

2023

Environmental Management Plan



HEADSPRING
INVESTMENTS
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Environmental Management Plan

PROPOSED INSTALLATION AND OPERATIONS OF A FIELD MOBILE PHYSICAL AND CHEMICAL LABORATORY, FARM TRIPOLI 546, OMHEKE REGION

PROJECT DETAILS

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ABBREVIATIONS

AIDS	Acquired Immuno-Deficiency Syndrome
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
PR	Proponent's Representative
Reg.	Regulation
S	Section
TB	Tuberculosis

1 INTRODUCTION

Headspring Investments (Pty) Ltd (HIS), the proponent, is proposing to install and operate a containerized mobile laboratory on Farm Tripoli No. 546 in the Omaheke Region.

The proponent has been conducting exploration activities which involve; exploration drilling, hydrogeological drilling, core sampling, geophysical well logging, testing of hydrogeological wells and core sample testing (geochemical sampling and analysis). During the exploration stage ore samples were sent to Kazakhstan for physical and geo-chemical analysis. HSI intends to operate an onsite mobile geo-analytical laboratory. The laboratory will provide sample preparation, assaying and analytical testing of the uranium mineralization from the exploration and water analysis test. This will help to reduce and minimize the transportation, and thus the movement of radioactive material, as well as testing costs.

The laboratory will therefore be used to confirm the exploration drilling results therefore ensuring prompt analyses of results. The laboratory will be installed on a 20m x 20m concrete slab. The installation process will involve activities such as land preparation, minor construction activities which will entail the preparation of the construction of the concrete slab, placing of 6 containers on the concrete platform with already installed laboratory equipment inside the containers.

The proponent appointed Eco- Wise Environmental Consulting cc to undertake the Environmental Impact Assessment (EIA) 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).

Eco-Wise Consulting CC completed the first phase of the public consultation phase, whereafter the proponent appointed Environam Consultants Trading (ECT) to proceed with the subsequent activities and complete the process leading to finalising the EIA and applying for the ECC.

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 EIA 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.
- Decommissioning - the period at which activities on site have reached the end of economic viability and closure is imminent.

2 ROLES AND RESPONSIBILITIES

Headspring Investments (Pty) Ltd (the Proponent) 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 Proponent 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:

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

2.1 PROPONENT’S REPRESENTATIVE

The Proponent 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 Proponent’s Representative (PR). The Proponent may decide to assign this role to one person for the full duration of the development, or may assign a different PR 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 PR’s responsibilities are depicted in **Table 1** as follows:

Table 1: PR’s responsibilities

Responsibility	Project Phase
Making sure that the necessary approvals and permissions laid out in Table 2 are obtained/adhered to	Throughout the lifecycle of this development
Making sure that the relevant provisions detailed in Table 3 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"> • Construction • Operation and maintenance • Decommissioning
Issuing fines for contravening EMP provisions	<ul style="list-style-type: none"> • Construction • Operation and maintenance • Decommissioning

2.2 ENVIRONMENTAL CONTROL OFFICER

The PR 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 PR/Proponent 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 Proponent 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 Proponent, PR, the contractors, and Interested and Affected Parties (I&APs) with regard to this EMP;

- Conducting site inspections (recommended minimum frequency is 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 PR on the removal of person(s) and/or equipment not complying with the provisions of this EMP;
- Making recommendations to the PR 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 Proponent 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 4** applies to contractors appointed during the construction phase and **Table 5** 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 Impact Assessment (EIA) 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 alteration to the initial layout.

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

4 APPLICABLE LEGISLATION

Legal provisions that have relevance to various aspects of this development are listed in **Table 2** below. The legal instrument and applicable corresponding provisions are provided.

Table 2: Legal provisions relevant to this development

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	<p>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.”</p> <p>Article 95(l) deals with the “maintenance of ecosystems, essential ecological processes and biological diversity” and sustainable use of the country’s natural resources.</p>	Sustainable development should be at the forefront of this development.
Environmental Management Act No. 7 of 2007 (EMA)	<p>Section 2 outlines the objective of the Act and the means to achieve that.</p> <p>Section 3 details the principle of Environmental Management</p>	The development should be informed by the EMA.
EIA Regulations GN 28, 29, and 30 of EMA (2012)	<p>GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate.</p> <p>GN 30 provides the regulations governing the environmental assessment (EA) process.</p>	<p>Activity 2.3 The import, processing, use and recycling, temporary storage, transit or export of waste.</p> <p>Activity 8.9 Construction and other activities within a catchment area.</p> <p>Activity 9.1 The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974.</p> <p>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.</p>
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 EIAs 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	The EIA process should incorporate the aspects outlined in the guidelines.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	proponent in the scoping process.	
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 Act No. 54 of 1956	Section 23(1) deals with the prohibition of pollution of underground and surface water bodies.	The pollution of water resources should be avoided during construction and operation of the development.
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.
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 Health Act no 36 of 1919	Section 119 prohibits persons from causing nuisance.	Developer and Contractors of the proposed development are to comply with these legal requirements.
Public and Environmental Health Act 1 of 2015	This act provides a framework for a structured uniform public and environmental health system in Namibia.	Covid-19 protocols will be legislated by this provision, amongst others.
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.

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 EIA conducted for this development. These management actions have been organised temporally according to project phase:

- Planning and design phase management actions (**Table 3**);
- Construction phase management actions (**Table 4**);
- Operation and maintenance phase management actions (**Table 5**);
- Chemicals and reagents management actions (**Table 6**);
- Decommissioning management actions (**Table 7**).

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

5.1 PLANNING AND DESIGN PHASE

The PR should ensure that the management actions detailed below in **Table 3** are adhered to during the period before the construction of the infrastructure starts.

