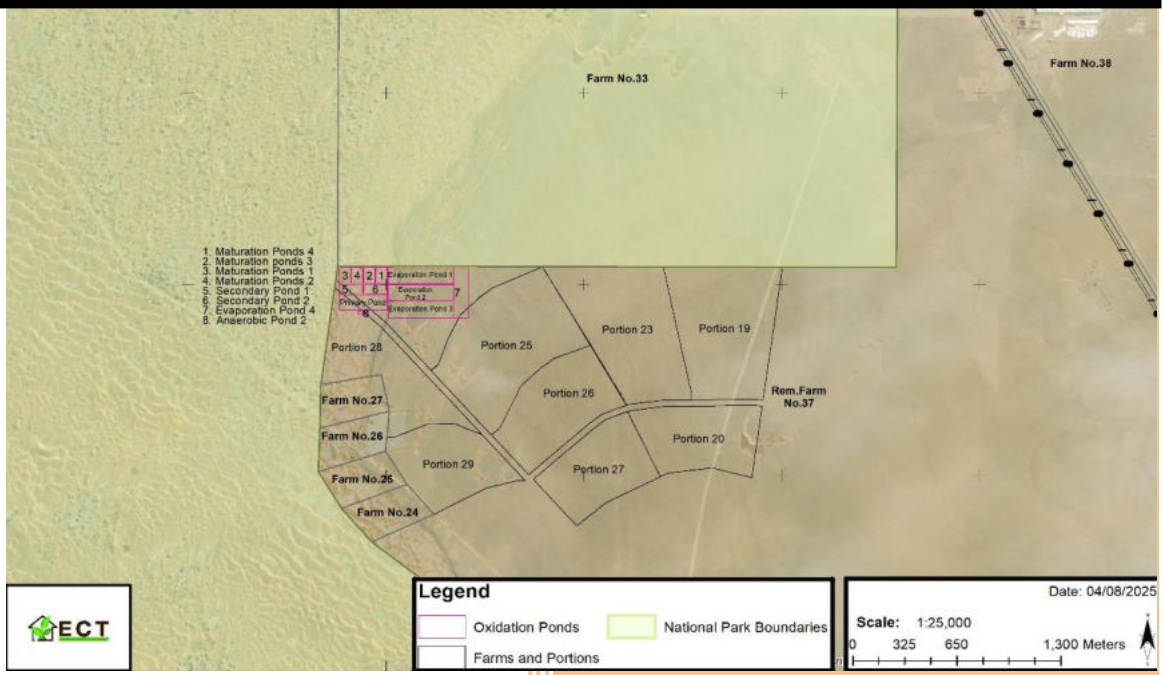
2025

Environmental Management Plan

Proposed Construction, Operation, Maintenance and Decommissioning of the Proposed Temporary Sewer Oxidation Ponds for Green Valley Proper and Green Valley Extensions 1-5 (Farm 37), Walvis Bay, Erongo Region



ECT
ENVIRONAM CONSULTANTS TRADING

WALVIS BAY
YOUR OASIS OF OPPORTUNITIES

PROPOSED CONSTRUCTION, OPERATION, MAINTENANCE AND DECOMMISSIONING OF THE PROPOSED TEMPORARY SEWER OXIDATION PONDS FOR GREEN VALLEY PROPER AND GREEN VALLEY EXTENSIONS 1-5 (FARM 37), WALVIS BAY, ERONGO REGION

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Signature (EAP)

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LIST OF ACRONYMS

AIDS	Acquired immune deficiency syndrome
°C	Degrees Celsius
CRR	Comments and response report
dB	Decibels
DESR	Draft Environmental Scoping Report
DR	Developers Representative
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EAR	Environmental Assessment Report
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
ECT	Environam Consultants Trading
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
ESR	Environmental Scoping Report
KRC	Kunene Regional Council
FESR	Final Environmental Scoping Report
GN	Government Notice
HIV	Human immunodeficiency virus
IFC	International Finance Corporation
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
m^2	Meters Squared
MEFT	Ministry of Environment, Forestry and Tourism
MEFT: DEA	Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs & Forestry
MSDS	Material Safety Data Sheets
MURD	Ministry of Urban and Rural Development
MWTC	Ministry of Works Transport and Communication
NACOMA	Namibian Coast Conservation and Management Project
NAHS	Sodium Hydrosulfide
PPE	Personal Protection Equipment
PPP	Public participation Process
p/km^2	People per square kilometre
RED	Reliable Electricity Distributor
SADC	Southern African Development Community
SAIEA	Southern Africa Institute for Environmental Assessment
SMBS	Sodium Metabisulfite
USAID	United States Agency for International Development

