2023

EIA REPORT Proposed Installation and Operations of a Field Mobile Physical and Chemical Laboratory on Farm Tripoli 546, Omaheke Region

HEADSPRING INVESTMENTS ROSATOM

ECT ENVIRONAM CONSULTANTS TRADING

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LIST OF ACRONYMS

AIDS	Acquired immune deficiency syndrome
CRR	Comments and response report
dB	Decibels
DESR	Draft Environmental Scoping Report
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EAR	Environmental Assessment Report
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
ESR	Environmental Scoping Report
FESR	Final Environmental Scoping Report
GTZ	Gesellschaft für Technische Zusammenarbeit
HIV	Human immunodeficiency virus
HSI	Headspring Investments (Pty) Ltd
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
MEFT	Ministry of Environment, Forestry and Tourism
MEFT: DEA	Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs
MURD	Ministry of Urban and Rural Development
MWTC	Ministry of Works Transport and Communication
NRPA	Namibia Radiation Protection Authority
NUI	Namibia Uranium Institute
PPP	Public participation process
p/km^2	People per square kilometre
RMP	Radiation Management Plan
SADC	Southern African Development Community
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

1 INTRODUCTION AND BACKGROUND

Headspring Investments (Pty) Ltd (HSI), the proponent, is proposing to install and operate a mobile containerized 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. This will help to reduce and minimize the transportation, and thus the movement of radioactive material, as well as testing costs.

The laboratory will be used to confirm the exploration drilling results, therefore ensuring prompt analyses of results. The laboratory will be installed on a 20m x 20m concreteslab. 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 above activity is discussed in more detail in Chapter 4. The proponent appointed Eco-Wise Environmental Consulting 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 Environmental Consulting 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 applyingfor 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.

1.1 PROJECT LOCATION

The study area is located on Farm Tripoli No. 546 in the Leonardville area of the Aminuis Constituency in Omaheke Region and is found on the following coordinates: 23.49431°S and 18.65239°E.

2 LEGISLATIVE FRAMEWORK

The principle environmental regulatory agency in Namibia is the Office of the Environmental Commissioner within the Directorate of Environmental Affairs of the Ministry of Environment, Forestry and Tourism. Most of the policies and legislative instruments have their basis in two clauses of the Namibian Constitution, i.e., Article 91 (c) and Article 95 (l); however, good environmental management finds recourse in multiple legal instruments. **Table 2** provides a summary of the legal framework considered to be relevant to this development and the environmental assessment process.

3 ENGINEERING SERVICES

The infrastructure needs of the proposed project can be categorised into two broad classifications namely:

- Basic infrastructure that includes electricity and roads.
- Environmental infrastructure that consists of water supply, sewage and drainage systems, solid waste management and radioactive waste management.

The service infrastructure such as water, sewer, drainage, electricity and roads will be designed by registered professional engineers to integrate with the existing infrastructure on Farm Tripoli No. 546. Three separate septic tanks will be installed for the Laboratory. One will be dedicated for domestic waste and two separate ones for the Laboratory waste. Access to the site will be obtained from the existing farm gravel road, which links to the nearby C23 main road.

4 PUBLIC PARTICIPATION PROCESS

In terms of Section 21 of the EIA Regulations a call for public consultation with all I&APs during the EIA process is required. This entails consultation with members of the public and providing them an opportunity to comment on the proposed project. The Public Consultation Process does not only incorporate the requirements of Namibia's legislation, but also takes account of national and international best practises.

A public meeting was held at Leonardville on 13 October 2022. The comment period of the initial public participation process commenced on **25 September 2022** and ended on 19 **October 2022**.

The second phase of the Public Consultation Process involved the lodging of the Draft Environmental Scoping Report (DESR) to all registered I&AP for comment. Registered and potential I&APs were informed of the availability of the DESR for public comment. An Executive

Summary of the DESR was included in the communication that was sent out to the registered I&APs.I&APs were given time until **4 May 2023** to submit comments or raise any issues or concernsthey may have with regard to the proposed project. The comments and input received during this period are incorporated in this Final Environmental Scoping Report that is submitted to the Environmental Commissioner together with the application for an Environmental Clearance Certificate.

5 POTENTIAL IMPACTS IDENTIFIED

The following planning and design phase impacts were identified:

- Surface and groundwater;
- Fauna and flora;
- Existing infrastructure;
- Traffic;

The following construction phase impacts were identified:

- Fauna and flora;
- Pressure on the existing infrastructure;
- Surface and groundwater;
- Health, safety and security;
- Air quality,
- Noise pollution,
- Traffic;
- Waste management;
- Hazardous substances;
- and Socio-economic impact.

The following operational phase impacts were identified:

- Surface and ground water;
- Air quality;
- Noise;
- Solid waste management;
- Radioactive waste management;
- Human health and safety;
- Infrastructure;
- Socio-economic;
- And Visual impact.

6 CONCLUSION

Metallurgy of uranium in laboratory settings poses a low level of radiological risk and can be controlled easily. Uranium concentrates dust and uranium ore dust pose the greatest risks. Inhalation of radon and radon daughters is also possible, although it carries minor risks.

It is possible for substantial amounts of dust to be generated during sample preparation, including crushing, grinding, splitting, screening, sieving, and blending. Rooms for sample preparation should be isolated from other areas and equipped with dust control systems such as hoods and filters.

The amount of uranium concentrate dust handled in the laboratory is usually small, rarely exceeding a few hundred grams, so inhalation is less likely. In spite of this, it is important to handle dry concentrates with care, particularly when screening, blending, or performing any other operation that may cause dust to be generated.

The significance of negative environmental impacts can be reduced with the effective and appropriate mitigation provided in this report, the EMP and the RMP attached. If authorised, the implementation of the EMP and RMP should be included as a condition of approval.

The EMP and RMP should be used as an on-site tool during all phases of the development. Future environmental audits should be carried out to ensure compliance of the EMP, RMP and environmental regulations of Namibia.

It is, therefore, recommended that this project be authorized and that a clearance certificate be issued for the project.

1. INTRODUCTION

1.2 Project Background

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

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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.

1.3 Project Location

The study area is located on Farm Tripoli No. 546 in the Leonardville area of the Aminuis Constituency in Omaheke Region and is found on the following coordinates: 23.49431°S and 18.65239°E. Refer to **Figure 1** below for the locality map of the proposed development, and **Figure 2** for the Layout map of Farm Tripoli.