Table 3: Planning and design management actions

PLANNING AND DESIGN PHASE IMPACTS	
Impact	Mitigation Measures
Surface and ground water	<ul style="list-style-type: none"> • Appoint professional engineers to develop a detailed storm water management design as part of the infrastructure service provision of the development. • The service infrastructure should be designed and constructed by suitably qualified engineering professionals. • Develop and implement a preventative maintenance plan for the service infrastructure. • 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 and captured through a proper storm water management system to be treated in an appropriate manner before disposal into the environment. • Wastewater should not be discharged directly into the environment. • Ensure wastewater collected in septic tanks are not radioactive. • Ensure septic tank system is installed in accordance with statutory regulation • The wall and floor must be concrete slabs and ensure no seepage to the ground • Frequent monitoring to establish the level of waste water • Ensure frequent emptying to prevent overflow • Disposal of waste from the development should be properly managed. • Ensure proper containment is provided for septic tanks underground. The walls and floor must be concrete slabs to ensure no seepage to the ground.
Fauna and flora	<ul style="list-style-type: none"> • Adapt the proposed development to the local environment - e.g. small adjustments to the site layout to avoid potential features such as existing vegetation, large trees, etc. • Plant local indigenous species of flora as part of the landscaping as these species would require less maintenance than exotic species.

PLANNING AND DESIGN PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> 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 infest the area further over time.
Existing Service Infrastructure	<ul style="list-style-type: none"> It is recommended that alternative and renewable source of energy be explored and introduced into the proposed development to reduce dependency on the grid. Solar geysers and panels should be introduced to provide for general lighting and heating of water and buildings. Other 'green' technologies to reduce the proposed development's dependency on fossil fuel should be explored where possible. Designs and building materials should be as such to reduce dependency on artificial heating and cooling in order to limit the overall energy necessities. Water saving mechanisms should be incorporated within the proposed development's design and plans in order to further reduce water demand. Re-use of treated waste water should be considered wherever possible to reduce the consumption of potable water. Adhere to water quality guidelines in terms of The Water Act, 1956. HSI to ensure that they are within the Namibian water quality guidelines for acceptable level of uranium in drinking water, as a minimum. HSI to consider using the lower WHO guidelines as international best practise.
Traffic	<ul style="list-style-type: none"> Ensure that road junctions have good sightlines. Limit the type of vehicles to use the internal roads e.g. heavy trucks. Adhere to the speed limit. Implement traffic control measures where necessary.

5.2 CONSTRUCTION PHASE

The management actions listed in **Table 4** 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
Fauna and flora	<ul style="list-style-type: none"> • Prevent contractors from collecting wood, veld food, etc. during the construction phase. • Do not clear the entire development site, but rather keep the large individual trees and shrubs not directly affecting the development as part of the landscaping. • Transplant removed vegetation where possible, or plant new trees in lieu of those that have been removed. • The trees that are to be kept should be clearly marked with “danger tape” to prevent accidental removal. • Regular inspection of the marking tool should be carried out. • The very important trees should be “camped off” to prevent the unintended removal or damage to these trees.
Pressure on existing infrastructure	<ul style="list-style-type: none"> • Educate workforce on water saving measures. • Ensure all potable water points are metered and regularly read. • Ensure that the workforce is provided with temporary toilets during the construction phase.
Surface and Ground Water Impacts	<ul style="list-style-type: none"> • 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. • No dumping of waste products of any kind in or in close proximity to water bodies. • 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. • Ensure that oil/ fuel spillages from construction vehicles and machinery are minimised and that where these occur, that they are appropriately dealt with. • Drip trays must be placed underneath construction vehicles when not in use to contain all oil and spillages that might be leaking from these vehicles.

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> Contaminated runoff from the construction sites should be prevented from entering the surface and ground water bodies. All materials on the construction site should be properly stored. Disposal of waste from the site should be properly managed and taken to the Leonardville disposal site. Construction workers should be given ablution facilities at the construction site that are located at least 30 m away from any surface water and these should be regularly serviced. Washing of personnel or any equipment should not be allowed on site. 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.
Health, Safety and Security	<ul style="list-style-type: none"> Construction personnel should not overnight at the site, except for security personnel. Ensure that all construction personnel are properly trained depending on the nature of their work. 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 construction phase. Facilitate access to antiretroviral medication for construction personnel. Conform to the stipulated protocols related to Covid-19. Restrict unauthorised access to the site and implement access control measures. Clearly demarcate the construction site boundaries along with signage of no unauthorised access. Clearly demarcate dangerous areas and no go areas on site. 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. The workforce should be provided with all necessary Personal Protective Equipment where appropriate. Adhere to the Covid-19 protocols as and when they are applicable.
Traffic	<ul style="list-style-type: none"> Limit and control the number of access points to the site.

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> • Ensure that road junctions have good sightlines. • Construction vehicles need to be in a road worthy condition and maintained throughout the construction phase. • Transport materials in the least number of trips as possible. • Adhere to the speed limit. • Implement traffic control measures where necessary. • Minimise the movement of heavy vehicles during peak time. • Minimise the movement of vehicles on or close to the C23 road.
Noise	<ul style="list-style-type: none"> • No amplified music should be allowed on site. • 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 masks, ear muffs and ear plugs to workers.
Air quality	<ul style="list-style-type: none"> • 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 construction clearing activities to minimise dust. • Construction vehicles to only use designated roads. • 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	<ul style="list-style-type: none"> • It is recommended that waste from the temporary toilets be disposed of at the Leonardville Wastewater Treatment Works or any approved facility in the vicinity such as Gobabis, on a regular

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
	<p>basis.</p> <ul style="list-style-type: none"> • 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 off at an appropriate local disposal site in Leonardville, in consultation with the local authority.
Hazardous Substances	<ul style="list-style-type: none"> • 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. • 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.
Socio-economic	<ul style="list-style-type: none"> • 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.