1 INTRODUCTION

The Municipality of Walvis Bay aims to provide bulk and basic services; and housing for the development of Green Valley Proper and Extensions 1 – 5 (Farm 37). A minimum of 1500 erven will be constructed. The services will be done under the Decentralised Build Together Program and/or any other housing schemes applicable to various community-based organisations for the decongestion, and relocation of Otweya fire victims and backyard squatters; and Narraville residents without water. Amongst the basic services to be provided is a wastewater treatment facility. Ultimately the Municipality intends to put up an advanced treatment plant. However, the growing population and urban expansion in the Green Valley extensions have necessitated an urgent sustainable and scalable wastewater management solution.

It is on this basis that the Municipality proposes the construction of temporary sewer oxidation ponds to serve Green Valley Proper and Green Valley Extensions 1 – 5, as an emergency and interim treatment solution.

Oxygen pond systems, although expensive to construct and require considerable areas for evaporation, are simple to operate and can be incorporated easily, quickly and cost-effectively in communities.

The proponent has appointed Environam Consultants Trading (ECT) to undertake the EIA process for this project and to apply for an ECC from the Office of the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT), in terms of the Environmental Management Act No. 7 of 2007 and its Regulations of 2012. 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.

An EMP is one of the most important outputs of the EA process as it synthesises all 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.

It is not envisaged to decommission the development during the validity of the ECC. However, should this be considered at the end of its useful life, the development will be dismantled to restore the area to *ante operam* conditions. A full decommissioning plan should be developed within the first 24 months of operation.

2 EMP METHODOLOGY

An EMP is important for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life cycle. All personnel taking part in the construction and operations of the proposed activity should be made aware of the contents of the EMP, to plan the relevant activities of the project accordingly and in an environmentally sound manner. The objectives of an EMP:

- Ensuring compliance with regulatory stipulations and guidelines which may be national/local /international;
- Define details of who, what, where and when environmental management and mitigation measures are to be implemented;
- Formulate measures which will mitigate adverse impacts on various environmental components, protect environmental resources where possible, and enhance the value of environmental components where possible; and
- Providing feedback for continual improvement in environmental performance.

The stipulated EIA procedures outlined in the Environmental Management Act (No. 7 of 2007) and its Regulations (2012) were followed. The following key activities and tasks have been undertaken as part of the EIA and EMP development process:

- Initial input from stakeholders, as their input is essential for developing an all-inclusive plan. Since no resource exists in isolation, an EMP can affect various other parties. Input is necessary to address concerns early in the planning process.
- Identify the problems and/or questions associated with the proposed development. Clearly defined objectives were identified to remain focused on a plan.
- Make a list of applicable criteria, standards, and principles for construction as required by legislation, regulations, policies, etc.
- Established the extent of the plan and the actions required by the proponent to ensure its execution.
- Sought public input through advertisement of the EIA process in widely circulated newspapers and continuous engagements with registered I&APs.

This environmental management plan was developed to guide short-term goals and decision-making and will provide environmental-related guidelines. By having this plan in place, the proponent and contractors will have means to make informed decisions.

3 ROLES AND RESPONSIBILITIES

The Municipality of Walvis Bay (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 decommissioned in the future. 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).

3.1 DEVELOPER'S REPRESENTATIVE

The Developer should assign the responsibility of managing all aspects of this development for all the project's 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 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 1 as follows:

Table 1: DR's responsibilities

Responsibility	Project Phase
Ensure that all required approvals, licenses, and permits are obtained before commencing work.	Throughout the lifecycle of this development
Making sure that the relevant provisions are addressed during planning and design phase.	Planning and design phase
Suspending/evicting individuals and/or equipment not complying with the EMP	• Construction • Operation and maintenance
Issuing fines for contravening EMP provisions	• Construction • Operation and maintenance

3.2 ENVIRONMENTAL CONTROL OFFICER

The DR should assign the responsibility of overseeing the implementation of the EMP during the construction and operation and maintenance phases to a designated member of staff, referred to 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 development:

- Management and facilitation of communication between the Developer, DR, the contractors, and Interested and Affected Parties (I&APs) regarding this EMP;
- Conducting site inspections (recommended minimum frequency is bi-monthly) 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 amendments to this document.

