Antimony	µg/litre	Sb	H	< 5	< 50
Arsenic	µg/litre	As	H	<10	< 50
Barium	µg/litre	Ba	H	0,5	< 2
Beryllium	µg/litre	Be	H	< 2	< 5
Bismuth	µg/litre	Bi	H	< 250	< 500
Boron	µg/litre	B	H	< 300	< 500
Bromide	µg/litre	Br	H	< 500	< 1 000
Cadmium	µg/litre	Cd	H	< 5	< 10
Cerium	µg/litre	Ce	H	<1 000	<2 000
Cesium	µg/litre	Cs	H	< 1 000	< 2 000
Chromium Total	µg/litre	Cr	H	< 50	< 100
Cobalt	µg/litre	Co	H	< 250	< 500
Copper	µg/litre	Cu	H	< 500	< 2 000

Specifications for water quality intended for human consumption from the source and piped water supply					
Status				Ranges and upper limits	
Interpretation				(Ideal guideline)	(Acceptable Standard)
DETERMINANTS	Unit	Format	Concern	95 Percentile Requirement	
<b>INORGANIC MICRO DETERMINANTS</b>					
Cyanide (free)	µg/litre	CN <sup>-</sup>	H	< 20	< 50
Cyanide (recoverable)	µg/litre	CN <sup>-</sup>	H	< 70	< 200
Iron	µg/litre	Fe	H,E	< 200	< 300
Lead	µg/litre	Pb	H	<10	< 50
Manganese	µg/litre	Mn	H	< 50	< 100
Mercury	µg/litre	Hg	H	< 1	<2
Nickel	µg/litre	Ni	H	< 50	< 150
Selenium	µg/litre	Se	H	< 10	< 50
Thallium	µg/litre	Tl	H	< 5	< 10
Tin	µg/litre	Sn	H	<100	<200
Titanium	µg/litre	Ti	H	< 100	< 300
Uranium	µg/litre	U	H	< 3	< 15
Vanadium	µg/litre	V	H	< 100	< 500
Zinc	µg/litre	Zn	H	< 1 000	< 5 000
Organo-metallic compounds	µg/litre	-	H	below detection limit	below detection limit
<b>ORGANIC DETERMINANTS</b>					
Dissolved Organic Carbon	mg/litre	DOC-C	H	< 5	<10
Phenol compounds	µg/litre	phenol	H	< 5	< 10
<b>DISINFECTION AND DISINFECTION BY-PRODUCTS</b>					
Bromodichloromethane (Part of THM)	µg/litre		H	< 20	< 50
Bromoform (Part of THM)	µg/litre		H	< 40	< 40
Chloroform (Part of THM)	µg/litre		H	< 20	< 100
Dibromomonochloro-methane (Part of THM)	µg/litre		H	< 20	< 100
Trihalomethanes (Total)	µg/litre	THM	H	< 100	< 150
Bromate	µg/litre		H	< 5	< 10
Chloramines	mg/litre	Cl <sub>2</sub>	H	< 2	< 4
Chlorine dioxide	µg/litre		H	< 400	< 800
Chlorite	µg/litre		H	< 400	< 4000
Chlorate	µg/litre		H	< 200	< 700
Haloacetic acids	µg/litre		H	not detected	< 60
Chlorine, free, after 30 min; GENERAL	mg/litre	Cl <sub>2</sub>	H,I	0,1 – 0,5	0,1 - 3,0
Chlorine, free, after 30 min; SPECIFIC	mg/litre	Cl <sub>2</sub>	Turbidity: < 0,3 NTU	0,1	0,1 - 3,0
Chlorine, free, after 30 min; SPECIFIC	mg/litre	Cl <sub>2</sub>	Turbidity: > 0,3 NTU	0,5	0,1 - 3,0
Chlorine, free, after 60 min; SPECIFIC	mg/litre	Cl <sub>2</sub>	Turbidity: >1,0 NTU	1,0	0,1 - 3,0