5.3 OPERATION AND MAINTENANCE PHASE

The management actions included in **Table 5** 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	<ul style="list-style-type: none"> • An Environmental Practitioner should monitor the implementation of the EMP, and recommend any changes to this document when necessary. • An Environmental Practitioner should inspect the site on a regular basis (preferably monthly or bi-monthly). • Bi-annual reports must be submitted to the Environmental Commissioner.
Surface and Ground Water	<ul style="list-style-type: none"> • Ensure septic tank system is installed in accordance with statutory regulations and standards. • Ensure proper containment is provided for septic tanks underground. The walls and floor must be concrete slabs to ensure no seepage to the ground. • Provide leakproof lining to the containment. • Ensure wastewater collected in septic tanks are not radioactive. • Ensure frequent monitoring and recording to establish the level of waste water in the septic tanks. • Ensure frequent emptying to prevent overflow. • Ensure monitoring boreholes are in place and well maintained. • Maintain records from monitoring boreholes and wastewater and avail to the relevant authorities. • A no-go buffer area of at least 30 m should be allocated to any water bodies in the area. • No dumping of waste products of any kind in or in close proximity to any water bodies. • Contaminated runoff from the various operational activities should be prevented from entering any water bodies. • 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. • Wastewater should not be discharged directly into the environment. • Disposal of waste from the development should be properly managed. • The service infrastructure should be designed and constructed by suitably qualified engineering professionals. • Develop and implement a preventative maintenance plan for the service infrastructure, especially

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
	<p>wastewater.</p> <ul style="list-style-type: none"> • Adhere to Water Quality Guidelines from the Ministry of Agriculture, Water and Land Reform. • Staff must be provided with emergency response procedures which they should be familiar with. • Staff should at all times be aware of the precautions associated with the handling of petroleum / chemical products as described in the relevant Material Safety Data Sheets.
Air quality	<ul style="list-style-type: none"> • Manage activities that generate emissions or dust. • Minimise the movement of vehicles in the area. • 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). • It is advised to pave the internal road network. • Provide for area air sampler(s) for monitoring dust for long-lived alpha and beta particles. This should be done weekly as part of the workplace monitoring programme. • All monitoring equipment should be calibrated at an approved metrology laboratory in accordance with a standard schedule and maintain calibration certificates for all equipment.
Noise	<ul style="list-style-type: none"> • Limit the types of activities that generate excessive noise. • Adhere to relevant laws, and regulations.
Solid waste management	<ul style="list-style-type: none"> • A sufficient number of waste bins should be placed on the property for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for at appropriate sites. • The waste containers should be able to be closed to prevent birds and other animals from scavenging. • Solid waste will be collected and disposed off at an appropriate local disposal site in Leonardville, this should be done in consultation with the local authority.
Radioactive waste management	<ul style="list-style-type: none"> • Store unused primary core samples at the core sample storage yard in marine shipping container within farm Tripoli. • The solid radioactive waste should be placed in heavy-duty plastic bags, sealed with a cable tie and stored in 210L drums.

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> • Label the drums and store securely at the core sample storage yard in marine shipping container. • Place the 210L drums on surfaces lined with High-Density Polyethylene (HDPE) material within the containers, to contain the waste in case of any incident. • Collect the liquid waste from the laboratory wet chemical process in the designated septic tank. Analyse the water in the tank for radioactive contamination, should there be any radioactive contamination, it should be taken to the mobile processing plant for extraction of any remaining uranium. • Screen all items leaving the laboratory for contamination. Items with surface contamination exceeding the limits to be retained in the laboratory and disposed of in the 210L drums.
Human health and safety	<ul style="list-style-type: none"> • Personnel must be familiar with the provisions of the Radiation Management Plan (RMP) and EMP. • Provide all radiation exposed workers with the correct Personal Protective Equipment (PPE). • All personnel to implement the radiation safety procedures outlined in the Radiation Management Plan (RMP). • Ensure the personnel undergo the relevant training i.e., Annual Radiation Refresher Course; and Bi-annual Procedure Refresher Course. • Apply dose limit for workers and members of public as per the IAEA General Safety Requirements (IAEA, 2014) and the Radiation Protection and Waste Disposal Regulations (MoHSS, 2011). • All radiation workers must be provided with a summary of their annual occupation exposure. • The annual occupational exposure must be documented in the annual report. • Monthly work place monitoring records must be compiled. • Records of samples received at the laboratory must be kept. • The XRF must be stored securely in the laboratory. • Keep the laboratory closed at all times when not in use. • Ensure the farm is maned with security guard(s). • Ensure the laboratory is fenced off security personnel are stationed at the entrance gate. • No members of the public must be allowed in the controlled areas of the laboratory. • Ensure that appropriate radiation warning signage is posted at the entrance to supervised and controlled areas of the laboratory.

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
Infrastructure	<ul style="list-style-type: none"> • Ensure that the infrastructure is designed and supervised by suitably qualified engineering professionals. • It is recommended that alternative and renewable sources of energy be explored and introduced into the proposed development to reduce dependency on the grid. • Solar geysers and panels should be considered to provide for general lighting and heating of water and buildings. • Designs and building materials should be as such to reduce dependency on artificial heating and cooling in order to limit the overall energy consumption. • Water saving mechanisms should be incorporated within the proposed development's design and plans in order to further reduce water demand
Socio-economic	<ul style="list-style-type: none"> • Contribution of HSI to Namibian and local economy should be monitored and reported on through annual reviews. Such reports should be produced by the company as part of its management, as well as the Chamber of Mines. • The relevant department should report to the Executive Management on Corporate Social Responsibility initiatives. They should indicate their aim of serving the local community and meeting development needs for example, the health or education sector. • The Company and its Contractors will make their best efforts to employ local labour where practicable. The written agreement between HSI and the main contractor should contain the 'Locals First' clause stipulating the commitment to employ local Namibians where possible. • A fair and transparent employment scheme should be established in consultation with the relevant authorities such as Leonardville Village Council, Aminuis Constituency Office and Omaheke Regional Council. Once the unskilled or semi skilled labour needs have been identified, it will be passed on to the Community Liaison Officer who will then make an initial approach for local labour. • Ensure that recruitment takes place in a legal and fair manner so as to minimise conflict. • The recruitment process should be gender inclusive, i.e. qualified women should be given an equal opportunity where possible. Remuneration should also meet Namibian set standards. • Adhere to the legal provisions for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.) in the contract.

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> • The recruitment process must be formal and organised. • Preference should be given to recruit those who live closest to the project area. • Recruitment should not take place at construction site. • Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside the agreed upon process. • Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those from the local community. • Clearly explain to all job seekers the terms and conditions of their respective employment contract (e.g. period of employment etc.) - make use of interpreters when necessary. • Secure accreditation for in-house skills transfer which recognizes and certifies any training courses.
Visual and Sense of Place	<ul style="list-style-type: none"> • 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. • Natural colours and building materials such as wood and stone should be incorporated. • Visual pollutants can further be prevented through mitigations such as keeping existing vegetation, introducing indigenous trees; keeping structures unpainted and minimising large advertising billboards.

5.4 Chemicals and reagents management actions

The management actions included in **Table 6** below are applicable in respect of chemicals and reagents management.