3.3 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. To ensure effective environmental management, the aforementioned chapters should be included in the applicable contracts for outsourced construction, operation and maintenance work. The contractor upon receiving this EMP should ensure:

- To undertake their activities in an environmentally sensitive manner and within the context of this EMP;
- To undertake good housekeeping practices during the duration of their activities; and
- To ensure that adequate environmental awareness training takes place in the language understood by the employees.

4 ASSUMPTIONS AND LIMITATIONS

This EMP has been drafted based on the scoping assessment conducted for the proposed development as represented by the developer. ECT will not be held responsible for the potential consequences that may result from any alterations to the initial layout.

It is assumed that construction labourers will be sourced mostly from Walvis Bay and surrounding communities, and that migrant labourers (if applicable) will be housed within Walvis Bay area.

5 LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

Table 2 below provides a summary of the legal framework considered to be relevant to this development and the environmental assessment process.

Table 2: Legal provisions relevant to this development

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	Article 91 (c) provides for duty to guard against "the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia." Article 95(l) deals with the "maintenance of ecosystems, essential ecological processes and biological diversity" and sustainable use of the country's natural resources.	Sustainable development should be at the forefront of this development.
Environmental Management Act No. 7 of 2007 (EMA)	Section 2 outlines the objective of the Act and the means to achieve that. Section 3 details the principle of Environmental Management	The development should be informed by the EMA.
EA Regulations GN 28, 29, and 30 of EMA (2012)	GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate. GN 30 provides the regulations governing the environmental assessment (EA) process.	**Activity 2.1** The construction of facilities for waste sites, treatment of waste and disposal of waste. **Activity 8.6** Construction of industrial and domestic wastewater treatment plants and related pipeline systems. **Activity 8.9** Construction and other activities within a catchment area. **Activity 9.2** Any process or activity which requires a permit, licence or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
		Activity 10.1 (a) The construction of – Oil, water, gas and petrochemical and other bulk supply pipelines.
Convention on Biological Diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention.	The project should consider the impact it will have on the biodiversity of the area.
Draft Procedures and Guidelines for conducting EAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	Care should be taken that the development does not lead to the degradation of the natural beauty of the area.
Water Resources Management Act 11 of 2013.	A permit application in terms of Sections 72(1) of the Water Act is required for the disposal of industrial or domestic waste water and effluent.	The pollution of water resources should be avoided during construction and operation of the development. No final effluent will be produced by the system for discharge into the environment. All effluent will be evaporated.
The Ministry of Environment, Forestry and Tourism (MEFT) Policy on HIV & AIDS	MEFT has developed a policy on HIV and AIDS. In addition, it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor(s) have to adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with construction projects has shown that a significant risk is created when construction workers interact with local communities.
Local Authorities Act No. 23 of 1992	The Local Authorities Act prescribes the manner in which a town or municipality should be managed by the Town or Municipal Council. Sections 34-47 make provision for the aspects of water and sewerage.	The development has to comply with the provisions of the Local Authorities Act.
Regional Councils Act No. 22 of 1992	The Regional Councils Act legislates the establishment of Regional	The area is in the jurisdiction of Erongo

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	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.	Regional Council. All relevant laws must be abided to.
Labour Act no 11 of 2007	Chapter 2 details the fundamental rights and protections. Chapter 3 deals with the basic conditions of employment.	Given the employment opportunities presented by the development, compliance with the labour law is essential.
Public and Environmental Health Act of 2015	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 publicly accessible premises. The proponent should ensure that the site is off limits from public during construction to avoid incidences.
Nature Conservation Ordinance no 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants	Indigenous and protected plants have to be managed within the legal confines.
Atmospheric Pollution Prevention Ordinance (No. 11 of 1976).	The Ordinance objective is to provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto.	All activities on the site will have to take due consideration of the provisions of this legislation.
Roads Ordinance 17 of 1972	This Ordinance consolidates the laws relating to roads.	The provisions of this legislation have to be taken into consideration in as far as access to the development site is concerned.
Roads Authority Act, 1999	Section 16(5) of this Act places a duty on the Roads Authority to ensure a safe road system.	Some functions of the Roads Ordinance 17 of 1972 have been assigned to the Roads Authority.