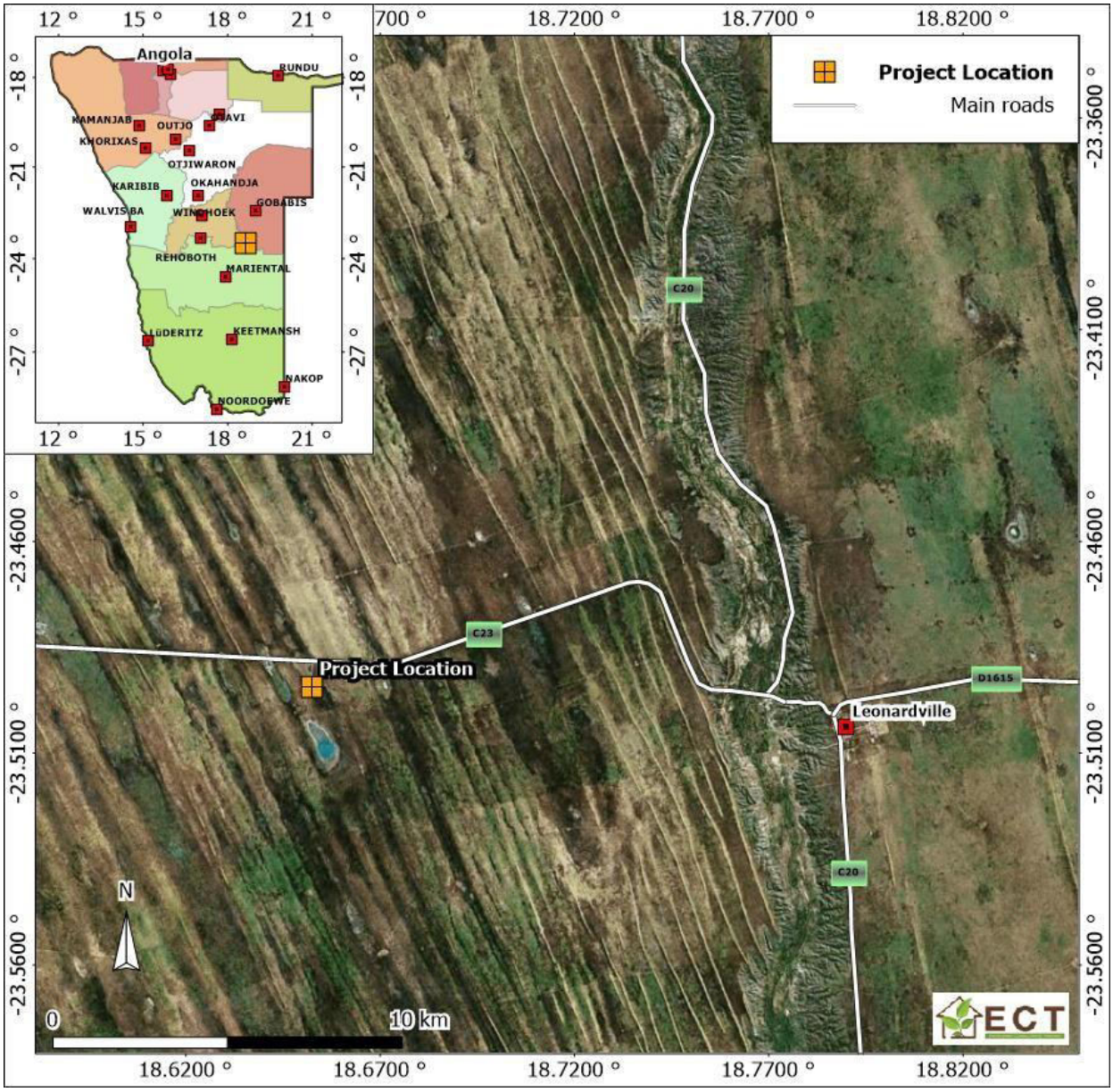

Figure 1: Locality map of proposed development

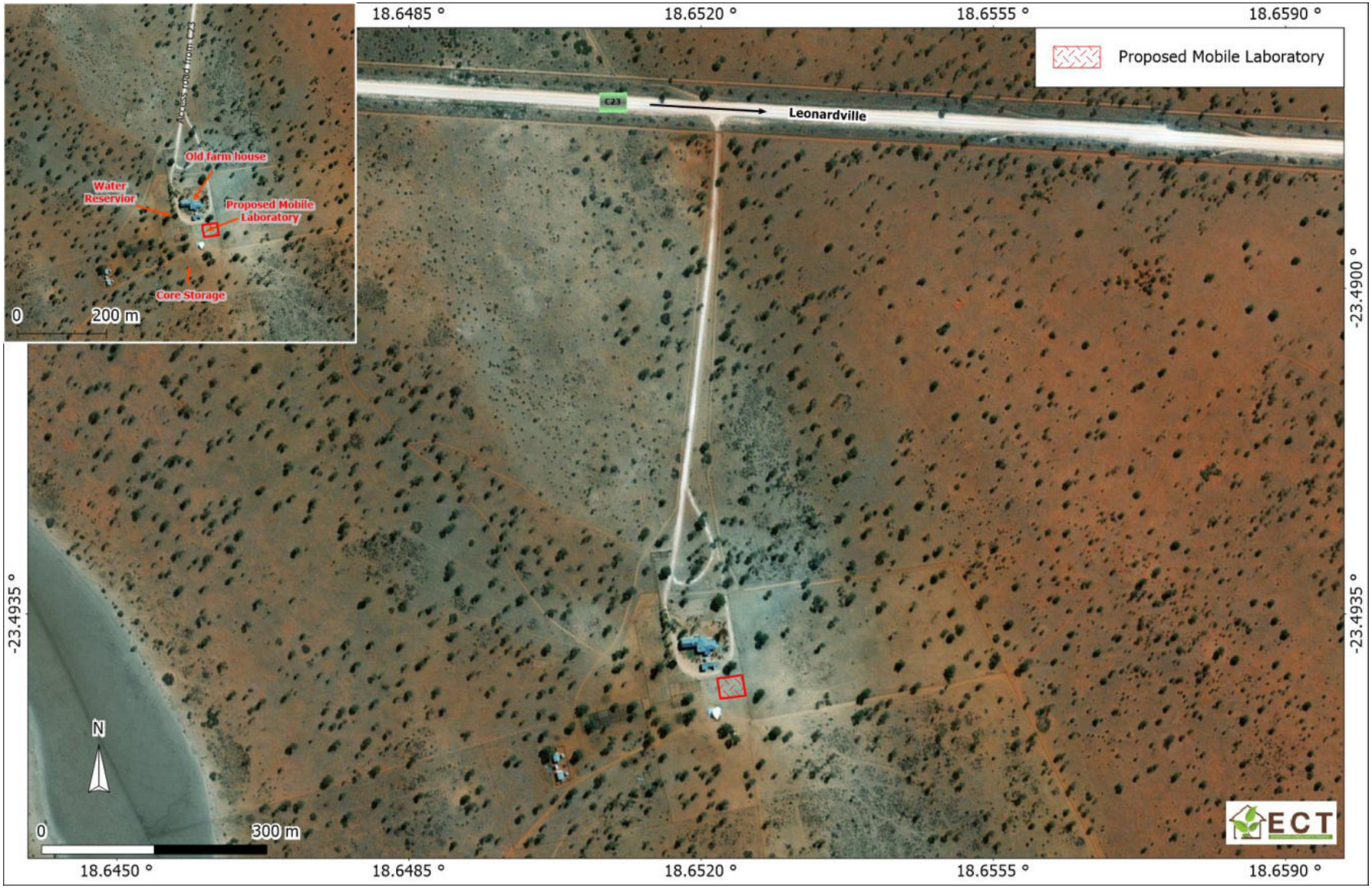

Figure 2: Layout map of Farm Tripoli

1.4 Terms of Reference and Scope of Project

The scope of this project is limited to conducting an environmental impact assessment and applying for an Environmental Clearance Certificate for the Proposed Installation and Operations of a Field Mobile Physical and Chemical Laboratory on Farm Tripoli No. 546 in the Omaheke Region, and associated infrastructure as indicated in section 1.1 above. This includes consultations with client; site investigations and analysis; stakeholder consultations; impact analysis; mitigation formulation; report writing; and draft Environmental Management Plan.

1.5 Assumptions and Limitations

In undertaking this investigation and compiling the Environmental Assessment, the following assumptions and limitations apply:

- Assumes the information provided by the proponent is accurate and discloses all information available.
- Various design alternatives were initially considered by the proponent, having taken due regard of the natural and environmental constraints, and the unique character and appeal of Leonardville and surrounds. The current designs thus present the most feasible results.

1.6 Content of Environmental Scoping Report

In terms of Section 8 of the gazetted EIA Regulations certain aspects must be included in a Scoping Report. **Table 1** below delineate, for ease reference, where this content is found in the Environmental Scoping Report.

Table 1: Contents of the Scoping / Environmental Assessment Report

Section	Description	Section of ESR/ Annexure
8 (a)	The curriculum vitae of the EAPs who prepared the report;	Refer to **Annexure E**
8 (b)	A description of the proposed activity;	Refer to Chapter 4
8 (c)	A description of the site on which the activity is to be undertaken and the location of the activity on the site;	Refer to Chapter 3
8 (d)	A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	Refer to Chapter 3
8 (e)	An identification of laws and guidelines that have been considered in the preparation of the scoping report;	Refer to Chapter 2

Section	Description	Section of ESR/ Annexure
8 (f)	Details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including	Refer to Chapter 5
	(i) the steps that were taken to notify potentially interested and affected parties of the proposed application	Refer to Chapter 5
	(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	Refer to **Annexures A** and **B** for site notices and advertisements respectively.
	(iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 22 as interested and affected parties in relation to the application;	Refer to **Annexure D**
	(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	Refer to **Annexure D**
8 (g)	A description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the environment and on the community that may be affected by the activity;	Refer to Chapter 4
8 (h)	A description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Refer to Chapter 7
8 (i)	terms of reference for the detailed assessment;	Refer to Chapter 1
8 (j)	An environmental management plan	Refer to **Annexure F**

2. LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

The principle environmental regulatory agency in Namibia is the Office of the Environmental Commissioner within the Directorate of Environmental Affairs of the Ministry of Environment,

Forestry and Tourism. Most of the policies and legislative instruments have their basis in two clauses of the Namibian Constitution, i.e., Article 91 (c) and Article 95 (l); however, good environmental management finds recourse in multiple legal instruments. **Table 2** below provides a summary of the legal framework considered to be relevant to this development and the environmental assessment process.

Table 2: Legislation applicable to the proposed 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.
EIA 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 2.3** The import, processing, use and recycling, temporary storage, transit or export of waste. **Activity 8.9** Construction and other activities within a catchment area. **Activity 9.1** The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974. **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

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
		release of emissions, pollution, effluent or waste.
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 proponent in the scoping process.	The EIA 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 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.
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.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
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.
Atomic Energy and Radiation Protection Act, 2005 (Act NO.5 of 2005).	To establish an Atomic Energy Board and to provide for its composition and functions; to establish a National Radiation Protection Authority; to amend the Hazardous Substances Ordinance, 1974 (Ordinance No. 14 of 1974); and to provide for related matters.	To provide for adequate protection of the environment and of people in current and future generations against the harmful effects of radiation by controlling and regulating the production, processing, handling, use, holding, storage, transport and disposal of radiation sources and radioactive materials, and controlling and regulating prescribed non-ionising radiation sources.
Hazardous Substances Ordinance, 1974 (Ordinance No. 14 of 1974)	To provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances; and to provide for matters connected therewith.	To provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances.
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 legislatedby this provision, amongst others.

This EIA process will be undertaken in accordance with the EIA Regulations. A Flow Diagram (refer to **Figure 3** below) provides an outline of the EIA process to be followed.

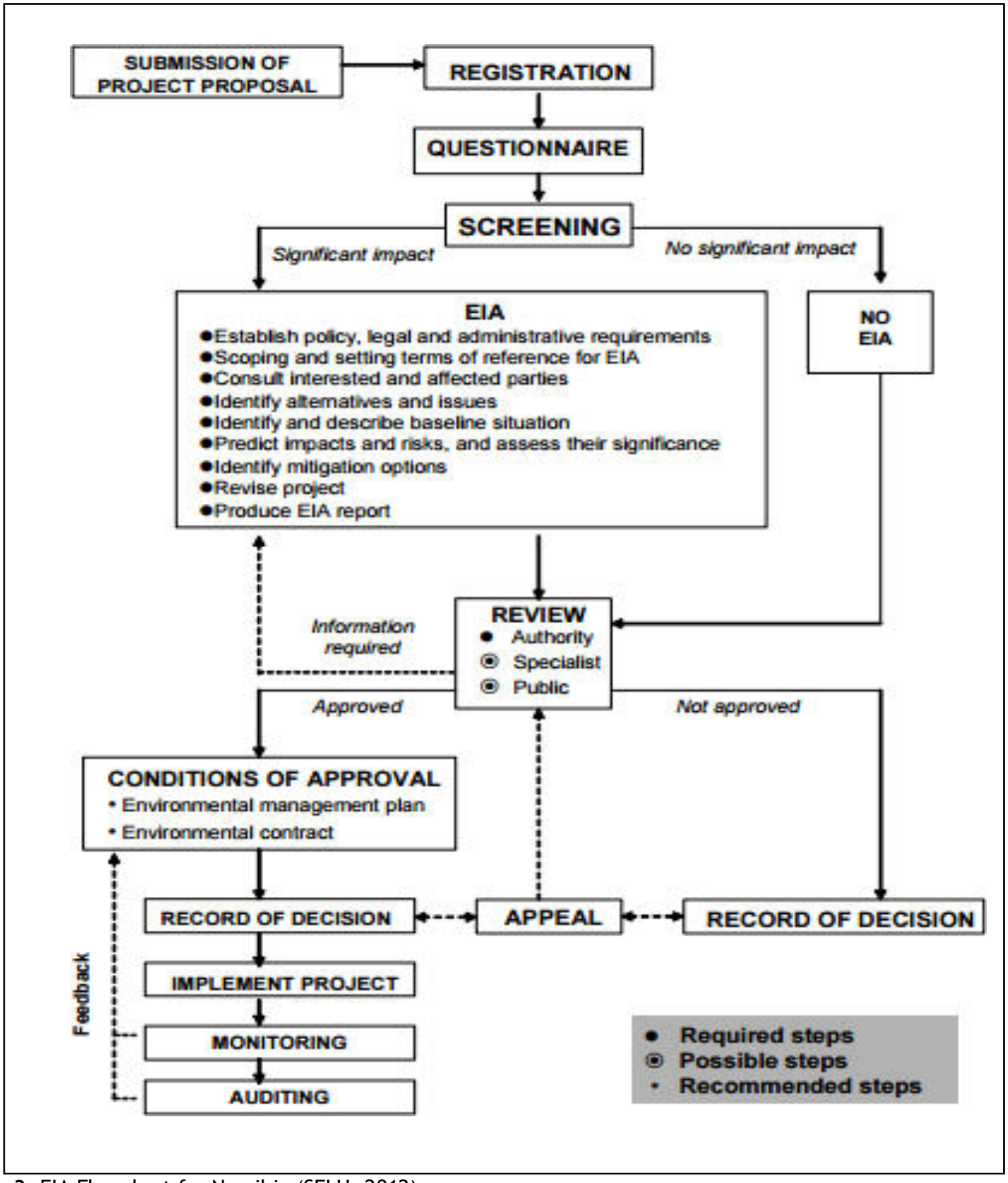

Figure 3: EIA Flowchart for Namibia (SELH, 2012)

3. ENVIRONMENTAL BASELINE DESCRIPTION

3.1. Social Environment

3.1.1. Socio-Economic Context

The proposed development is situated in the Aminius constituency of the Omaheke Region. The total current population of Omaheke Region is estimated to be 71,233 with 34,016 females and 37,217 males (NSA, 2011). Seventy-three (73%) of the population of Omaheke Region over 15 years of age are literate. The total population of the constituency to be specific is 12,309. According to the Namibia Labour Force Survey (2018), the estimated unemployment rate in Omaheke Region is 46.6%. The population density in Omaheke Region is relatively low at 0.8 persons per km2, compared to the national average of 2.1 persons per km^2. The life expectancy in Omaheke Region is 61 years in females and 53 years in males (NSA, 2011).

The statistics shown in **Table 3** below are derived from the 2011 Namibia Population and Housing Census (NSA, 2011):

Table 3: Statistics of Aminuis Constituency and Omaheke Region (NSA, 2011)

AMINUIS CONSTITUENCY	
ATTRIBUTE	**INDICATOR**
Population	12,309
Females	5,773
Males	6,533
Population under 5 years	15%
Population aged 5 to 14 years	26%
Population aged 15 to 59 years	51%
Population aged 60 years and above	7%
Female: male ratio	100:113
Literacy rate of 15 years old and above	78%
People above 15 years who have never attended school	26%
People above 15 years who are currently attending school	11%
People above 15 years who have left school	60%
People aged 15 years and up who belong to the labour force	63%
Population employed	47%
Homemakers	27%
Students	34%
Retired or old age income recipients	39%
Income from pension	14%
Income from business and non-farming activities	14%
Income from farming	35%
Income from cash remittance	7%

AMINUIS CONSTITUENCY	
Wages and salaries	32%
OMAHEKE REGION	
ATTRIBUTE	**INDICATOR**
Population	71,233
Population under 5 years	15%
Population aged 5 to 14 years	24%
Population 15 to 59 years	54%
Literacy rate of 15 years old and above	73%

3.1.1.1. Employment Creation (Job Opportunities)

Unemployment still hampers most of the developing world and Omaheke region is no exception. The proposed development is likely to increase the job opportunities in the region. The Construction phase of the project will provide job opportunities, of which 80% are expected to be unskilled and semi-skilled people and can be sourced from the unemployed labour force of Leonardville and the surrounding communities.