Table 6: Chemicals and reagents management actions

CHEMICAL	MANAGEMENT ACTIONS
Acetone	<ul style="list-style-type: none"> • Prevent material entering drains and watercourses. Advise local authorities if spillage has entered watercourses and sewer. • Contain and absorb using inert material and transfer into suitable containers for recovery or disposal by a licensed waste contractor. • Use in well-ventilated area. Avoid inhaling vapour. Avoid contact with eyes, skin and clothing. Keep container tightly closed when not in use. • Storage should be cool, well-ventilated away from sources of ignition or heat. Prevent accumulation of static charge. Store in original packaging. • Dispose of waste and residues in accordance with local authority requirements. This material and its container must be disposed as hazardous waste.

Methanol	<ul style="list-style-type: none">• Keep away from heat, sparks, open flames, hot surfaces.• No smoking• Keep container tightly closed.• Do not breathe mist, vapours, spray.• Wash exposed skin thoroughly after handling• Do not eat, drink or smoke when using this product.• Use only outdoors or in a well-ventilated area.• Wear protective gloves, protective clothing, eye protection, face protection.• If inhaled - Remove person to fresh air and keep comfortable for breathing.• If swallowed, rinse mouth• Wash contaminated clothing before reuse.• Dispose of contents/container to comply with local regulations <p>Waste Disposal Recommendations</p> <ul style="list-style-type: none">• Do not discharge into drains or the environment.• Remove waste in accordance with local and/or national regulations.• Do not be mix together with other waste.• Manage waste responsibly.• Take the necessary measures to prevent risks of pollution or damage to people or animals.• Recycle by distillation.• Incinerate under surveillance with energy recovery.
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Kerosene	<ul style="list-style-type: none">• Keep away from heat/sparks/open flames/hot surfaces. - No smoking.• Keep container tightly closed.• Take precautionary measures against static discharge.• Avoid breathing dust/fume/gas/mist/vapours/spray.• Wash skin thoroughly after handling• Use only outdoors or in a well-ventilated area.• Avoid release to the environment.• Wear protective gloves/protective clothing/eye protection/face protection.• If on skin (or hair): Take off immediately all contaminated clothing. Rinse with water/shower.• If exposed or concerned: Get medical advice/attention.• If swallowed: Immediately call a poison center/doctor/• Do NOT induce vomiting.• In case of fire, use firefighting foam or other appropriate media to extinguish.• Store in a well-ventilated place. Keep cool.• Store locked up.• Dispose of contents/container in accordance with local/regional/national/international regulation.
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<p>Sulphuric acid</p>	<p>Environmental Precautions</p> <ul style="list-style-type: none"> • Stop the spill to prevent environmental release if it can be done safely. • Take action to isolate environmental receptors including drains, storm sewers and natural water bodies. Keep on impervious surface if at all possible. • Use water sparingly to prevent product from spreading. <p>Containment and Clean-Up Methods</p> <ul style="list-style-type: none"> • Carefully contain and stop the source of the spill, if safe to do so. • Protect bodies of water by diking absorbents, or absorbent boom, if possible. • Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. • The use of firefighting foam may be useful in certain situations to reduce vapours. • The proper use of water spray may effectively disperse product vapours or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection. • Take up with dry earth, sand or other non-combustible, inert oil absorbing materials. • Carefully shovel, scoop or sweep up into a waste container with clean, non-sparking tools for reclamation or disposal. • Response and clean-up crews must be properly trained and must utilize proper protective equipment. <p>Waste Disposal Recommendations</p> <ul style="list-style-type: none"> • Consult state and local waste regulations to determine appropriate disposal options. • May be considered a hazardous waste if disposed. • Direct solid waste (landfill) or incineration at a solid waste facility is not permissible. • Do not discharge to sanitary or storm sewer. Personnel handling waste containers should follow precautions provided.
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Hydrochloric acid

- Do not breathe vapours, aerosols.
- Avoid substance contact.
- Ensure adequate ventilation.
- Evacuate the danger area, observe emergency procedures, consult an expert.
- Wear acid-resistant protective clothing

Methods and materials for containment and cleaning up

- Cover drains. Collect, bind, and pump off spills.
- Observe possible material restrictions
- Take up with liquid-absorbent and neutralising material.
- Dispose of properly.
- Clean up affected area.

Environmental precautions

- Do not let product enter drains.

<p>Ammonium hydroxide</p>	<p>Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves/ protective clothing/ eye protection/ face protection. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>Personal precautions, protective equipment and emergency procedures</p> <ul style="list-style-type: none"> • Do not breathe vapours, aerosols. • Avoid substance contact. • Ensure adequate ventilation. • Evacuate the danger area, observe emergency procedures, consult an expert. • Use equipment for eye protection tested and approved under appropriate government standards • Wear tightly fitting safety goggles • Handle with gloves. • Gloves must be inspected prior to use. • Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. • Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. • Wash and dry hands. <p>Environmental precautions</p> <ul style="list-style-type: none"> • Do not let product enter drains. <p>Methods and materials for containment and cleaning up</p> <ul style="list-style-type: none"> • Cover drains. • Collect, bind, and pump off spills. • Observe possible material restrictions • Take up with liquid-absorbent material • Dispose of properly. • Clean up affected area.
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Sodium hydroxide

- Wear chemical splash goggles and face shield.
- Wear butyl rubber gloves, apron, and/or clothing.
- Wear appropriate protective clothing to prevent skin exposure.
- Wear approved respirators.

Eyes:

- In case of contact, immediately flush eyes with plenty of water for at least 15 minutes.
- Get medical aid immediately.

Skin:

- In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately.
- Wash clothing before reuse.

Ingestion:

- If swallowed, do NOT induce vomiting. Get medical aid immediately.
- If victim is fully conscious, give a cupful of water.
- Never give anything by mouth to an unconscious person.

Inhalation:

- If inhaled, remove to fresh air.
- If not breathing, give artificial respiration.
- If breathing is difficult, give oxygen.
- Get medical aid.

Spills/Leaks

- Vacuum or sweep up material and place into a suitable disposal container.
- Avoid runoff into storm sewers and ditches which lead to waterways.
- Clean up spills immediately, observing precautions in the Protective Equipment section.
- Avoid generating dusty conditions.
- Provide ventilation.
- Do not get water on spilled substances or inside containers.