6 MANAGEMENT ACTIONS

The aim of the management actions in this chapter 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 assessment conducted for this development. These management actions have been organised temporally according to project phase:

- Planning and design phase management actions;
- Construction phase management actions;
- Operation and maintenance phase management actions;
- Decommissioning phase management actions.

6.1 PLANNING AND DESIGN PHASE

The DR should ensure that the management actions detailed below are adhered to during the commencement of the construction of the infrastructure.

Table 3: Planning and design management actions

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
Surface and ground water	• The service infrastructure should be designed and constructed by suitably qualified engineering professionals. • Develop and implement an efficient maintenance plan for the development. • No dumping of waste products of any kind in or in close proximity to any water bodies. • Ensure that surface water accumulating on-site are channelled away from site, though proper drainage systems. • Wastewater should not be discharged directly into the environment. • The oxidation pond walls and floors must be properly lined with impenetrable material, to ensure no seepage to the ground. • Frequent monitoring to establish the level of wastewater in the ponds. • Ensure frequent removal of sludge to prevent overflow. • Removal and disposal of waste sludge from the oxidation ponds should be properly managed.
Fauna and Flora	• *Explore the planting of indigenous trees around the development.* • Prevent the introduction of potentially invasive alien ornamental plant species such as; Lantana, Opuntia, Prosopis, Tecoma, etc. as part of the landscaping as these species could infestate the area further over time.
Infrastructure	• Construction of infrastructure should be in line with the International and National Requirements for waste water treatment facilities, and for storage of wastewater. • Adhere to the provisions of wastewater management, water resources conservation and protection guidelines in terms of The Water Resource Management Act. • *Adhere to the design guidelines of the Department of Water Affairs.* • Implement robust containment measures for wastewater to prevent leaks from the oxidation ponds. • Install barriers, *fencing* or protective structures around the project site to prevent unauthorized access and minimize the risk of accidents. • Ensure professional design and construction of the infrastructure from qualified and registered engineers.
Traffic	• Implement traffic control measures (where necessary).

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
	• In cooperation with the local authority, erect clear signage regarding restricted areas, access and exit points to the oxidation ponds, speed limits, traffic rules, etc.

6.2 CONSTRUCTION PHASE

The management actions listed below 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 4: Construction phase management actions