The principle of maximising local employment creation can be applied by identifying suitable construction contractors in each region. It is highly likely that suitable construction contractors would be identified in Leonardville and Gobabis. In particular, the town of Gobabis is well-supplied with competent small and medium enterprise (SME) construction companies to develop the proposed facility. The project would also give rise to indirect economic benefits through the procurement of materials, goods and local services.

The local economy of the nearby village of Leonardville is expected to benefit from the project. A percentage of moneys derived from salaries and wages earned by construction workers is likely to be spent at the town and surrounding areas. The moneys spent in communities around the project location would create substantial flows of revenue within these communities, thus acting as a catalyst for growth in the local economy.

In addition, procurement of construction materials, goods and services would have beneficial downstream economic impacts by stimulating demand up the supply chain. The more goods and services procured from local SMEs or enterprises at the village, the greater the project's contribution to the growth of the local economy.

It is therefore recommended that, where feasible, contractors employ local labour by recruiting from local communities and the region at large; that procurement of materials, goods and services from local suppliers be encouraged.

3.1.1.2. Livelihoods

Due to scarcity of water and fertile land, Omaheke is regarded as having a low suitability for crop production; rain-fed agriculture is not very reliable due to poor soil quality and rainfall variability. Livelihood activities concern major activities and strategies that people undertake in their communities to make a living. In Omaheke Region, cattle farming for both subsistence and commercial used for gain is the most customary form of livelihood within the region bestowing the designation of Cattle Country to the region. In addition, cattle farming predominates the freehold private farms, open communal areas as well as surveyed farms which are presently used communally. The rearing of cattle in the region is primarily for beef production which is the main driving force behind the region's economy.

Nonetheless, farming accounts the main source of household income for only 28% of households in the region. Formal employment with wages and salaries is the main source of household income for 46.6% of households in the region. San communities living in undeveloped communal areas of Omaheke practice a hunter-gatherer lifestyle to degree, although present-day socio-economic, legal political and environmental realities make the form of living increasingly difficult (Regional Poverty Profile, 2004).

The livelihoods of the local communities is likely to be positively impacted therefore predicted to be better than before the development of the facility in the area.

3.1.1.3. Tourism

Private game farms and conservancies in Omaheke Region offer protection to wildlife which then becomes an attraction to tourists and trophy hunters, in turn providing farm owners with alternate livelihoods as well as sources of income from game farming, hunting and ecotourism. The area attracts a lot of tourists from all over the world. Excessive waste, dust, noise and vibrations can have negative impacts on the tourism industry in the area, as it can become a nuisance to tourists. Mitigation measures at the site must be put in place to reduce these impacts.

3.1.1.4. In - Migration

Due to enhanced employment opportunities that could be created by the envisaged project, some in-migration of job seekers to Leonardville and nearby settlements can be expected. Depending on the amount of in-migration, local areas may start experiencing overcrowdings, over use of infrastructure, local conflicts, increase of goods prices due to increased demand etc.

3.1.1.5. HIV & Covid-19

Namibia has a high incidence of HIV/AIDS, which has a strong and adverse socio-economic impact on livelihoods of people in the region. The HIV prevalence rate is estimated at 16.9% for Namibia (MoHHS, 2015).

The spending powers of locals working for HSI are likely to increase, and this might be a perfect opportunity for sex workers to explore. Migrant labourers from other regions and expatriates are normally vulnerable and may use the services rendered by the sex workers.

Construction camps often become a focal point for promiscuous sexual activities. Such activities, particularly when carried out without protection, can result in increases in sexually transmitted diseases (STDs) and especially AIDS among neighbouring communities, construction workers and their partners.

Should the HIV prevalence increase, the following consequential issues could arise:

- Reduced workforce in the Omaheke Region.
- Diversion of income expenditure to medical care.
- Increase in orphans and households headed by children.
- Increase in pregnancy related mortality.
- The current rate of 3,129 people per doctor could increase.

Educate workers and surrounding communities on measures to prevent the spread of HIV/AIDs through awareness campaigns, provision of safety equipment for workers, child labour prohibited. While the Covid-19 pandemic in Namibia has seen a significant decline, the risk nevertheless has not disappeared entirely. Caution should still be applied, especially where you have a number of people gathered. HSI, its employees and contractors should at all times conform to any stipulated protocols related to Covid-19 as they may arise.

3.1.2. Archaeological and Heritage Context

Omaheke Region like the rest of Namibia is home to many different cultural groups. There are not many heritage sites found within the confines of Leonardville, however a national monument known as German Lazaret is found in the area. This structure was built in 1896 on the highest hillock south east of the former Gobabis fort. It was initially used as a hospital until 1904, and turned into a dwelling for civil servants and civilians after the end of World War 1 (NHC, 2015). No known heritage sites are however located within the proposed development area. If any heritage or culturally significant artefacts are found during the construction phase, construction must stop and the National Heritage Council of Namibia immediately notified.

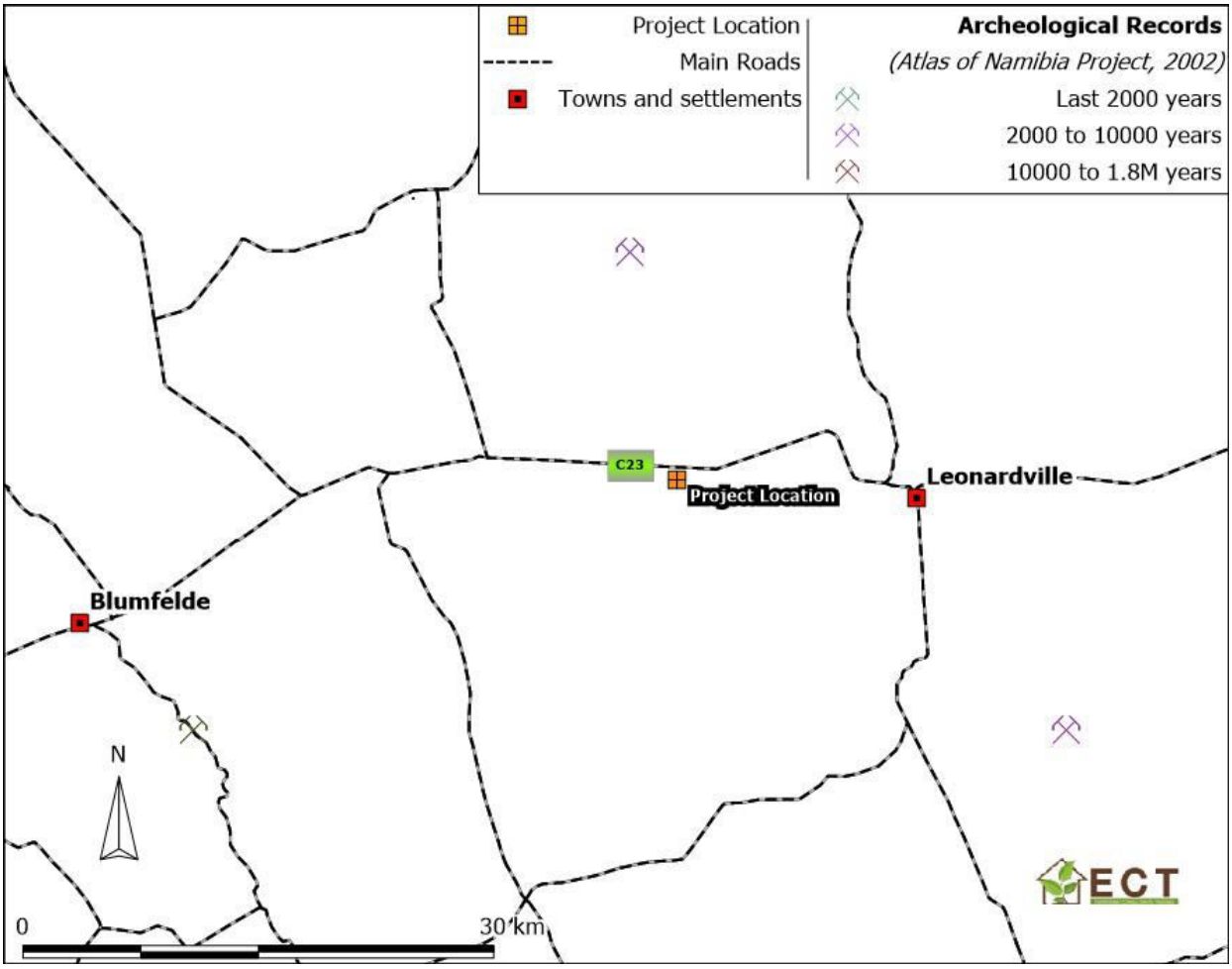

Figure 4: Known archaeological records in area

3.2. Bio-Physical Environment

3.2.1. Climate

3.2.1.1. Local Precipitation

The mean annual rainfall is highly variable and may range between 200 mm - 400 mm in the area. The distribution of rainfall within the Nama Basin is extremely seasonal with almost all the rain falling in summer, from November to April, with occasional winter rainfall (**Figure 5**). Mean annual gross evaporation is between 3,000 mm and 3,400 mm (RBS, 2018). Sporadic and unpredictable, high intensity, highly localised storm events between October and April does occur. The variation in rainfall in the area is averaged to be 40-50 % per year.

3.2.1.2. Temperature

Ambient air temperature is an important parameter in determining pollution plume behaviour, the depth of mixing height, and position of the inversion layer. The mixing layer is the average thickness of the layer within which pollutants are expected to mix with air over a geographical

area. The inversion layer is characterised by an increase in temperature with height (RBS, 2018).

The greater the difference between the emitted pollutant and the ambient air temperature, the resulting plume will have a buoyancy rise. Daytime temperatures range between 35° to 45°C from October to April, the hottest months, and can drop below freezing between June and August. The annual mean temperature is around 32°C with the mean monthly temperatures ranging between 23°C to 34°C throughout the year (RBS, 2018).

3.2.1.3. Wind Patterns

The medium-term (days) and short-term (seconds) wind characteristics are of fundamental importance in determining the area of the ground that can be exposed to emissions of Hazardous Air Pollutants (HAPs) from a source. Based on the regional wind patterns, the dominant wind direction is from the north eastern and southwest quadrants of Farm Tripoli (RBS, 2018).