Handling

- Wash thoroughly after handling.
- Do not allow water to get into the container because of violent reaction.
- Minimize dust generation and accumulation.

- Do not get in eyes, on skin, or on clothing.
- Keep container tightly closed.
- Avoid ingestion and inhalation.
- Discard contaminated shoes.
- Use only with adequate ventilation.

Storage

- Store in a tightly closed container.
- Store in a cool, dry, well-ventilated area away from incompatible substances.
- Keep away from metals.
- Corrosives area.
- Keep away from acids.
- Store protected from moisture.
- Containers must be tightly closed to prevent the conversion of NaOH to sodium carbonate by the CO₂ in air.

Disposal Considerations

- Determine whether the chemical is classified as a hazardous waste.
- Consult national and local hazardous waste regulations to ensure complete an accurate classification.

<p>Isodecanol</p>	<ul style="list-style-type: none"> • Wash contaminated skin thoroughly after handling. • Avoid release to the environment. • Wear protective gloves/ protective clothing/ eye protection/ face protection. • IF ON SKIN: Wash with plenty of water. • IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. • If skin irritation occurs: Get medical advice/ attention. • If eye irritation persists: Get medical advice/ attention. • Take off contaminated clothing and wash it before reuse. • Collect spillage. • Dispose of contents/ container in accordance with national regulations. <p>Environmental precautions</p> <ul style="list-style-type: none"> • Avoid discharge into drains or watercourses or onto the ground. • Avoid discharge to the aquatic environment • Do not empty into drains. • Keep container tightly sealed when not in use. • Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. • In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels. <p>Methods for cleaning up</p> <ul style="list-style-type: none"> • Wear protective clothing. • Clear up spills immediately and dispose of waste safely. Small Spillages: Collect spillage. Large Spillages: Absorb spillage with non-combustible, absorbent material. The contaminated absorbent may pose the same hazard as the spilled material. • Collect and place in suitable waste disposal containers and seal securely. • Label the containers containing waste and contaminated materials and remove from the area as soon as possible. • Flush contaminated area with plenty of water. • Wash thoroughly after dealing with a spillage.
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<p>Distilled or deionized water</p>	<ul style="list-style-type: none"> • Non-irritating to the eyes. • Non-irritating to the skin. • No hazard expected in normal industrial use. • No hazard expected in normal industrial use. • No special handling procedures are required. • This material does not contain any hazardous air pollutants.
<p>Sodium chlorate</p>	<p>This chemical is not considered hazardous.</p> <p>Personal Precautions</p> <ul style="list-style-type: none"> • Ensure adequate ventilation. • Use personal protective equipment as required. • Avoid dust formation. <p>Environmental Precautions</p> <ul style="list-style-type: none"> • Should not be released into the environment. <p>Methods for Containment and Clean Up</p> <ul style="list-style-type: none"> • Sweep up and shovel into suitable containers for disposal. • Avoid dust formation.

<p>Manganese dioxide</p>	<p>After inhalation:</p> <ul style="list-style-type: none"> • Remove the victim into fresh air. • Respiratory problems: consult a doctor/medical service. <p>After skin contact:</p> <ul style="list-style-type: none"> • Rinse with water. • Soap may be used. • Take victim to a doctor if irritation persists. <p>After eye contact:</p> <ul style="list-style-type: none"> • Rinse with water. • Do not apply neutralizing agents. • Take victim to an ophthalmologist if irritation persists. <p>After ingestion:</p> <ul style="list-style-type: none"> • Rinse mouth with water. • Immediately after ingestion: give lots of water to drink. • Do not induce vomiting. • Consult a doctor/medical service if you feel unwell. <p>Environmental precautions:</p> <ul style="list-style-type: none"> • Contain released substance, pump into suitable containers. • Plug the leak, cut off the supply. • Dam up the solid spill. • Take account of toxic/corrosive precipitation • water. • Prevent soil and water pollution. • Prevent spreading in sewers. <p>Methods and material for containment and cleaning up:</p> <ul style="list-style-type: none"> • Prevent dust cloud formation. • Scoop solid spill into closing containers. • Carefully collect the spill/leftovers. • Clean contaminated surfaces with an excess of water. • Wash clothing and equipment after handling. • Take collected spill to manufacturer/competent authority. <p>a) Respiratory protection:</p>
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| | <ul style="list-style-type: none">• Dust production: dust mask with filter type P3.• High dust production: self-contained breathing apparatus. <p>b) Hand protection:</p> <ul style="list-style-type: none">• Gloves. <p>- materials (good resistance)
Butyl rubber, chlorinated polyethylene, nitrile rubber, neoprene, PVC, chlorinated polyethylene.</p> <p>c) Eye protection:</p> <ul style="list-style-type: none">• Safety glasses.• In case of dust production: protective goggles. <p>d) Skin protection:</p> <ul style="list-style-type: none">• Protective clothing.• Dustproof clothing. |
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Sodium chloride	<p>Eye Contact</p> <ul style="list-style-type: none"> • Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. • Get medical attention. <p>Skin Contact</p> <ul style="list-style-type: none"> • Wash off immediately with plenty of water for at least 15 minutes. • Get medical attention immediately if symptoms occur. <p>Inhalation</p> <ul style="list-style-type: none"> • Remove to fresh air. • Get medical attention immediately if symptoms occur. <p>Ingestion</p> <ul style="list-style-type: none"> • Get medical attention if symptoms occur. • Clean mouth with water and drink afterwards plenty of water. <p>Personal Precautions</p> <ul style="list-style-type: none"> • Ensure adequate ventilation. • Use personal protective equipment as required. • Avoid dust formation. <p>Environmental Precautions</p> <ul style="list-style-type: none"> • Should not be released into the environment. <p>Methods for Containment and Clean</p> <ul style="list-style-type: none"> • Sweep up and shovel into suitable containers for disposal. • Avoid dust formation. <p>Exposure Guidelines</p> <ul style="list-style-type: none"> • This product does not contain any hazardous materials with occupational exposure Limits established by the regulatory bodies. <p>Engineering Measures</p> <ul style="list-style-type: none"> • Ensure adequate ventilation, especially in confined areas. • Ensure that eyewash stations and safety showers are close to the workstation location. <p>Personal Protective Equipment</p>
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	<p><i>Eyeface Protection</i></p> <ul style="list-style-type: none"> • Wear appropriate protective eyeglasses or chemical safety goggles <p><i>Skin and body protection</i></p> <ul style="list-style-type: none"> • Wear appropriate protective gloves and clothing to prevent skin exposure. <p><i>Respiratory Protection</i></p> <ul style="list-style-type: none"> • Follow the relevant respirator regulations if exposure limits are exceeded or if irritation or other symptoms are experienced. <p><i>Hygiene Measures</i></p> <ul style="list-style-type: none"> • Handle in accordance with good industrial hygiene and safety practice.
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5.5 Decommissioning phase

The management actions included in **Table 7** below are applicable during the decommissioning phase.