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Erosion and Sedimentation	• Avoid unnecessary removal of topsoil cover during construction. • Ensure stockpiles are located within the boundary of the site and are protected from erosion. • Stabilize cleared areas as soon as possible to prevent and control surface erosion. • Limit clearing of vegetation to those areas within the footprint of construction. • Minimise open areas and reduce the frequency of disturbance.
Fauna and flora	• Prevent contractors from collecting wood, veld food, etc. during the construction phase. • Disturbance of areas outside the designated working zone is not allowed. • No vegetation should be removed outside the designated project area.
Surface and Ground Water	• Use drip trays, linings or concrete floors when evidence of leaks is observed on construction vehicles or equipment. • Remove leaking vehicles from project location immediately. • No servicing and maintenance of vehicles and/or equipment should be conducted on site. • Any spillage of hazardous substances including fuel, oil, paint or cleaning solvent must be cleaned up immediately and disposed of at a designated disposal facility.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons into *water sources*. • Properly secure all temporary / portable toilets (if any) to the ground to prevent them toppling due to wind or any other cause. • Maintain toilets in a hygienic state and remove waste to a licensed disposal facility. • Ensure that no spillages occur when the toilets are cleaned or emptied. • Prohibit urination on site, other than at designated facilities. • Contain contaminated water from batching operations and allow sediments to settle before being disposed of as waste water. • Stabilize cleared areas as soon as possible to prevent and control surface erosion. • Proper environmental awareness and remedial response training of operators must be conducted on a regular basis. • An emergency plan should be in place on how to deal with spillages and leakages during this phase.
Health, Safety and Security	• Provide suitable emergency and safety signage on site (manufactured of durable, weatherproof material). The signage signs should be placed at strategic locations to ensure awareness. • Demarcate and barricade any areas which may pose a safety risk (including hazardous substances, deep excavations etc.). These notices must be worded in English, and local languages. • Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times. • Prevent illegal access to the construction site by implementing appropriate security measures. These security measures must not pose a threat to surrounding communities. • Should a construction camp be necessary, it should be located in such a way that it does not pose a risk to the public. • Equipment housed on site must be placed in a way that does not encourage criminal activities. • For safety and security reasons it is recommended that the entire site (construction site and camp) be fenced-off and security personnel be employed to safeguard the premises and to avert criminal activates. • Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site, at all times. • Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons. • Adequate lighting within and around the construction location should be erected, when visibility becomes an issue.
Air quality	• All loose material should be kept on site for the shortest possible time. • Ensure measures are in place to minimise dust generated during the construction phase. • Use appropriate dust suppression measures when dust generation is unavoidable, e.g. dampening with water, particularly during prolonged periods of dry weather. • Avoid excavation, handling and transport of materials which may generate dust under high wind conditions. • Locate stockpiles of construction materials in sheltered areas where they are not exposed to erosive effects of the wind. • Ensure all vehicle, plant and equipment are in good condition. • Encourage reduction of engine idling.
Noise	• Inform neighbouring communities of construction activities to commence and provide for continuous communication between them and contractor. • Limit construction times to acceptable daylight hours. • Install technology such as silencers on construction machinery. • Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure. • Provide protective equipment such as ear muffs, masks and ear plugs to workers.
Traffic	• Limit and control the number of access points to the site. • Ensure that road junctions have good sightlines. • Construction vehicles need to be in a road worthy condition and maintained throughout the construction phase. • Transport the materials in the least number of trips as possible.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents. • Adhere to the speed limit. • Implement traffic control measures where necessary. • Minimise the movement of heavy vehicles during peak time.
Waste Management	• It is recommended that waste from the portable toilets be disposed of at a suitable waste disposal site, on a regular basis. Consultation with the local authority should be sought in this regard. • A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site. • The waste containers should be able to be closed to prevent birds and other animals from scavenging. • Solid waste will be collected and disposed of at an appropriate local landfill in *Walvis Bay*, in consultation with the local authority.
Hazardous Substances	• All chemicals and other hazardous substances (if any), 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. • 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. • Storage areas for all substances should be bunded and capable to hold 120% of the total volume of a given substance stored on site.
Heritage	• There are no known heritage *sites* envisaged in the area; however the contractor might come across archaeological features or objects that possess cultural values during construction activities. • If such remains or objects with cultural values (e.g. bones, weapons, ancient cutlery, graves etc) are uncovered at the project location or surrounding, it should be barricaded off, and • The relevant authorities (i.e. the local police and National Heritage Council of Namibia) should be contacted immediately.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Social	• Ensure locals enjoy priority in terms of job opportunities, to the extent possible, for skills that are available locally. • Ensure local procurement where commodities are available locally.

6.3 OPERATION AND MAINTENANCE PHASE

The management actions below apply during the operation and maintenance phase of this development.