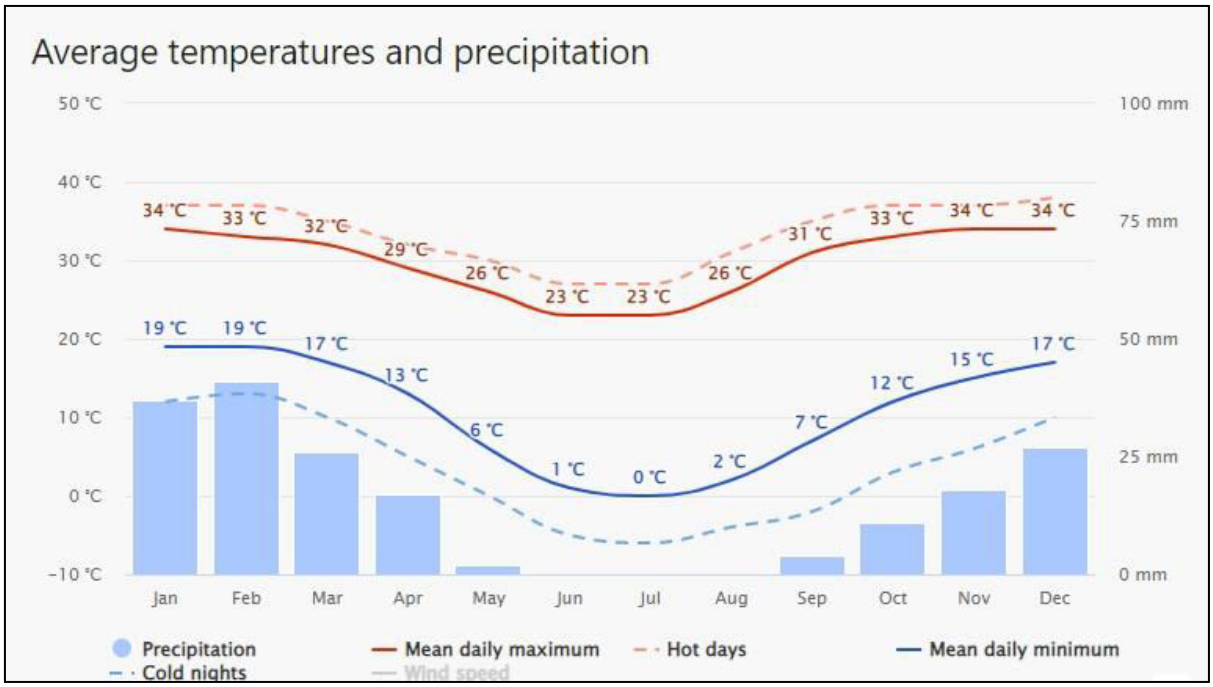

Figure 5: Climate data for Leonardville (Meteoblue, 2023)

3.2.2. Topography of the Area

The landscape at the project site is classified as being in the Kalahari Sandveld, which is characterised by palaeo dunes and pans. The local topography falls off to the east as the Kalahari is approached. The site is located within the catchment of the Nossob River, an ephemeral river, draining into a south-southeastern direction. The Nossob River is located approximately 12km east of the site.

No perennial surface water sources exist within the region; and the only prominent drainage

channels are the Black and White Nossob Rivers and the shallow ancient river beds of Eiseb, Epukiro and Otjozondjou. It is only the Nossob Rivers that actively flow after exceptionally good rains, however almost all rainfall infiltrate immediately due to the porous Kalahari sands (LAC, 2015).

3.2.3. Geology of the Study Area

As per UNESCO (2016), the SAB is part of a huge sedimentary basin in which a thick sequence of layers has been deposited. The layers of Carboniferous through Jurassic age are together known as Karoo Supergroup and contain mainly sandstones, shales, mudstones, siltstones and limestone. They are covered by a blanket of sediments of the Kalahari Group (deposited since approximately 65 million years ago), of Tertiary-Quaternary age and consisting predominantly of sand, calcrete (duricrust), gravel, clayey gravel, sandstone and marl.

The Karoo Supergroup in southern Africa is of considerable importance for both economic and scientific reasons. From an economic perspective it is unique in that it hosts all the coal deposits of the subcontinent. The combined reserves are estimated to be in the order of 67,000 MT, which according to the World Energy Council makes nearly 10% of the World total. From the scientific perspective, the Karoo strata are famed for their rich non-marine fauna and flora spanning the Permian and Triassic periods, in particular, the reptile-mammal transition (Johnson et al., 1996). Documented basins in southern Africa containing Karoo Supergroup strata are the main Karoo Basin of South Africa, and the Great Kalahari Basin, stretching from Namibia (Aranos Basin) through Botswana (Kalahari Basin) into Zimbabwe (MidZambezi Basin) (Figure 6). The basin fill is covered by sediments of the Cenozoic Kalahari Group.

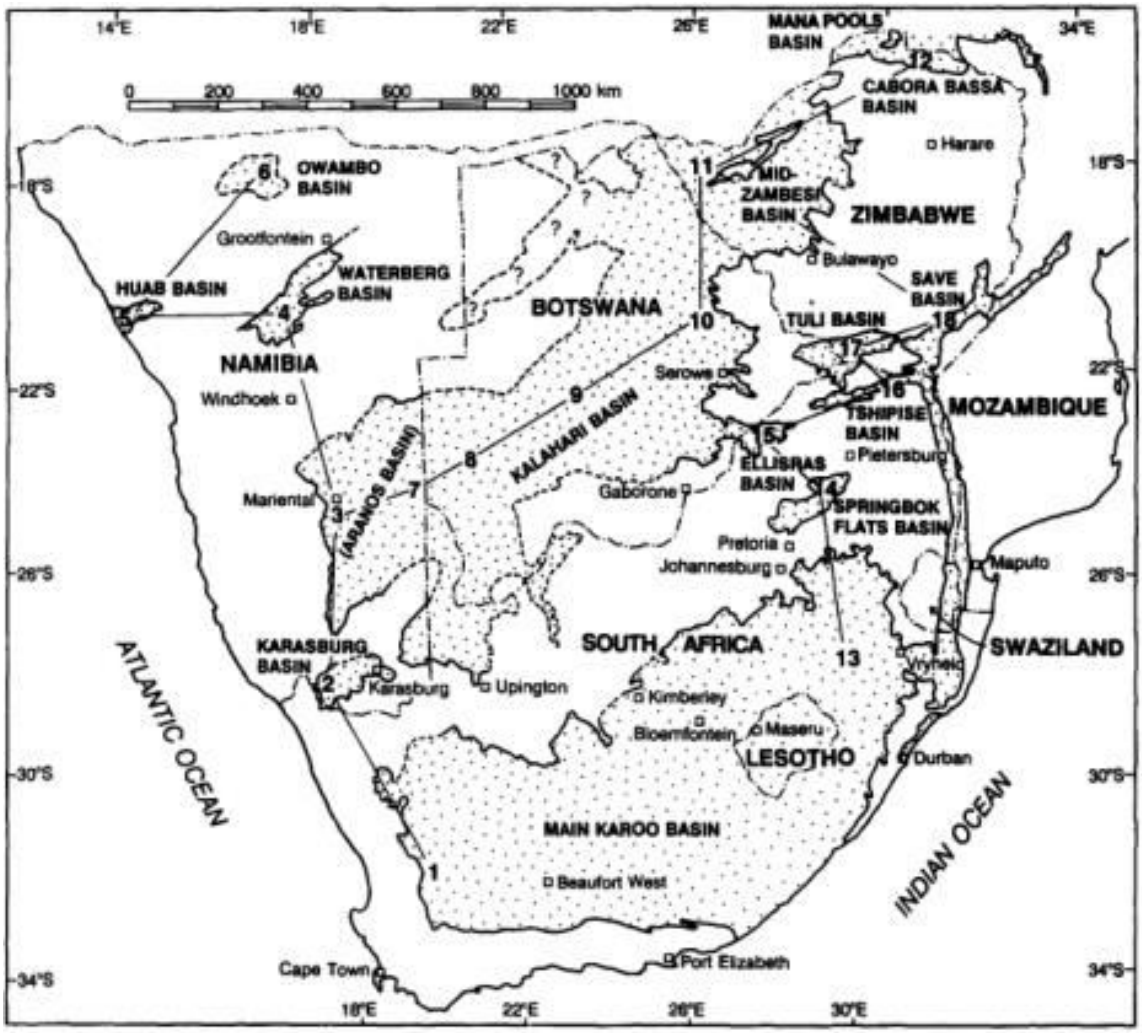

Figure 6: Large sedimentary basins in Southern Africa (Source: UNESCO, 2016)

3.2.4. Hydrogeology of the Area

The project site falls within the Stampriet Artesian Basin (SAB), a groundwater protection zone managed by the Department of Water Affairs (DWA) in the Ministry of Agriculture, Water and Forestry. The StamprietArtesian Basin (SAB) is a transboundary groundwater resources which Namibia shares by Botswana and South Africa, of which the largest area of the basin (that is 73%) is covered in Namibia. Groundwater recharge in the Stampriet Artesian Basin is very limited.The Stampriet Artesian Basin is recharge by several ephemeral river channels such as the Nossob, Seeis, Auob and Olifants Ephemeral Rivers (RBS, 2018).

The groundwater occurrence within the Stampriet Artesian Basin (SAB) is associated with the upper Kalahari Group and in the underlying Karoo Sequences. The three main aquifers in the SAB in Namibia are in the Kalahari Beds, the Auob Sandstone and the Nossob Sandstone. The thickness of the Kalahari aquifers varies from 0 to 350 m although they generally do not exceed 100m. In the southeastern part of the Namibian SAB, the Kalahari sediments are considerably thicker,reaching about 250 m in the 'Pre-Kalahari Valley', while sediments are found to be relatively thinner along the northern and western boundaries of the basin. The Auob is an artesian aquifer that is found at depths varying from 0 to over 300 m, and its thickness varies from 0 to 150 m. However, thicknesses in some areas are not known. The Nossob is an artesian aquifer that can be found in depths varying from 0 to more than 400m and its thickness varies from 0 to 60m in Namibia (UNESCO, 2016).

The Auob Sandstone Aquifer and the NossobSandstone Aquifer lie in the Ecca Group of the lower Karoo Sequence and are separated by shale layers of the Mukorob Member, which is overlaid by Rietmond Shale and Sandstone. The Auob and Nossob Aquifers are confined and free flowing in the Auob Valley from Stampriet andfurther downstream, as well as in the Nossob Valley around Leonardville. Water levels elsewhere in boreholes in the artesian aquifers are subartesian. Several springs are located in the eastern outcrop of the Kalkrand Basalt in the northwest. Groundwater also occurs in the Kalahari layers across the basin and in the Prince Albert Formation of the Karoo Sequence.

Groundwater flow is expected to take place through primary porosity in the Kalahari cover,while it is expected along fractures, faults (secondary porosity) and other geological structurespresent within the underlying formations (hard rock formations).

According to the Department of Water Affairs and Forestry, (2001) and the International Hydrological Programme of the United Nations Educational Scientific and Cultural Organisation (UNESCO, (2016), water in the area is used for human consumption, stock watering and increasingly for irrigation and tourism / hospitality establishment purposes. Although agriculture and tourism / hospitality both have economic advantages of creating more rural jobs job opportunities, these economic activities if managed poorly can be great source of groundwater pollution from the use of fertilisers and poor selection of kraals locations with

respect to the exiting boreholes in the agricultural sector to the poor management of wastewater and disposal of solid waste in the tourism / hospitality sectors.

The Stampriet Artesian Basin (SAB) show a rise in the rest water level with good pressure head to which the Nossob Aquifer is subjected within the basin. This observation is very important from an environmental point of view, since borehole penetration of the Nossob Aquifer is most likely to cause relatively poor-quality groundwater from the aquifer to infiltrate upwards into the overlying Auob Aquifer (with better quality groundwater (RBS, 2018).

Groundwater flow from the project site can be expected into a southeasterly direction; however local drainage patterns may vary due to groundwater abstraction in the area. According to the Department of Water Affairs and Forestry database, water is utilized in the area with approximately 4 boreholes known of within a 5km radius of the project site. Depth to water table is expected to be less than 60m below ground level (mbgl). Sources of water supply for the proposed laboratory activities could be obtained from local groundwater resources. See **Figure 7** below, for the hydrogeological.

The project site does fall within the Stampriet Subterranean groundwater control area, as defined by law in the Artesian Water Control Ordinance of 1955. This means that government controls the exploration and usage of it.