Table 7: Proposed mitigation measures for the decommissioning phase

DECOMMISSIONING PHASE IMPACTS	
Impact	Mitigation Measures
General Guidelines	<ul style="list-style-type: none"> • Read safety data sheets (SDSs), equipment manuals, instrument instructions, standard operating procedures (SOPs) and any other pertinent documents in preparation for handling laboratory items. This will allow the user to be aware of the hazards associated with items being handled, packed, and moved. • Refer to MSDS on Chemical Reagents for guidance on proper handling of chemical items during the decommissioning process. Never transport hazardous materials alone. • Chemical reagents must be securely packed based on compatibility. Chemicals must be placed in impermeable containers or boxes to be safely moved. • Remove all bottles of fully consumed chemicals from the project site and dispose of accordingly. • Wear personal protective equipment (PPE) appropriate for the materials being handled. • Perform basic surface and visible decontamination of all assigned laboratory spaces. This includes common areas such as stock rooms, waste collection areas, and equipment rooms. This also includes storage units such as freezers and refrigerators. • Perform basic surface and visible decontamination of all laboratory equipment.

DECOMMISSIONING PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> • A decommissioning Hazard Tag should be affixed to the equipment to be moved when decontamination is complete.
Fauna and flora	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Use drip trays, linings or concrete floors when evidence of leaks are observed on vehicles or equipment. • Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons in close proximity to water ways and bodies. • 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 any water ways / bodies; and ground water bodies. • Existing ablution facilities at the project site should be used. No urinating outside these designated facilities will be allowed. • Waste disposal from the site should be properly managed and taken to the Leonardville 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	<ul style="list-style-type: none"> • 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. • All areas where radioactive materials were handled and stored (including equipment and machinery) shall be secured to prevent unauthorized entry and removal. • 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.

DECOMMISSIONING PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> • Conform to the stipulated protocols related to Covid-19. • Restrict unauthorized access to the site and implement access control 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. The workforce should be provided with all necessary Personal Protective Equipment where appropriate. • Adhere to the Covid-19 protocols as and when they are applicable.
Traffic	<ul style="list-style-type: none"> • Limit and control the number of access points to the site. • Ensure that road junctions have good sightlines. • 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 C23 road, hence no stopping in the road, wholly or partially, but rather pull off the road or park on the roadside.
Noise	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • All loose material should be kept on site for the shortest possible time.

DECOMMISSIONING PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> • 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. • 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	<ul style="list-style-type: none"> • 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 off at an appropriate local disposal site in Leonardville, in consultation with the local authority. • Regular inspection and housekeeping procedures should be maintained at all times.
Hazardous Substances	<ul style="list-style-type: none"> • 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. • Awareness of the hazardous nature of various types of waste should be enforced. • 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.
Radioactive Materials	<ul style="list-style-type: none"> • Consult the Radiation Management Plan for more detailed guidance on handling, storage and disposal of radioactive waste. • Completely wipe down and decontaminate fume hood surfaces, sinks, bench tops, and any equipment and other surfaces exposed to radioactive material with decontaminate cleanser. • Perform initial contamination swipe and survey testing in areas exposed to radioactive material as well as surrounding areas. • Final swipe tests should be performed by the NRPA to ensure levels of decontamination are in compliance with relevant regulations and guidelines.

DECOMMISSIONING PHASE IMPACTS	
Impact	Mitigation Measures
	<ul style="list-style-type: none"> Remove all radioactive labels, stickers, and tape from all facility equipment, refrigerators, sinks, and hoods after final swipe tests results.
Socio-economic	<ul style="list-style-type: none"> 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.

5.6 DECOMMISSIONING PHASE

The impacts associated with this phase will be similar to that of the construction phase. The Environmental Management Plan for this phase will have to be reviewed at the time of decommissioning to cater for changes made to the development.

5.7 CONCLUSION

All known environmental and social risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that environmental performance be monitored regularly to ensure compliance and that corrective measures be taken if necessary. It is also recommended that this information be made available to the surrounding communities on a regular basis.

The Environmental Management Plan should be used as an on-site tool during all phases of the project.

Appendix A - Water Quality Guidelines

THE WATER ACT, 1956 (ACT 54 OF 1956) AND ITS REQUIREMENTS IN TERMS OF WATER SUPPLIES FOR DRINKING WATER AND FOR WASTE WATER TREATMENT AND DISCHARGE INTO THE ENVIRONMENT

1. INTRODUCTION

The provisions of the Water Act are intended, amongst other things, to promote the maximum beneficial use of the country's water supplies and to safeguard water supplies from avoidable pollution.

The drinking water guidelines are not standards as no publication in the Government Gazette of Namibia exists to that effect. However the Cabinet of the Transitional Government for National Unity adopted the existing South African Guidelines (461/85) and the guidelines took effect from 1 April 1988 under the signature of the then Secretary for Water Affairs.

The sections of the Water Act that relate to the discharge of industrial effluents are:

- Section 21(1) which states that
 - The purification of waste water shall form an integral part of water usage and
 - that purified effluents shall comply with the General Standard Quality restrictions as laid out in Government Gazette R553 of 5 April 1962 and
- Section 21(2) which further stipulate that this purified effluent be returned as close as possible to the point of abstraction of the original water.