Table 5: Operation and maintenance management actions

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
Environmental monitoring and Evaluation	• An Environmental Practitioner should monitor the implementation of the EMP, and recommend any changes to the document when necessary. • The Environmental Practitioner should inspect the site on a regular basis (preferably monthly or bi-monthly). • Biannual reports are to be submitted to the Environmental Commissioner.
Surface and Ground Water	• Use impermeable materials to line the ponds to prevent groundwater contamination. Proper containment mechanisms installed should be able to contain any leakages that might occur during the operation of the facility. • Any leaks of the oxidation ponds and sewer pipes should be fixed immediately and areas rehabilitated as needed. • Ensure that ponds are designed and operated to effectively remove pollutants and prevent overflows and spills. • Proper monitoring of the oxidation pond levels must take place to eliminate overfilling. • Regularly remove sludge from the ponds to prevent the accumulation of pollutants.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Maintaining the installation in good operating order is of paramount importance in preventing ponds and equipment failure. The condition of the sewage reticulation systems must be checked regularly and repaired to prevent leakages. • During maintenance operations, remove leaking vehicles and/or equipment from project location immediately. • The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently. • Remove all excess sedimentation, rubble and any other waste material present in waterways and dispose of in a suitable manner to ensure proper drainage runoff. • Develop and implement a groundwater monitoring system and programme, with the aim of monitoring possible contamination from the ponds. • Groundwater monitoring boreholes should be installed, sampled and analysed periodically.
Health, Safety and Security	• Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises. • Staff must be properly trained and made aware of safety and hazardous nature of the ponds and wastewater. • Firefighting equipment and first aid kit should be made available at the project site and serviced regularly. • Display contact details of emergency services in the area at strategic locations of the facility. • Demarcate and place signage on any areas which may pose a safety risk (including trenches, excavations etc). • The project personnel are advised to ensure that proper personal protective gear and first aid kits are available, at all times. • Staff should be properly trained in first aid and safety awareness. • Ensure no unauthorised entry to the ponds. • Regularly inspect the perimeter security fence and repair immediately if there is any breach.
Visual and Sense of Place	• It is recommended that more ‘green’ technologies be implemented within the engineering 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.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
Noise	• All maintenance vehicles, machinery and equipment must be regularly serviced to ensure minimal noise production. • The use of low frequency white noise or flashing lights should be considered instead of audible high frequency warning signals for moving maintenance vehicles. • Placement of noise producing equipment, e.g. compressors, in such a way that noise is directed away from receptors and / or are attenuated. • Where possible, use infrastructure to act as noise barriers to sensitive environments. • Provide hearing protectors as standard PPE for workers in situations with elevated noise levels. • Maintain the grievance mechanism to capture public perceptions and complaints with regard to noise impacts, track investigation actions and introduce corrective measures for continuous improvement.
Odour	• Mechanical aerators or diffused air systems can maintain dissolved oxygen levels, preventing anaerobic conditions. • Surface aerators enhance oxygen transfer while promoting mixing. • Constructing ponds in series (primary, secondary, and maturation ponds) improves treatment efficiency. • Ensuring appropriate depth and hydraulic retention time (HRT) prevents stagnation. • Regular desludging prevents excessive buildup of anaerobic sediments. • Dredging or sludge removal reduces sulfide and methane production. • Nitrate addition suppresses sulfate-reducing bacteria, reducing H_2S formation. • Bioaugmentation introduces specialized bacteria to enhance organic breakdown. • Odour-neutralizing agents (e.g., enzymatic sprays) can mask or break down foul smells. • Vegetative buffers (trees, shrubs) help disperse odours and absorb volatile compounds. • Floating covers (straw, geomembranes) can trap odours. • Regular odour monitoring (using olfactometry or electronic noses) helps identify problem areas. • Transparent communication with residents can reduce complaints and improve public acceptance.
Waste management	• Regularly remove sludge from the ponds to prevent the accumulation of pollutants. • Ensure the use of proper equipment, containers and/or vehicles, and then dispose of the collected solids at an approved dumpsite.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Ensure all project maintenance personnel wear proper personal protective equipment. • Any waste generated must be contained and disposed of accordingly. • Waste bins / containers must be readily available at the project site at all times. • Any leaks from oxidation ponds and sewer lines should be fixed immediately and areas rehabilitated as needed
Social	• Employment creation should be targeted at the residence of *Walvis Bay*, or nearby communities. • Maintenance contractors should be sourced from *Walvis Bay*, or nearby communities. • Locally source services required during the operational process, such as securities, plant hire, etc.
Air quality	• Ensure frequent removal of waste solids from the *Town* ponds. • Introduce aeration methods to increase decomposition when odours become unbearable. • Regular air quality monitoring should be conducted at the site. • Keep complaints register regarding bad odour / smells at the site; and act on it if becomes a regular complaint.
General	• Minimize the frequency of slow-growing grass or vegetation that would be problem for the anaerobic ponds. • Mosquitos breeding habits can be prevented by cutting, pruning and removing the vegetation that grows in the pond. • Removal of floating cum and macrophytes (e.g. Lemna spp.) from facultative and maturation ponds to maximize photosynthesis and surface re-aeration, and prevent fly and mosquito breeding. • Introduce larvivorous fish or use eco-friendly larvicides to reduce mosquito breeding. • Removal of mosquitos and flies can be achieved by spraying the scum on the surface with clean water. • Removal of any accumulated solids in the ponds' inlets and outlets. • Rodents or other animals can cause damage to the embankments, so it's necessary to repair them when they are located.

6.4 DECOMMISSIONING PHASE

It is not envisaged to decommission the proposed development during the validity of the ECC. However, should this be considered at the end of its useful life, the development will be dismantled to restore the area to *ante operam* conditions. Decommissioning will entail the complete removal of all infrastructure including buildings and underground infrastructure not forming part of post decommissioning use. Any pollution present on the site must be remediated. A full decommissioning plan should be developed within the first 24 months of operation to include the following measures as a minimum (See Table 6 below).