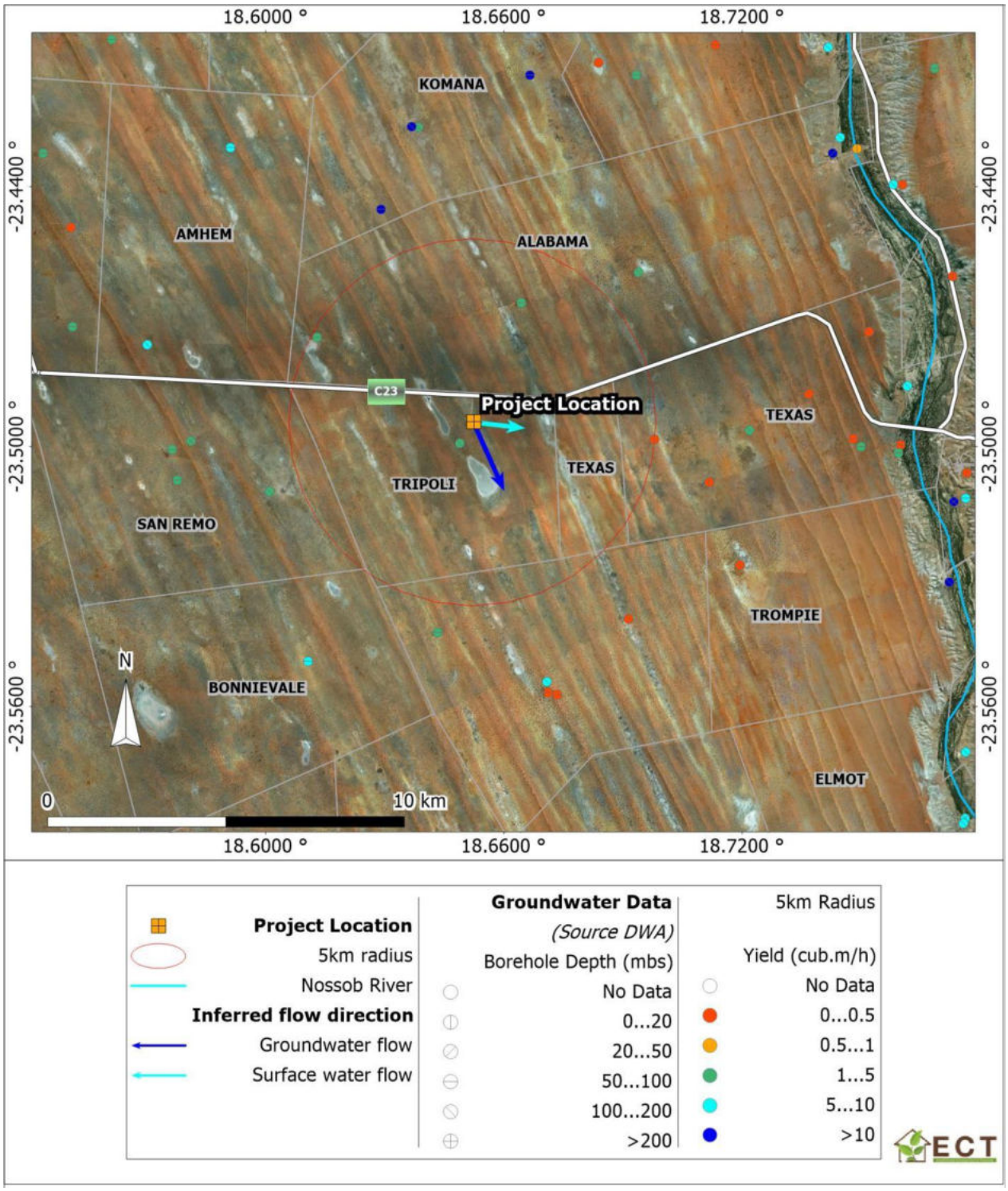

Figure 7: Hydrogeological Map

3.2.5. Surface and Groundwater Vulnerability

Surface and groundwater resources are essential for the sustainability of human life, food production and socio-economic growth in the region and Namibia at large. In general, surface water is supposed to be more vulnerable to groundwater, since it is directly exposed to human activities, thus it can be easily polluted. However, even though groundwateris protected by geological layers of the earth, the quality and quantity of groundwater are at high risk from human activities. The assessment of surface and groundwater vulnerability is anessential step for the efficient management of the water resources, especially in areas with intensive anthropogenic activities and groundwater pollution.

Vulnerability assessment of surface water covered possible runoff, the presence of source factors and major flow routes such as major high order discontinuities such as faults, ephemeral river channels, valleys and gullies as pathways; and the presence of surface water in the ephemeral rivers body as a target. The groundwater assessments covered hydraulic properties and thickness of the unsaturated and saturated zones derived from geological and hydrogeological data. The assessment of the unsaturated characteristics was based on the ability for source factors to influence the system through known pathway factors such as discontinuities. The combined effects of the unsaturated and saturated flow probabilities were used as indicator for groundwater vulnerability. However, groundwater or surface water will only be vulnerable to contamination if the following three (3) components are all present at the same time and at a site specific area at the project site:

(i) Contaminant sources such as oils, chemicals, hazardous and/or radioactive waste handled and stored at the site;

(ii) Potential pathways for contaminants to migrate and reach a groundwater / surface water body such as porous rock formation / surficial deposits, major high order discontinuities, ephemeral river channels, valleys and gullies;

(iii) Targets (economic water resources) present within the project area.

Overall, economic and protected groundwater resources are found in the area and form part of the Stampriet Artesian Basin (SAB) protection zone. During the rainy season, surface water bodies can be found along the local ephemeral river systems. Surface rainwater in the area also accumulates in pans between the dunes. This surface water often recharges the local and regional groundwater resources along the faults, solutions holes and other discontinuities along these ephemeral rivers in the general surrounding areas. The same surfacewater also replenishes the local and regional dams. According to UNESCO (2016) report, it is assumed that recharge to the Auob and Nossob aquifers in normal rainfall years is practically non-existent. Apart from diffuse recharge by downward seepage from the Kalahari aquifers, there are a few recharge zones facilitating concentrated recharge during rare wet years. Recent reassessment of the recharge behaviour of the confined aquifers by Tredoux et al. (2002), Kirchner et al. (2002) and van Wyk (2014) suggest that recharge via sinkholes and faults are the dominant mechanism of recharge in the north-western and western boundaries of the STAS, and specifically to the Auob aquifer. By extension, considering that the flow direction in this multi-layered aquifer basin is north-west to south-east, it is assumed by these authors that focused recharge through sinkholes and faults is the major recharge source for the confined aquifers only. Rain water flows towards the sinkhole depressions where it seeps away within some hours (Figure 3.9). Recharge to the Kalahari and Auob aquifers during above normal rainfall years may be as much

as 3% of rainfall (i.e. 4 to 9.5 mm/yr) (JICA, 2002). Recharge into the Nossob aquifer is negligible independently of normal or heavy rainfall events, thus the water resources in the Nossob aquifer can be regarded as fossil water. It is worth mentioning that recharge rates of the Auob and Nossob aquifers are very difficult to estimate because of insufficient long-term rainfall and water level records.

Surface and groundwater resources in the area maybe vulnerable to pollution as a result of some of the proposed laboratory activities. Supporting activities such as campsite and discharge of liquid and solid waste are potential sources that could affect local water resources. If not managed properly the effect of the proposed field-based laboratory activities could have cumulative negative effects on the localwater resources in addition to the already existing threatening activities / pressures such as:

(i) Small settlements, farms, tourism / hospitality facilities discharge sewage into poorly designed waste water management facilities and sometimes in close proximity to their water boreholes. This can cause severe nitrate (and nitrite) and other bacterial load poisoning of the groundwater, which will develop some time after the construction of such waste water facilities;

(ii) Kraals for livestock situated close to the borehole or on unsuitable ground conditions with discontinuities or porous materials. Farmers should always try to construct kraals for livestock several hundred metres away from boreholes and on suitable ground which is less porous and specialist knowledge is highly necessary on site selection;

(iii) Unused boreholes and wells used as refuse tips. All unused boreholes must be sealed when not in use;

(iv) Poorly planned sewage treatment plants and solid waste disposal sites, and;

(v) Large-scale agriculture and intensive farming practices have a significant impact on the groundwater resources through the introduction of leachable chemicals into the ground affecting the water quality as well as depletion of the existing often poorly recharged groundwater resources quantity.

According to the vulnerability of groundwater resources (DWAF, 2001), groundwater within the Stampriet Artesian Basin (SAB) is highly vulnerable to pollution. It is important that the proposed laboratory activities as well as the existing farms, tourism, hospitality and local community related potential polluting activities must not be placed or undertaken in areas with high order discontinuities, valleys or gullies systems (International Hydrological Programme of the United Nations Educational Scientific and Cultural Organisation (UNESCO), 2016)).

Ephemeral Rivers in the area such as the Nossob, Seeis, Auob and Olifants play a vital role in the recharge of the various national water supply scheme operated by local farmers, Regional Council, Local Authorities and NamWater within the Stampriet Artesian Basin (SAB). Generation of any hazardous, radioactive and solid waste and/or any wastewater should be properly managed, contained and disposed of accordingly. Discharge of any form of waste into a public stream and underground water source is prohibited

3.2.6. Terrestrial Ecology

The site falls within the Tree and shrub savanna biome, which is characterised by Southern

linear duneveld type vegetation. See **Figure 9**. The vegetation structure type is classified as Kalahari shrubland.

The site itself is partially disturbed and earmarked for development. The dominant vegetation on site consists mainly of large Camel thorn trees (*Acacia Erioloba*), grass and some scattered small thorn bush (See **Figure 8**). The Camel thorn trees are protected in Namibia by the Forestry Act (No.12 of 2001).

It is recommended that the protected Camel thorn trees be conserved and incorporated into the development.

Figure 8: Typical vegetation at the project location

Deducing from the Atlas of Namibia, the proposed site is within the area that is known to have 100 to 150 plant species and a low to medium diversity of higher plants (Mandelsohn et al (2003). With regards to fauna, minimal wildlife has been observed in the vicinity of the study area, with more domestic animals frequenting the site.

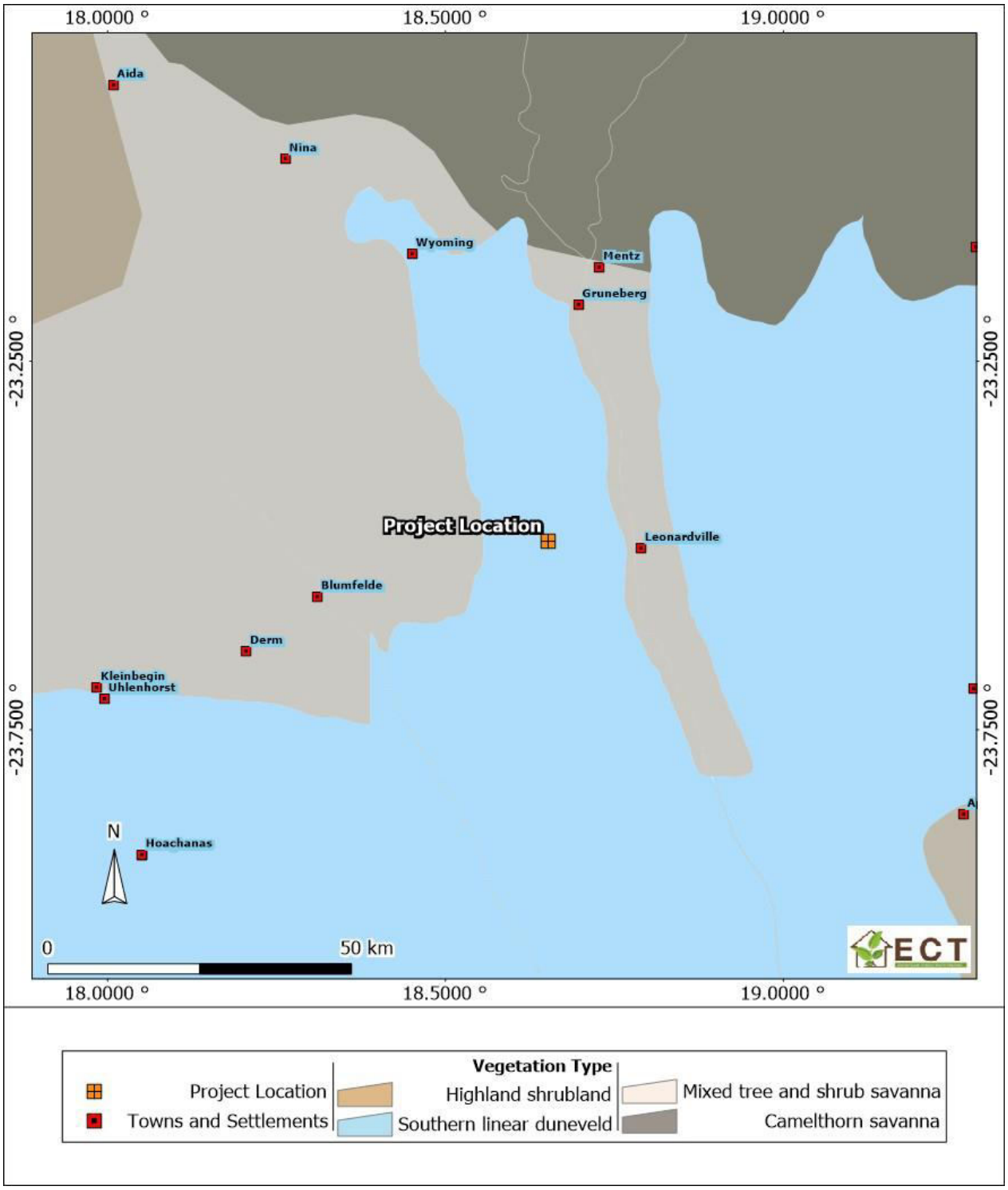

Figure 9: Vegetation type of study area

3.2.6.1. Fauna Diversity

3.2.6.1.1. Reptiles

The high percentage of endemic reptile species (41.3%) associated with the general area underscores the importance of this area without formal state protection. The most important reptiles in the area are viewed as those classified as vulnerable and protected game under Namibian legislation – i.e. *Stigmochelys pardalis*, *Psammobates oculiferus*, *Psammobates tentorius verroxii* and *Varanus albigularis*. Tortoises, for example *Stigmochelys pardalis*, *Psammobates oculiferus*, *Psammobates tentorius verroxii,* are viewed as the group of reptiles most under threat in Namibia. Tortoises, snakes and monitor lizards are routinely killed for food or as perceived threats (RBS, 2018).