Where a local authority has undertaken the duty of disposing of all effluents from an industrial process the provisions of Section 21(1) and 21(2) apply to the local authority and not the producer of the effluents. If there is difficulty in complying with these provisions then the applicant may apply for an exemption from the conditions in terms of Section 21(5) and 22(2) of the Water Act. The Permanent Secretary after consultation with the Minister may grant the issuance of a Waste Water Discharge Permit under Sections 21(5) and 22(2) subject to such conditions as he may deem fit to impose.

After independence, the Government of the Republic of Namibia decided that for the interim the existing guidelines will continue to be valid and to remain in use until a proper study has been conducted and new standards have been formulated (Article 140 of Act 1 of 1990).

2. GUIDELINES FOR THE EVALUATION OF DRINKING-WATER QUALITY FOR HUMAN CONSUMPTION WITH REGARD TO CHEMICAL, PHYSICAL AND BACTERIOLOGICAL QUALITY

Water supplied for human consumption must comply with the officially approved guidelines for drinking-water quality. For practical reasons the approved guidelines have been divided into three basic groups of determinants, namely:

- Determinants with aesthetic / physical implications: TABLE 1.
- Inorganic determinants: TABLE 2.
- Bacteriological determinants: TABLE 3.

2.1 CLASSIFICATION OF WATER QUALITY

The concentration of and limits for the aesthetic, physical and inorganic determinants define the group into which water will be classified. See TABLES 1 and 2 for these limits. The water quality has been grouped into 4 quality classes:

- Group A: Water with an excellent quality
- Group B: Water with acceptable quality
- Group C: Water with low health risk
- Group D: Water with a high health risk, or water unsuitable for human consumption.

Water should ideally be of excellent quality (Group A) or acceptable quality (Group B), however in practice many of the determinants may fall outside the limits for these groups.

If water is classified as having a low health risk (Group C), attention should be given to this problem, although the situation is often not critical as yet.

If water is classified as having a higher health risk (Group D), urgent and immediate attention should be given to this matter.

Since the limits are defined on the basis of average lifelong consumption, short-term exposure to determinants exceeding their limits is not necessarily critical, but in the case of toxic substances, such as cyanide, remedial measures should immediately be taken.

The overall quality group, into which water is classified, is determined by the determinant that complies the least with the guidelines for the quality of drinking water.

TABLE 1: DETERMINANTS WITH AESTHETIC / PHYSICAL IMPLICATIONS

DETERMINANTS	UNITS*	LIMITS FOR GROUPS			
		A	B	C	D**
Colour	mg/l Pt***	20			
Conductivity	mS/m !at 25 °C	150	300	400	400
Total hardness	mg/l CaCO ₃	300	650	1300	1300
Turbidity	N.T.U****	1	5	10	10
Chloride	mg/l Cl	250	600	1200	1200
Chlorine (free)	mg/l Cl	0,1- 5,0	0,1 – 5,0	0,1 – 5,0	5,0
Fluoride	mg/l F	1,5	2,0	3,0	3,0
Sulphate	mg/l SO ₄	200	600	1200	1200
Copper	µg/l Cu	500	1000	2000	2000
Nitrate	mg/l N	10	20	40	40
Hydrogen Sulphide	µg/l H ₂ S	100	300	600	600
Iron	µg/l Fe	100	1000	2000	2000
Manganese	µg/l Mn	50	1000	2000	2000
Zink	mg/l Zn	1	5	10	10
pH****	pH-unit	6,0 – 9,0	5,5 – 9,5	4,0 – 11,0	4,0 – 11,0

* In this and all following tables "l" (lower case L in ARIAL) is used to denote dm³ or litre

** All values greater than the figure indicated.

*** Pt = Platinum Units

**** Nephelometric Turbidity Units

***** The pH limits of each group exclude the limits of the previous group

TABLE 2: INORGANIC DETERMINANTS

DETERMINANTS	UNITS	LIMITS FOR GROUPS			
		A	B	C	D*
Aluminium	µg/l Al	150	500	1000	1000
Ammonia	mg/l N	1	2	4	4
Antimonia	µg/l Sb	50	100	200	200
Arsenic	µg/l As	100	300	600	600
Barium	µg/l Ba	500	1000	2000	2000
Beryllium	µg/l Be	2	5	10	10
Bismuth	µg/l Bi	250	500	1000	1000
Boron	µg/l B	500	2000	4000	4000
Bromine	µg/l Br	1000	3000	6000	6000
Cadmium	µg/l Cd	10	20	40	40
Calcium	mg/l Ca	150	200	400	400
Calcium	mg/l CaCO ₃	375	500	1000	1000
Cerium	µg/l Ce	1000	2000	4000	4000
Chromium	µg/l Cr	100	200	400	400
Cobalt	µg/l Co	250	500	1000	1000
Cyanide (free)	µg/l CN	200	300	600	600
Gold	µg/l Au	2	5	10	10
Iodine	µg/l I	500	1000	2000	2000
Lead	µg/l Pb	50	100	200	200
Lithium	µg/l Li	2500	5000	10000	10000
Magnesium	mg/l Mg	70	100	200	200
Magnesium	mg/l CaCO ₃	290	420	840	840
Mercury	µg/l Hg	5	10	20	20
Molybdenum	µg/l Mo	50	100	200	200
Nickel	µg/l Ni	250	500	1000	1000
Phosphate	mg/l P	1	See note below	See note below	See note below
Potassium	mg/l K	200	400	800	800
Selenium	µg/l Se	20	50	100	100
Silver	µg/l Ag	20	50	100	100
Sodium	mg/l Na	100	400	800	800
Tellurium	µg/l Te	2	5	10	10
Thallium	µg/l Tl	5	10	20	20
Tin	µg/l Sn	100	200	400	400
Titanium	µg/l Ti	100	500	1000	1000
Tungsten	µg/l W	100	500	1000	1000
Uranium	µg/l U	1000	4000	8000	8000
Vanadium	µg/l V	250	500	1000	1000

* All values greater than the figure indicated.

Note FOR Table 2 on phosphate: Phosphates are not toxic and essential for all life-forms. Natural water will, however, seldom contain phosphate; it is generally seen as an indicator of pollution and is usually accompanied by other pollutants. Wherever drinking water is combined with or consists wholly of reclaimed or recycled water, it may be expected to contain phosphate. The general guideline for a concentration level to be aimed at is 1 mg/l as P. But in many cases this may be difficult to achieve technically. For this reason the Department will allow a phosphate concentration level of up to 5 mg/l as P in water intended for human consumption. Please refer also to the “Note on Phosphate” under Section 3: General Standards for Waste/Effluent.