Specifications for water quality intended for human consumption from the source and piped water supply					
Status				Ranges and upper limits	
Interpretation				(Ideal guideline)	(Acceptable Standard)
DETERMINANTS	Unit	Format	Concern	95 Percentile Requirement	
<b>BIOLOGICAL REQUIREMENTS</b>					
<b>Algae</b>					
Chlorophyll $\alpha$	$\mu\text{g/litre}$		E,O	< 1	< 2
Blue-green algae	cells	/ml	H,O	< 200	< 2 000
Mycrocystin	$\mu\text{g/litre}$		H	< 0.1	< 1
Geosmin	$\eta\text{g/litre}$		E, H	< 15	< 30
2-Methyl Iso Borneal (2 MIB)	$\eta\text{g/litre}$		E, H	< 15	< 30
<b>OTHER DETERMINANTS</b>					
Agricultural chemical compounds			H	Any organic compound recognized as an agro-chemical should be in accordance with the WHO and EPA requirements.	
Industrial chemical compounds			H	Any organic compound recognized as an industrial chemical should be in accordance with the WHO and EPA requirements.	
Endocrine disruptive chemicals			H	Any chemical compound that is suspected of having endocrine disruptive effects shall be in accordance with the WHO and EPA requirements.	
<b>RADIOACTIVITY</b>				<b>95 Percentile Requirement</b>	
Gross alpha activity	Bq/litre		H	< 0.2	< 0.5
Gross beta activity	Bq/litre		H	< 0.4	< 1.0
If Gross alpha and beta is above specification calculate Dose based on individual radionuclide concentrations	mSv/a		H	$\leq 0.04$	$\leq 0.1$
<b>ANALYSIS QUALITY CHECK***</b>					
Ion balance: Total anions			-	< 3 -Tolerance = 0.2 m equivalent 3-10 – Tolerance 2% on +- balance 10-800 – Tolerance 5% on +- balance	
TDS Balance: determined / calculated	ratio		-	~ 1	~ 1
Ratio TDS / EC (EC as $\mu\text{S/cm}$ )	ratio		-	~ 0,66	0,55 – 0,7

"Concern" refers to impact if the limit is transgressed: H = health concern; O = organoleptic effect; I = effect on infrastructure, structural; E = aesthetic effect

\* Based on a viral cell culture-dependent method and not on cell culture-independent methods (e.g. PCR)

\*\* Indicative of faecal pollution having occurred, even when the residual disinfectant levels are safe.

\*\*\* Comply with SANAS Guidelines

**Table 2: Microbiological and Biological Requirements**

MICROBIOLOGICAL REQUIREMENTS APPLICABLE TO ALL POTABLE WATER					
Microbiology	cfu			95 percentile	1 of samples maximum
Heterotrophic bacteria HPC or TCC	counts	/ml		100 at 37 <sup>o</sup> C	1 000 at 37 <sup>o</sup> C
Total Coliform	counts	/100 ml	H	0	5
E.Coli	counts	/100 ml	H	0	1
Enterococci	counts	/100 ml	H	0	1
Somatic Coliphage	counts	/100 ml	H	0	1
Clostridium perfringens inclusive spores	counts	/100 ml	H	0	1
Enteric viruses	viral count*	/10 L	H	0	1
Parasites (Protozoa) applicable to all potable water				95 percentile	99 percentile
Giardia lamblia	cysts	/100 litre	H	0	1
Cryptosporidium	oocysts	/100 litre	H	0	1
Giardia lamblia and Giardia lamblia (Grab sample)	cysts or oocysts	/10 L	H	0	0