Table 6: Proposed mitigation measures for the decommissioning phase

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
Fauna and flora	• Disturbance of areas outside the designated working zone is not allowed. • No vegetation should be removed outside the designated project area. • Prevent contractors from collecting wood, veld food, etc. during the decommissioning phase.
Surface and Ground Water Impacts	• Use drip trays, linings or concrete floors when evidence of leaks is observed on construction vehicles or equipment. • Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons in close proximity to the nearby river. • Decommissioning activities should be planned outside of the rainy season in order to limit the risk of ground and surface water pollution. • Contaminated runoff from the project site should be prevented from entering the nearby river. • Waste disposal from the site should be properly managed and taken to the local disposal site. • Should it be necessary to wash equipment used during decommissioning activities, this should be done at an area properly suited and prepared to receive and contain contaminated waters. • An emergency plan should be in place on how to deal with spillages and leakages during this phase. • Proper environmental awareness and remedial response training of the decommissioning team must be conducted on a regular basis.
Health, Safety and Security	• Ensure that all construction personnel are properly trained depending on the nature of their work. • Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used. • Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times. • Provide for first aid kit and properly trained personnel to apply first aid when necessary. • A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases and Covid-19. • Provide free condoms in the workplace throughout the decommissioning phase. • Facilitate access to antiretroviral medication for construction personnel. • Conform to the stipulated protocols related to Covid-19. • Restrict unauthorized access to the site and implement access control measures.

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Clearly demarcate the decommissioning site boundaries along with signage of no unauthorized access. • Clearly demarcate dangerous areas and no-go areas on site. • Adequate lighting within and around the decommissioned location should be erected, when visibility becomes an issue. • Staff and visitors to the site must be fully aware of all health and safety measures and emergency procedures. • The contractor/s must comply with all applicable occupational health and safety requirements.
Traffic	• Limit and control the number of access points to the site. • Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents. • Construction vehicles need to be in a road worthy condition and maintained throughout the decommissioning phase. • Transport materials in the least number of trips as possible. • Adhere to the speed limit. • Implement traffic control measures where necessary. • Construction vehicles should not be allowed to obstruct the *D1983* road, or any other prominent roads, hence no stopping in the road, wholly or partially, but rather pull off the road or park on the roadside.
Noise	• No amplified music should be allowed on site. • Inform neighbouring communities of decommissioning activities to commence and provide for continuous communication between them and contractor. • Limit decommissioning times to acceptable daylight hours. • Install technology such as silencers on machinery utilised during decommissioning activities. • Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure. • Provide protective equipment such as masks, ear muffs and ear plugs to workers.
Air quality	• All loose material should be kept on site for the shortest possible time. • It is recommended that dust suppressants such as Dustex be applied to all the decommissioning clearing activities to minimise dust. • Construction vehicles to only use designated roads.

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	• During high wind conditions the contractor must make the decision to cease works until the wind has calmed down. • Cover any stockpiles with plastic to minimise windblown dust. • Ensure construction vehicles are well maintained to prevent excessive emission of smoke.
Waste management	• A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site. • The waste containers should be able to be closed to prevent birds and other animals from scavenging. • Solid waste will be collected and disposed of at an appropriate local disposal site in *Walvis Bay*, in consultation with the local authority.
Socio-economic	• Ensure locals enjoy priority in terms of job opportunities, to the extent possible, for skills that are available locally. • Ensure local procurement where commodities are available locally.

Appendix A - Water Quality Guidelines

ANNEXURE

Water Quality Standards for Effluent

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				
			Special Standard	General Standard
DETERMINANTS	**UNIT**	**FORMAT**	**95 percentile requirements**	
PHYSICAL REQUIREMENTS				
Temperature	° C		Not more than 10^0C 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	
ORGANIC REQUIREMENTS				
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
INORGANIC MACRO DETERMINANTS				
Ammonia (NH_4 – N)	mg/litre	N	< 1	< 10
Nitrate (NO_3 - N)	mg/litre	N	< 15	< 20
Nitrite (NO_2 - 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_4	< 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

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				
			Special Standard	**General Standard**
DETERMINANTS	**UNIT**	**FORMAT**	**95 percentile requirements**	
INORGANIC MICRO DETERMINANTS				
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	Ti	< 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, H g & Pb	< 200	< 500
UNSPECIFIED COMPOUNDS FROM ANTHROPOGENIC ACTIVITIES				
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
DISINFECTION				
Residual chlorine	mg/litre		< 0.1 Dependent on recipient water body	< 0.3 Dependent on recipient water body