3.2.6.1.2. Amphibians

The most important amphibian from the general area is viewed as *Pyxicephalus adspersus* with population trends decreasing (IUCN 2015). With the exception of the ephemeral pans in the immediate area, temporary pools after showers and farm dams and reservoirs, no permanent surface water exists in the development area. Large numbers of *Pyxicephalus adspersus* are associated with the ephemeral pans throughout the general area after the influx of water. The Nossob and Olifants Ephemeral Rivers often with permanent pools and the Hardap Dam, to the southwest, are the closest suitable all year-round amphibian habitat. However, the overall lack of suitable habitat is expected to negatively affect the presence of most amphibians (RBS, 2018).

3.2.6.1.3. Mammals

The most important species from the general area are probably all those classified as rare (*Cistugo seabrae*, *Zeltomys woosnami*, *Felis nigripes*) under Namibian legislation and vulnerable (*Smutsia temminckii Acinonyx jubatus*, *Panthera pardus*, *Felis nigripes*) and near threatened (*Eidolon helvum*, *Hyaena brunnea*) by the IUCN (2015). Some species such as cheetah, leopard and brown hyena do not necessarily occur in the area permanently but rather pass through occasionally depending on environmental conditions, etc (RBS, 2018).

3.2.6.1.4. Birds

Species viewed as the most important potentially occurring in the general area are those listed as endangered (white-backed vulture, tawny eagle, martial eagle, bateleur, black harrier, black stork, Ludwig's bustard), vulnerable (secretary bird, lappet-faced vulture, white-headed vulture, African fish-eagle) and near threatened (marabou stork, Verreaux's eagle, peregrine falcon, kori bustard) by Simmons *et al*. (2015) in Namibia as well as those species classified as critically endangered (white-backed vulture, white-headed vulture), endangered (lapped-faced vulture, black harrier, Ludwig's bustard), vulnerable (secretarybird, martial eagle) and near threatened (bateleur, kori bustard) by the IUCN (2015). Other important aquatic species, etc. – are maccoa duck (Near Threatened-NT), Cape vulture (Critically Endangered-CE), black-necked grebe (Near Threatened-NT), greater flamingo (Vulnerable-V), lesser flamingo (Vulnerable - V), great white pelican (Vulnerable-V) and saddle-billed stork (Endemic-E) (RBS, 2018).

3.2.6.2. Flora Diversity

3.2.6.2.1. Trees/shrubs and Grasses

The most important species are the endemic – *Tetragonia schenckii* – and near endemic species as well as those with some form of formal protection – i.e. Forestry, Nature Conservation and CITES species. The endemic/near endemic grasses (*Anthephora argentea*, *Eragrostis lehmanniana*, *Eragrostis truncata*, *Panicum kalaharense* and *Stipagrostis amabilis*) are viewed as the most important species potentially occurring in the general area (RBS, 2018).

3.2.6.2.2. Aloes

Aloes potentially occur in the general area, and also viewed as important are *Aloe hereroensis* and *A. zebrina* (Rothmann 2004).

3.2.6.2.3. Commiphora

Many endemic Commiphora species are found throughout Namibia with Steyn (2003) indicating that *Commiphora africana*, *C. glaucescens*, *C. tenuipetiolata* and *C. crenato-serrata* potentially also occurring in the general area.

3.2.6.2.4. Ferns

At least 64 species of ferns, of which 13 species being endemic, occur throughout Namibia. Ferns in the general area include at least 1 endemic species (Marsilea burchellii) and 12 indigenous species (*Actiniopteris radiata*, *Adiantum capillus-veneris*, *Cheilanthes marlothii*, *Marselia coromandelina*, *M. aegyptiaca*, *M. ephippiocarpa*, *M. farinosa*, *M. macrocarpa*, *M. unicornis*, *M. vera*, *Ophioglossum polyphyllum* and *Pellaea calomelanos*) (Crouch *et al.* 2011). The general area is under collected with more species probably occurring in the general area (RBS, 2018).

3.2.6.2.5. Lichens

The overall diversity of lichens is poorly known from Namibia, especially the coastal areas and statistics on endemicity is even sparser (Craven 1998). More than 100 species are expected to occur in the Namib Desert with the majority being uniquely related to the coastal fog belt (Wirth 2010). Lichen diversity is related to air humidity and generally decreases inland form the Namibian coast (Schults and Rambold 2007). Off road driving is the biggest threat to these lichens which are often rare and unique to Namibia.

To indicate how poorly known lichens are from Namibia, the recent publication by Schultz *et al.* (2009) indicating that 37 of the 39 lichen species collected during BIOTA surveys in the early/mid 2000's were new to science (i.e., new species), is a case in point (RBS, 2018).

3.2.6.2.6. Other species

Other species with commercial potential that could occur in the general area include *Harpagophytum procumbens* (Devil's claw) – harvested for medicinal purposes and often over-exploited – and *Citrullus lanatus* (Tsamma melon) which potentially has a huge economic benefit (Mendelsohn *et al.* 2002).

3.3. Surrounding Land Use

The land uses in this area is dominated by agriculture (cattle, small stock, irrigation and slowly growing wildlife farming) and tourism operations including lodges and campsites. Farm Tripoli No. 546 itself is designated as a farm and is surrounded by properties of the same land-use (See **Figure 10**). The immediate neighbouring farms are: Farm Alabama No. 704 to the northern border andFarm Texas No.17 as well as Portion 1 of Farm Texas No. 17 to the east. To the south Farm Askole No. 547 (1004) is found, with Farm San Remo No. 543 located to the west side of Farm Tripoli 546. Other farms in the vicinity include Portion 3 of Farm Arnhem No. 540, Farm Bonnievale No.702,Farm Komanya No. 991, Farm Trompie No.16, Farm Chamanoudon No.549 etc.

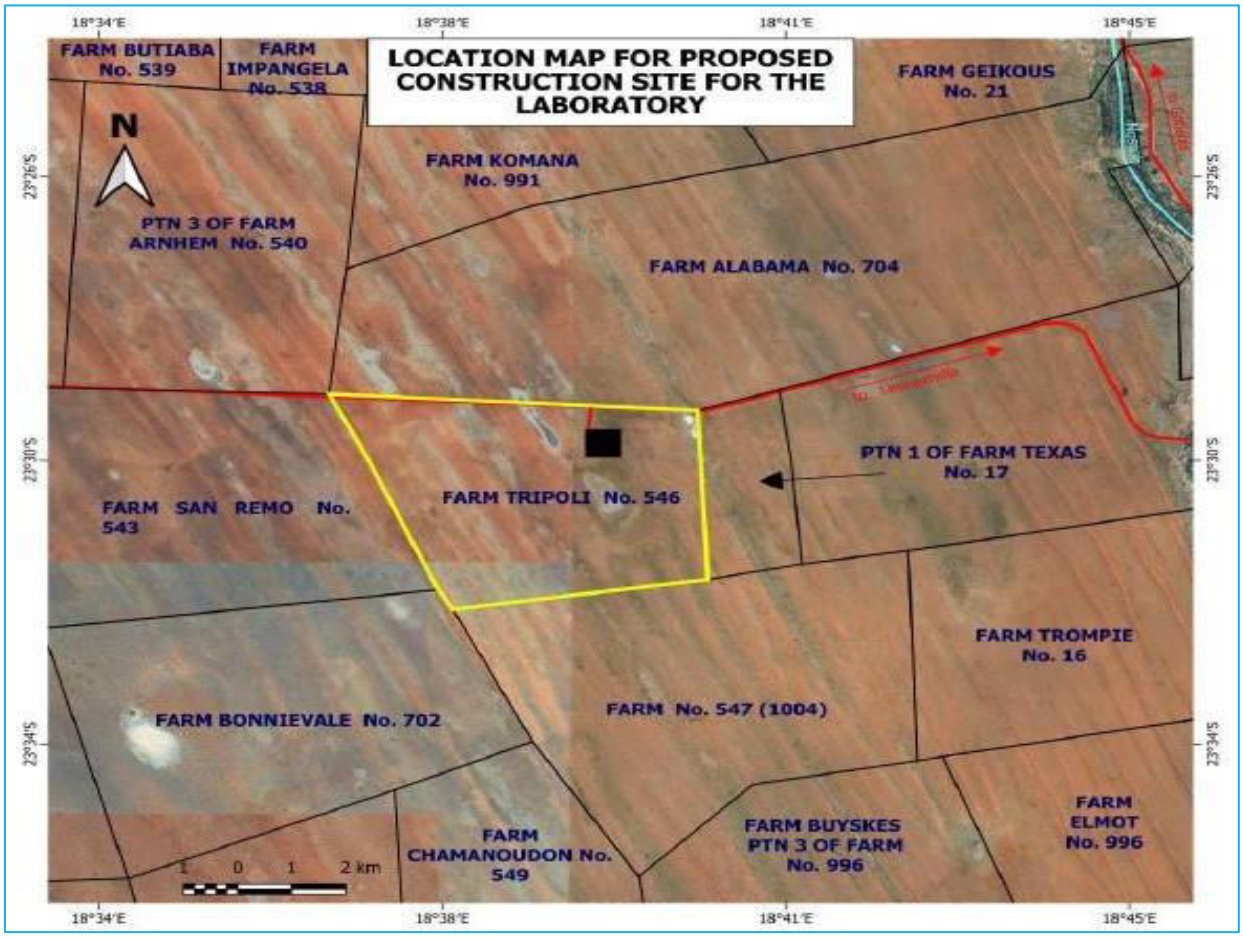

Figure 10: Map of surrounding farms

3.4. Physical Environment

The infrastructure needs of the proposed project can be categorised into two broad classifications namely:

- Basic infrastructure that includes electricity and roads.
- Environmental infrastructure that consists of water supply, sewage and drainage systems, solid waste management and radioactive waste management.

The service infrastructure such as water, sewer, drainage, electricity and roads will be designed by registered professional engineers to integrate with the existing infrastructure on Farm Tripoli No. 546.

Equipment and structures, construction work, testing and commissioning of the mobile laboratory will be done in accordance with relevant national regulations and standards. This will, amongst others, include the following standards and guidelines:

- ORHVS (NamPower) High-Voltage System Operation Rules.
- SANS 10161:1980 Designing of Building Foundations.
- SANS 10144:1995 Steel Reinforcement for Concrete.
- SANS 10145:2000 Construction of Concrete Masonry.
- SANS 10400 Application of National Building Rules and Regulations.
- SANS 10292 Grounding of Low-Voltage (LV) Distribution Systems.
- SANS 2220 Electrical Safety Systems.