2.2 BACTERIOLOGICAL DETERMINANTS

The bacteriological quality of drinking water is also divided into four groups, namely:

- Group A: Water which is bacteriological very safe;
- Group B: Water which is bacteriological still suitable for human consumption;
- Group C: Water which is bacteriological risk for human consumption, which requires immediate action for rectification;
- Group D: Water, which is bacteriological unsuitable for human consumption.

TABLE 3: BACTERIOLOGICAL DETERMINANTS

DETERMINANTS	LIMITS FOR GROUPS			
	A**	B**	C	D*
Standard plate counts per 1 ml	100	1000	10000	10000
Total coliform counts per 100 ml	0	10	100	100
Faecal coliform counts per 100 ml	0	5	50	50
<i>E. coli</i> counts per 100 ml	0	0	10	10

* All values greater than the figure indicated.

** In 95% of the samples.

NB If the guidelines in group A are exceeded, a follow-up sample should be analysed as soon as possible.

2.3 FREQUENCY FOR BACTERIOLOGICAL ANALYSIS OF DRINKING-WATER SUPPLIES

The recommended frequency for bacteriological analysis of drinking water is given in Table 4.

TABLE 4: FREQUENCY FOR BACTERIOLOGICAL ANALYSIS

POPULATION SERVED	MINIMUM FREQUENCY OF SAMPLING
More than 100 000	Twice a week
50 000 – 100 000	Once a week
10 000 – 50 000	Once a month
Minimum analysis	Once every three months

3 GENERAL STANDARDS FOR WASTE / EFFLUENT WATER DISCHARGE INTO THE ENVIRONMENT

All applications in terms of Section 21(5) and 22(2), for compliance with the requirements of Section 21(1) and 21(2) of the Water Act (Act 54 of 1956) that purified water shall comply with the General Standard as laid out in Government Gazette Regulation R553 of 5 April 1962.

TABLE 5 GENERAL STANDARDS FOR ARTICLE 21 PERMITS (EFFLUENTS)

DETERMINANTS	MAXIMUM ALLOWABLE LEVELS
Arsenic	0,5 mg/l as As
Biological Oxygen Demand (BOD)	no value given
Boron	1,0 mg/l as B
Chemical Oxygen Demand (COD)	75 mg / l as O
Chlorine, residual	0,1 mg/l as Cl ₂
Chromium, hexavalent	50 µg/l as Cr(VI)
Chromium, total	500 µg/l as Cr
Copper	1,0 mg/l as Cu
Cyanide	500 µg/l as CN
Oxygen, Dissolved (DO)	at least 75% saturation**
Detergents, Surfactants, Tensides	0,5 mg/l as MBAS – See also Note 2
Fats, Oil & Grease (FOG)	2,5 mg/l (!gravimetric method)
Fluoride	1,0 mg/l as F
Free & Saline Ammonia	10 mg/l as N
Lead	1,0 mg/l as Pb
Oxygen, Absorbed (OA)	10 mg / l as O*
pH	5,5 – 9,5
Phenolic Compounds	100 µg/l as phenol
Phosphate	1,0 mg/l as P - See also Note 1
Sodium	not more than 90 mg/l Na more than influent
Sulphide	1,0 mg/l as S
Temperature	35°C
Total Dissolved Solids (TDS)	not more than 500 mg / l more than influent
Total Suspended Solids (TSS)	25 mg/l
Typical faecal Coli.	no typical coli should be counted per 100 ml
Zinc	5,0 mg/l as Zn

* Also known as *Permanganate Value* (or PV).

** In Windhoek the saturation level is at approx. 9 mg/l O₂.

Note (1) on phosphate: Phosphates are not toxic and essential for all life forms. Natural water will seldom contain phosphate; it is generally seen as an indicator of pollution and is usually accompanied by other pollutants. Wherever drinking water is combined with or consists wholly of reclaimed or recycled water, it may be expected to contain phosphate. There is no general guideline for phosphate contained in the Regulation 553. But generally it is assumed that eutrophication or algal bloom in dams is promoted by nutrient concentrations as low as 0,01 mg/l as P; generally a phosphate concentration limit for dams of 0,1 mg/l is recommended. All water that is consumed and subsequently discharged, will eventually end up in rivers, dams or

groundwater – that is why for potable water, a concentration level of 1 mg/l as P is aimed at.

But, again, in many cases of waste and effluent treatment, this may be difficult to achieve technically, or the required waste and effluent treatment infrastructure is not available; as the required infrastructure is sophisticated and expensive. The current situation calls for a compromise and for this reason, this Department will judge each application individually on its merits and allow, in certain cases, a phosphate concentration level of up to 15 mg/l as P in any effluent or waste stream to be discharged into the environment. This regulation is subject to be reviewed every two years, calculated from the date of approval of this document.

Note (2) on detergents, surfactants and ten sides: The MBAS (or methylene blue active substances) – test does not encompass all surface active compounds currently, commercially available. The limit given is therefore only a guideline. Many of the cleaning agents are toxic to biological life-forms in rivers and dams.

It should be taken into consideration that some commercial products interfere with the effective removal of oil, fat and grease by grease and fat traps, by breaking up such long-chain molecules into shorter ones. These cleaning agents thus effectively allow such components to pass through the traps and land into sections of a treatment plant further down the line and interfere with the process there.

Many cleaning agents contain very powerful disinfectants, and/or biocides. Such substances may interact with biological treatment processes. They may reduce the effectiveness of such treatment or 'kill' it completely, if they land in septic tanks, biofilters or even activate-sludge plants. Their activity may be attenuated by dilution.

4. AUTHORIZATION

Herewith, the Guidelines for the Evaluation of Drinking Water for Human Consumption with regard to Chemical, Physical and Bacteriological Quality, as well as the General Standards for Article 21* Permits, amended for detergents, surfactants, ten sides, as well as phosphates, are confirmed and remain in force until further notice.

Issued under my hand with the authority vested in my office, within the Ministry for Agriculture, Water and Rural Development,

PERMANENT SECRETARY
Dr V Shivute

WINDHOEK,

DATE STAMP