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				
			Special Standard	**General Standard**
DETERMINANTS	**UNIT**	**FORMAT**		
BIOLOGICAL REQUIREMENTS (Algae and parasites)				
Further treatment of the effluent dependent on: 1. the water quality of the recipient water body if any 2. the distance from any point of potable water abstraction 3. an acceptable maximum contaminant level downstream of the point of discharge 4. the exposure to human and animal consumption downstream of the point of discharge 5. any reuse option that may be implemented.				
MICROBIOLOGY				
Further treatment of the effluent are dependent on: 1. the water quality of the recipient water body if any 2. the distance from any point of potable water abstraction 3. an acceptable maximum contaminant level downstream of the point of discharge 4. the exposure to human and animal consumption downstream of the point of discharge 5 any water reuse option that may be implemented.				

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**	
PHYSICAL AND ORGANOLEPTIC REQUIREMENTS					
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
INORGANIC MACRO DETERMINANTS					
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_2	H	< 0.2	< 0.5
Potassium	mg/litre	K	H	< 25	< 100
Sodium	mg/litre	Na	H.I	< 100	< 300
Sulphate	mg/litre	SO_4	H,O	100	< 300
Asbestos (fibres longer than 10 μm)	Fibres/litre		H	<500 000	< 1000 000
INORGANIC MICRO DETERMINANTS					
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**	
INORGANIC MICRO DETERMINANTS					
Cyanide (free)	**µg/litre**	**CN^-**	**H**	**< 20**	**< 50**
Cyanide (recoverable)	**µg/litre**	**CN^-**	**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**	**Ti**	**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**
ORGANIC DETERMINANTS					
Dissolved Organic Carbon	**mg/litre**	**DOC-C**	**H**	**< 5**	**<10**
Phenol compounds	**µg/litre**	**phenol**	**H**	**< 5**	**< 10**
DISINFECTION AND DISINFECTION BY-PRODUCTS					
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_2**	**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_2**	**H,I**	**0,1 – 0,5**	**0,1 - 3,0**
Chlorine, free, after 30 min; SPECIFIC	**mg/litre**	**Cl_2**	**Turbidity: < 0,3 NTU**	**0,1**	**0,1 - 3,0**
Chlorine, free, after 30 min; SPECIFIC	**mg/litre**	**Cl_2**	**Turbidity: > 0,3 NTU**	**0,5**	**0,1 - 3,0**
Chlorine, free, after 60 min; SPECIFIC	**mg/litre**	**Cl_2**	**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**	
BIOLOGICAL REQUIREMENTS					
Algae					
Chlorophyll α	**µg/litre**		**E,O**	**< 1**	**< 2**
Blue-green algae	**cells**	**/ml**	**H,O**	**< 200**	**<2 000**
Mycrocystin	**µg/litre**		**H**	**< 0.1**	**< 1**
Geosmin	**ηg/litre**		**E, H**	**< 15**	**< 30**
2-Methyl Iso Borneal (2 MIB)	**ηg/litre**		**E, H**	**< 15**	**< 30**
OTHER DETERMINANTS					
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.**	
RADIOACTIVITY				**95 Percentile Requirement**	
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**	**≤ 0.04**	**≤ 0.1**
ANALYSIS QUALITY CHECK* **					
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 µS/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 37^0 C**	**1 000 at 37^0 C**
Total Coliform	**counts**	**/100 ml**	**H**	**0**	**5**
E.Coli	**counts**	**/100 ml**	**H**	**0**	**1**
Entrerococci	**counts**	**/100 ml**	**H**	**0**	**1**
Somatic Coliphage	**counts**	**/100 ml**	**H**	**0**	**1**
Clostridium perfrigens 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**	
CORROSIVE AND SCALING PROPERTIES					
Calcium Carbonate Precipitation Potential	**mg/litre**	**CCPP**	**I**	**4 - 5**	**3 - 6**
Alkalinity/Sulphate/ Chloride Ratio	**Equi-valents**	**Corrosivet y Ratio**	**I**	**With SO_4 and Cl above 50 mg/litre Ratio=(Alk/50)/(SO_4/48+Cl/35.5) > 5.0 Water is Stable Ratio= (SO_4/48+Cl/35.5)/(Alk/50) > 0.2 Water is Corrosive**	
Total Hardness (Ca & Mg)	**mg/litre**	**$CaCO_3$**	**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.