3.4.1. Electricity Supply

The site will source its electricity supply from NamPower, which is the national power utility distributor.

3.4.2. Water Supply

The provision of water to the development will mainly be sourced from boreholes on the farm.

3.4.3. Sewage

The site will be connected to two 4000 liter LLDPE polyethylene underground septic tanks, via 110mm inlet piping system for laboratory waste. The polyethylene tank is exceptionally high resistant to chemicals and other media. It is not affected by aqueous solutions of salts, acids and alkalis. One brick built septic tank with the volume of approximately 20000 liter will be constructed to accommodate 6 to 10 people household waste. Considering the proposed workforce of the development, minimal stress to the sewage system is expected.

3.4.4. Access Roads

Access to the site will be obtained from the existing farm gravel road, which links to the nearby C23 main road.

3.4.5. Waste Removal

The development will be adequately equipped with containerised waste bins in all points of source and active locations at the site.

Waste removal from the site will be the responsibility of the proponent. All waste generated will be properly contained, collected and disposed of at a suitable waste disposal facility by a licensed contractor.

4. PROJECT DESCRIPTION

4.1. Site Overview

As previously outlined in Section 1.1, the proponent, is proposing to install and operate a mobile containerized laboratory at Farm Tripoli No. 546 in the Leonardville Constituency of the Omaheke Region.

HSI is conducting minerals exploration with special focus on uranium. The company has Exclusive Prospecting Licenses (EPL's) 6780, 6781, 6782, 6783, 4654, 4655, 4656, and 4657 in the Omahake, Hardap and Khomas regions. It has an approved Radiation Management Plan (RMP) for exploration activities. The exploration activities involve drilling, sampling, and laboratory testing of samples. During the exploration stage ore samples were send 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.

The mobile analytical laboratory will consist of six 40-foot marine shipping containers with overall dimensions of 12.0 x 2.4 x 2.8 m each (**See Figure 11**), giving an overall footprint of approximately 400 m^2.

Figure 11: Mobile Laboratory Containers

The laboratory will consist of the following amenities:

- Sample receiving area
- Core cutting and analysis area
- Drying department
- Crushing department
- Purification and storage area
- Area for determining carbonate content
- Sample preparation for the X-Ray Diffraction Analysis

- Uranium X-Ray Diffraction and Silicate Analysis
- Gamma spectrometry area
- Shower and bathroom
- Offices

Laboratory testing of uranium ores is a crucial step in the economic evaluation of uranium occurrences and in the development of uranium concentrate projects. In spite of the fact that these tests account for only a small proportion of a project's total cost, it is crucial that they are conducted properly, executed correctly, and interpreted correctly. As part of its primary purpose, it studies a particular ore's behavior in certain process environments and provides information that can be used in assessing the economic feasibility of a proposed project, as well as in developing a suitable metallurgical process and designing an industrial plant later, if the project is viable (IAEA, 1990).

The testing of uranium ore is necessary before a project can be developed to produce uranium concentrates. Its main purposes include:

- A systematic study of a particular ore's behavior in selected process environments, i.e., determining whether uranium can be efficiently extracted from the ore by using any of the proven processes;
- In order to assess the physical and chemical variability of the ore to be processed,
- Provide data for selecting and defining metallurgical processes for industrial plants;
- Provide data for the preliminary selection of equipment type and size;
- To provide data for estimating the magnitude of the project and to provide a preliminary assessment of its economic feasibility (IAEA, 1990).

By passing an ore sample through different steps, lab tests simulate the conditions of treating ore at full scale. Parameters are measured during each test in order to develop two types of information:

- Type and size of equipment needed
- Energy and reagent consumption.

The technical description, set up and equipment of the laboratory can be found in Appendix 1 of the Radiation Management Plan. Uranium exploration samples received at laboratory will be sorted, crushed and milled. Samples will be prepared as pressed pellets; this will then be analysed with X-Ray Fluorescence (XRF) and gamma-ray spectrometry. The following reagents and assorted supplies are also used in the laboratory:

REAGENTS

- Acetone
- Methanol
- Kerosene
- Sulphuric acid

- Hydrochloric acid
- Ammonium hydroxide
- Sodium hydroxide
- Isodecanol
- Distilled or deionized water
- Sodium chlorate
- Manganese dioxide
- Sodium chloride

ASSORTED SUPPLIES

- Soap, powdered and liquid
- Test tube brushes
- Filter paper, assorted sizes and filtration rates
- Paper towels
- Glass tubing
- Rubber tubing
- Plastic squirt bottles
- Cotton
- Rubber and cork stoppers, assorted sizes

4.2. Decision Factors

The following factors served as informants and were considered when preparing the layout designs for the proposed development:

- Respect natural vegetation;
- Risk of exposure to radiation;
- Contamination of water resources.

4.3. No – Go Alternative

The no-go alternative would essentially entail maintaining the existing method of testing and analysis which involves the transportation of ore samples overseas to Kazakhstan. This implies therefore that the risk of transportation of radioactive materials over long distances, including by road will continue. In addition, it leads to further delays in understanding the resource, as well as the underlying costs. An opportunity will be lost in employing the relevant skilled personnel in these specialised operations, which include existing Namibian graduates who already have the needed qualifications and also those that stand to be selected for initial and further training.

This will inhibit added growth of the Leonardville and surrounding communities and empowerment of the residents and entrepreneurs. While the no-go alternative will not result in any negative impacts, the potential positive impacts will be lost.

5. PUBLIC PARTICIPATION PROCESS

5.1. Public Consultation Process Phase 1

In terms of Section 21 of the EIA Regulations a call for public consultation with all I&APs during the EIA process is required. This entails consultation with members of the public and providing them an opportunity to comment on the proposed project. The Public Consultation Process does not only incorporate the requirements of Namibia's legislation, but also takes account of national and international best practises. Please see **Table 4** below for the activities undertaken as part of the public participation process.

Table 4: Table of Public Consultation Activities

ACTIVITY	REMARKS
Site Notices	**See Annexure A**
Placing advertisements in two newspapers for two consecutive weeks, namely The Namibian and New Era (28/09/2022 and 05/10/2022)	See **Annexure B**
Written notice to Interested and Affected Parties via Email	See **Annexure D**
Public Consultation Meeting	13/10/2022 Leonardville

A public meeting was held at Leonardville on 13 October 2022. The comment period of the initial public participation process commenced on **25 September 2022** and ended on **19 October 2022.**

A summary of the issues and comments raised during the initial consultation phase is found below (See **i and ii**). A more detailed issues and response matrix is attached as **Annexure D(3)** of this report. A high volume of comments and inputs were received from the I&APs during this phase, therefore similar comments were grouped and addressed collectively.

i. Summary and Issues from the Interested and Affected Parties

1. Concerns about water contamination/ pollution
2. Good to use natural resources to address socio-economic issues such as poverty which is experienced in the area.
3. Transparency, share information on activities with public.
4. Rationale for building the laboratory.
5. Project is viable at this point in time and should be implemented.
6. Involve previously advantaged communities in and around Leonardville.
7. Radioactive waste management, permitting and disposal thereof.
8. Operational duration of the containerised laboratory, and skills transfer to Namibians.

9. Concerned with handling, transport and disposal of hazardous material.
10. Distribution of wealth as a matter of urgency.
11. Concerns about the environmental impact of the laboratory.
12. Concerns about health and safety impact risks as well as the future of farming in Namibia.
13. Project must empower atleast 70% of Leonardville residence.
14. Concerns about the associated mining activities directly on the aquifer.
15. If exploration/mining does go ahead an independent laboratory must be used.
16. Project will provide employment opportunities and reduce poverty in Leonardville, and local communities.
17. Prioritize education in affected communities.
18. Provide process description of activities on the farm.
19. Concerns of conflict of interest of Tripoli farmer.
20. Project will create business opportunities and reduce crime in the area.
21. Details in respect of laboratory equipment (i.e. rock preparation, analytical)
22. Details in respect of laboratory facilities
23. Details of office space and staff accommodation
24. Details of chemicals and fuels
25. Details of circuit plans for the laboratory
26. Project will uplift the living standards of the local communities.
27. Development will have positive impact on the expansion and growth of Leonardville.
28. Project will lead to infrastructure improvements of Leonardville.

ii. Ministry of Health and Social Services (Namibia Radiation Protection Authority)

1. Safety of laboratory workers in relation to radiation exposure from the samples and radiation emitting equipment in case XRF is to be used
2. Management of dust (radioactive dust) and radon gas exposure in the lab
3. General management of radioactive samples
4. Disposal of radioactive waste / samples
5. The BID indicates that Hazardous waste will be neutralized and disposed of at Kupferberg through Rent-A-Drum. This statement is probably referring to hazardous waste other than radioactive waste. Kupferberg is not approved to handle such type of waste.

As part of the extended stakeholder consultations, meetings were held with the following key role players on the specified dates:

iii. 13 February 2023 – Chairman of Chamber of Mines, Windhoek (Mr Hilifa Mbako)

Summary of Issues from above meeting:

1. It is critical to engage the key stakeholders to understand the local dynamics
2. The uranium industry is currently well organised under the Namibian Uranium Association
3. In-situ leaching is touted as one of the more environmentally friendly technologies for Uranium mining

4. Its important to provide an opportunity for studies to be undertaken to obtain accurate information to assist decision making.

iv. 20 February 2023 – Namibia Radiation Protection Authority, Windhoek (Mr Axel Tibinyane, Dr Gideon Amakali)

1. The minutes of this meeting are attached as Annexure D(4) of this report.

v. 28 February 2023 – Executive Director of Namibian Uranium Institute, Swakopmund (Dr Gabi Schneider)

Summary of Issues from above meeting:

1. Mining activities in Namibia have to adhere to the Minerals and Environmental Management Acts.
2. In terms of special issues relating to uranium and radiation, close cooperation is required with the Namibia Radiation Protection Authority (NRPA).
3. Namibia doesn't have its own standards, and relies heavily on international best practise. The industry formed an association where members have to follow the code of conduct aimed at filling those gaps that exist.
4. Environmental performance is close to the association's heart especially if operating in an environmentally sensitive area.
5. HSI is not allowed by some government agencies to do a full environmental investigation.
6. Hence, there is a lot of assumption both positive and negative. These are also moving outside of the scientific field towards the emotional side.
7. In terms of radioactive waste existing mines have RMPs. There are no radioactive waste facilities in Namibia and the waste thus go to the tailings.

5.2. Public Consultation Process Phase 2

The second phase of the Public Consultation Process involved the lodging of the Draft Environmental Scoping Report (DESR) to all registered I&AP for comment. Registered and potential I&APs were informed of the availability of the DESR for public comment. An Executive Summary of the DESR was included in the communication that was sent out to the registered I&APs. I&APs were given time until **4 May 2023** to submit comments or raise any issues or concerns they may have with regard to the proposed project. The comments and input received during this period are incorporated incorporated in this Final Environmental Scoping Report that is submitted to the Environmental Commissioner together with the application for an Environmental Clearance Certificate.

6. ASSSESSMENT METHODOLGY

Impact assessments depend on the nature and magnitude of the proposed activity, as well as the type of environmental control envisaged for the particular project. Given the nature of the proposed activity, i.e., a construction project, the identification and assessment of the potential impacts will be based on the type and scale of the various activities associated with the project.