**Table 3: Special Requirements for the Protection of Infrastructure**

Specifications for water quality intended for human consumption from the source and piped water supply for the protection of infrastructure against corrosion					
Status			Ranges and upper limits		
Interpretation			(Ideal guideline)	(Acceptable Standard)	
DETERMINANTS	Unit	Format	Concern	95 Percentile requirement	
<b>CORROSIVE AND SCALING PROPERTIES</b>					
Calcium Carbonate Precipitation Potential	mg/litre	CCPP	I	4 - 5	3 - 6
Alkalinity/Sulphate/ Chloride Ratio	Equivalents	Corrosivity Ratio	I	With SO <sub>4</sub> and Cl above 50 mg/litre Ratio=(Alk/50)/(SO <sub>4</sub> /48+Cl/35.5) > 5.0 Water is Stable Ratio= (SO <sub>4</sub> /48+Cl/35.5)/(Alk/50) > 0.2 Water is Corrosive	
Total Hardness (Ca & Mg)	mg/litre	CaCO <sub>3</sub>	I	<200	< 400

**Table 4: Frequency of Microbiological Monitoring for Bulk Water Supply**

Size of population served	Turbidity 95%**	Frequency of sampling
> 250 000	< 0,5 NTU	Thrice weekly ***
100 001 – 250 000	< 1,0 NTU	Twice weekly
50 001 – 100 000	< 1,0 NTU	Once weekly
10 001 – 50 000	< 1,0 NTU	Three times every month
< 10 000 reticulated	< 1,0 NTU	Once every 1 month*
< 10 000 non-reticulated	1 – 2 NTU	Once every 1 month*

\* Upon complaints by the consumers or of medical practitioners and after incidents such as pipe breaks, the frequency should be increased until the situation has returned to original counts and been declared safe;

\*\* Average or 95 percentile turbidity of the water supplied

\*\*\* The frequency should be stepped up by one extra sampling per week for every 100 000 residents (including the estimated number of visitors residing within the area at any time) in the area served, over and above 250 000.

### **General Information**

1. The area being monitored shall be defined by the Minister in consultation with the Minister responsible for health and, where applicable, relevant officials from the Regional and Local Authorities;
2. At the time of sampling the operator shall also take a "free chlorine" reading of the same water under examination but prior to sampling for microbiological sampling, whilst using a portable device designed for that purpose and accepted by the Minister; this 'reading' is to be recorded and reported together with the results from the microbiological analyses;
3. As for field 'screening' of water supplies for microbiological contamination there exist portable devices designed for that purpose and accepted by the Minister; these 'readings' are to be recorded and reported together with the results from the microbiological analyses;
4. The results of the microbiological monitoring together with the free chlorine readings is to be reported as per mutual agreement to the ultimate supplier (bulk water supplier, Local Authority, or any other supplier) for remedial action where required, and to the Minister for record and monitoring purposes and follow up actions;
5. The costs of routine monitoring shall be borne by the authority commissioning the monitoring;

### **Methodology for Sampling and Analyses**

The methodologies followed for sampling and during transit and storage of samples prior to analysis shall be as prescribed.

1. Preferably samples are to be taken in borosilicate glass bottles with a glass or polypropylene screw-cap lid;
2. Where this is not feasible or practical polyethylene bottles with internal seal and with screw-lid can be used;
3. Samples shall, as far as practical, be analysed within 24 hours of sampling;
4. Where there are special requirements for the period between sampling and analysis to be less than 24 hours, such requirement should be attended to as far as is practical;
5. Samples are to be kept and stored, even during transit, at as low a temperature as is practically manageable, whilst preventing the risk of the sample freezing;
6. The sample shall be kept away from light and shielded from sunlight, to reduce chances of micro-/biological growth to a minimum;
7. The use of preservation chemicals should be considered, planned and executed with extreme care;
8. Where sample preservation is appropriate or required an extra smaller volume sample should be taken so as to not upset any other analyses that are affected by the preservation chemical(s);
9. Certain determinants may be monitored 'in the field' at the time of sampling; such field-data are to be measured in a receptacle or container different from the sample container; data so obtained shall be recorded as "field measurement" and cannot replace laboratory analysis for the parameters concerned;
10. The methodologies followed for physical, chemical and microbiological analysis shall be in agreement with the specifications listed in the latest edition of the SANS 241, Drinking Water Standards, published by the SABS.
11. The cost of routine, regulatory inspections and monitoring, for the purpose of fulfilling the provisions of this regulation shall borne by the service provider.