Assessment of the predicted significance of impacts for a proposed development is by its nature, inherently uncertain. To deal with such uncertainty in a uniform manner, standardised and internationally recognised methodologies have been developed. One such accepted methodology is applied in this study to assess the significance of the potential environmental impacts of the proposed development, outlined as follows in **Table 5.**

Table 5: Impact Assessment Criteria

CRITERIA	CATEGORY
Impact	Description of the expected impact
Nature Describe type of effect	**Positive**: The activity will have a social / economical / environmental benefit. **Neutral**: The activity will have no effect **Negative**: The activity will have a social / economical / environmental harmful effect
Extent Describe the scale of the impact	**Site Specific:** Expanding only as far as the activity itself (onsite) **Small:** restricted to the site's immediate environment within 1 km of the site (limited) **Medium:** Within 5 km of the site (local) **Large:** Beyond 5 km of the site (regional)
Duration Predicts the lifetime of the impact.	**Temporary:** < 1 year (not including construction) **Short-term:** 1 – 5 years **Medium term:** 5 – 15 years **Long-term:** >15 years (Impact will stop after the operational or running life of the activity, either due to natural course or by human interference)

CRITERIA	CATEGORY
	Permanent: Impact will be where mitigation or moderation by natural course or by human interference will not occur in a particular means or in a particular time period that the impact can be considered temporary
Intensity Describe the magnitude (scale/size) of the Impact	**Zero:** Social and/or natural functions and/ or processes remain unaltered **Very low:** Affects the environment in such a way that natural and/or social functions/processes are not affected **Low:** Natural and/or social functions/processes are slightly altered **Medium:** Natural and/or social functions/processes are notably altered in a modified way **High:** Natural and/or social functions/processes are severely altered and may temporarily or permanently cease
Probability of occurrence Describe the probability of the Impact actually occurring	**Improbable:** Not at all likely **Probable:** Distinctive possibility **Highly probable:** Most likely to happen **Definite:** Impact will occur regardless of any prevention measures
Degree of Confidence in predictions State the degree of confidence in predictions based on availability of information and specialist knowledge	**Unsure/Low:** Little confidence regarding information available (<40%) **Probable/Med:** Moderate confidence regarding information available (40-80%) **Definite/High:** Great confidence regarding information available (>80%)
Significance Rating The impact on each component is determined by a combination of the above criteria.	**Neutral:** A potential concern which was found to have no impact when evaluated **Very low:** Impacts will be site specific and temporary with no mitigation necessary. **Low:** The impacts will have a minor influence on the proposed development and/or environment. These impacts require some thought to adjustment of the project design where achievable, or alternative mitigation measures **Medium:** Impacts will be experienced in the local and surrounding areas for the life span of the development and may result in long term changes. The impact can be lessened or improved by an amendment in the project design or implementation of effective mitigation measures. **High:** Impacts have a high magnitude and will be experienced regionally for at least the life span of the development, or will be irreversible. The impacts could have the no-go proposition on portions of the development in spite of any mitigation measures that could be implemented.

*NOTE: Where applicable, the magnitude of the impact has to be related to the relevant standard (threshold value specified and source referenced). The magnitude of impact is based on specialist knowledge of that particular field.

For each impact, the EXTENT (spatial scale), MAGNITUDE (size or degree scale) and DURATION (time scale) are described. These criteria are used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The decision as to which combination of alternatives and mitigation measures to apply lies with the proponent, and their acceptance and approval ultimately with the relevant environmental authority.

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. Such significance is also informed by the context of the impact, i.e., the character and identity of the receptor of the impact.

7. MITIGATION HIERACHY

The mitigation hierarchy is a tool aimed at helping to manage biodiversity risk, and is commonly applied in Environmental Impact Assessments. The most common reference point for banks providing project finance is mitigation measures; this provides the financial institutions with information on how environmental and social risks will be managed (See **Figure 12** below). These cover avoidance, minimization, restoration and compensation amongst other things. It is possible and considered sought after to enhance the environment by ensuring that positive gains are included in the proposed activity or project. If negative impacts occur then the hierarchy indicates further steps.

Impact avoidance: This step is most effective when applied at an early stage of project planning. It can be achieved by:

- not undertaking certain projects or elements that could result in adverse impacts;
- avoiding areas that are environmentally sensitive; and
- putting in place preventative measures to stop adverse impacts from occurring.

Impact minimization: This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:

- scaling down or relocating the proposal;
- redesigning elements of the project; and
- taking supplementary measures to manage the impacts

Restoration: This step is taken to improve degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised. Restoration tries to return an area to the original ecosystem that occurred before impacts. Restoration is frequently needed towards the end of a project's life-cycle, but may be possible in some areas during operation.

Impact compensation: This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:

- rehabilitation of the affected site or environment, for example, by habitat enhancement;
- restoration of the affected site or environment to its previous state or better; and
- replacement of the same resource values at another location (off-set), for example, by wetland engineering to provide an equivalent area to that lost to drainage or infill. Offsets are often complex and expensive; it is therefore preferable to pay attention to earlier steps in the mitigation hierarchy.

Figure 12: Mitigation Hierarchy

8. POTENTIAL IMPACTS

This Chapter describes the potential impacts on the biophysical and socio-economic environments, which may occur due to the proposed activity. These include potential impacts, which may arise during the planning and design phase, potential construction related impacts (i.e., short to medium term) as well as the operational impacts of the proposed development (i.e., long-term impacts).

The assessment of potential impacts will help to inform and confirm the selection of the preferred project plan and design to be submitted to MEFT: DEA for consideration. In turn, MEFT: DEA's decision on the environmental acceptability of the proposed project and the setting of conditions of authorisation (should the project be authorised) will be informed by this chapter, amongst other information contained in this Report.

The baseline and potential impacts that could result from the proposed development are described and assessed with mitigation measures recommended. Finally, comment is provided on the potential cumulative impacts which could result should this development, and others like it in the area, be approved.

8.1. Planning and Design Phase Impacts

During the planning and design phase consideration is given to aspects such as surface and groundwater; fauna and flora; existing infrastructure; and traffic.

8.1.1. Surface and Groundwater

The Stampriet Artesian Basin and Nossob River in the area are important water sources that support human life, food production and socio-economic growth of the region. Any contamination to the environment may put these surface and ground water resources in the area at risk. This is likely to happen in the absence of adequate preventative measures, well designed containment and storm water drainage systems, and sound management systems. Poorly constructed and maintained service infrastructure in general may also lead to seepage of waste water into the water bodies. Poor and uncontrolled waste management is another potential pollutant of the surface water.

8.1.2. Fauna and Flora (Biodiversity)

The general area is relatively well populated with acacia trees and grassland. The surrounding area has been disturbed as a result of human activities. It can however be expected that the area will also support species of conservation in particular smaller vertebrates (reptiles, amphibians, mammals and birds); large wild animals are not found on the development site. Natural aquatic communities are absent from the region as a result of the absence of surface water flow due to the high infiltration rates, and the ephemeral river system in the area.

The proposed development area and associated infrastructure (e.g. water, sewage, access route, etc.) would be relatively small and thus only have localised negative implications on the environmental and associated fauna and flora.

8.1.3. Existing Service Infrastructure Impacts

It is important to note that the country in general is constrained and faced with a crisis in terms of water and electricity availability; and an increased demand for these amenities will further add to the predicament. The water demand for the laboratory is estimated at 18 m3/year (approximately 0,055 m3/day). The water demand for household use is estimated at 288 m3/year (approximately 0,8m3/day). Water for both operation and household use in the lab will be obtained from existing boreholes network in the area. There will not be any major impact on the existing infrastructure as far as water, sewerage, electricity etc. are concerned.

8.1.4. Traffic Impacts

Traffic is expected to increase during the operational phase of the project. Due to the nature of the development and the land use vehicles will frequent the area. The laboratory will not be transporting samples. All samples required for analysis will be brought to the laboratory by the HSI exploration team. The transport of samples to the laboratory will be done in accordance with the HSI exploration RMP. The main additional traffic that will be generated as a result of the laboratory activities are from the transportation of the workforce. The facility will employ between 10-15 staff members, who will be accommodated in Leonardville and nearby farms rental accommodation, until Tripoli accommodation facility is developed.

The workers will be ferried by 1 minibus from Leonardville to the site and back again after work. Other vehicle movement will consist of senior staff members, who will use an additional 1 lightduty vehicle (LDV). The added daily traffic is therefore, considered negligible and will have no significant impact on the level-of-service of intersections located along the C23 and gravel access roads. The existing road network has sufficient capacity to accommodate the future additional traffic. The overall traffic volumes to be generated are very low and within the capacity of the immediate road infrastructure.

8.2. Construction Phase Impacts

During the construction phase the following potential impacts have been identified: fauna and flora; pressure on the existing infrastructure; surface and ground water; health, safety and security impacts; air quality; noise, traffic; solid waste management; hazardous substances; and socio-economic impact.

8.2.1. Flora and Fauna

A number of large trees, mainly acacia, are found around the site. The site will be cleared to make way for the development and the installation of infrastructure services.

It is recommended that the trees found in the surrounds of the proposed site be kept and

maintained as far as possible to be part of the layout plan of the development. The trees that are to be kept should be clearly marked with "danger tape" or a similar tool to prevent accidental removal, with regular inspection of the marking tool carried out. The very important trees should be "camped off" to prevent the unintended removal or damage to these trees. Harvesting of trees for firewood should be prohibited or strictly managed. With the presence of construction workers there is an increased risk of poaching especially if workers are accommodated onsite. It is highly recommended that workers are housed offsite, in Leonardville and that unauthorised access to the site is firmly controlled.

8.2.2. Pressure on existing infrastructure

During the construction phase there will be an additional demand for basic municipal services such as water, electricity and sewer. The services will be used for both human consumption and for construction purposes. These impacts will however only be limited to the construction phase and will thus have minimal short term impact. The risk of wastage and pollution may occur if no proper management actions are implemented. There are currently 4 ablution facilities available at the project site. Adequate additional mobile toilets will be made available to accommodate the construction workforce.

8.2.3. Surface and Ground Water Impacts

Surface and ground water impacts may be encountered during the construction phase, especially if construction takes place during the rainy season. The risk of contaminating such water sources can be increased by accidental spillage of oils and fuels and any other equipment used during construction; chemical contamination from construction materials such as cement, paint and mechanical fluids. This risk is minimised by the fact that the construction period will be a short term activity.

8.2.4. Health, Safety and Security Impacts

Due to the demand of construction workers during this phase of the project, the deployment of a temporary construction workforce in Leonardville may be necessary. These types of projects, where construction workers have the opportunity to interact with the local community, create a significant risk for the development of social conditions and behaviors that contribute to the spread of HIV and AIDS, and Covid-19. The Ministry of Environment, Forestry and Tourism has initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments. For security reasons it is also recommended that workers are housed offsite, in Leonardville and that unauthorised access to the site is firmly controlled to curb poaching activities.

Safety issues could arise from the construction vehicles, earthmoving equipment and tools that will be used on site during the construction phase. This increases the possibility of injuries and the contractor must ensure that all staff members are made aware of the potential risks of injuries on site.

8.2.5. Air Quality

During the construction phase fugitive dust and exhaust gases generated have a potential impact on the air quality of the area and its surroundings. Dust problems are expected to be site specific and short term and should not affect any neighbouring farm. Road users of the C23 road will also not be affected by any dust pollution, due to the large distance from site (approximately 1km). Dust is generated mainly from the following activities:

- Excavations and stockpiles during site clearance;
- Use of heavy vehicles, machinery and equipment;
- Procurement and transport of construction materials to the site.

It is not expected to have a large fleet of vehicles and machinery, given the scale and size of the development.

8.2.6. Noise Impacts

An increase of ambient noise levels at the construction site is expected due to the construction activities. Noise pollution due to construction vehicles, equipment and machinery will be generated. It is not expected that the noise generated during construction will impact any third parties or neighbouring land; however it may interfere with the wildlife in the area. Excessive noise pollution has a negative impact on wildlife species by reducing habitat quality, increasing stress levels, and masking other sounds. The impact is however limited to the construction period only.

8.2.7. Traffic Impacts

Traffic is expected to increase during the construction phase of the project. A number of trucks and other heavy machinery will be required to deliver, handle and position construction materials as well as to remove spoil material. Not only will the increase in traffic result in associated noise impacts, it will also impact on the vehicular traffic in the area. The safety of road users needs to be considered especially on the C23 Road Main Road. Given the scale and size of the development, it is not expected to have a large fleet of vehicles and machinery on site.

8.2.8. Solid Waste Management

The construction activities will lead to the generation of significant amounts of solid waste mainly in the form of construction building rubble. This could have a negative environmental impact if not managed well. Therefore enough waste bins and skip containers should be availed to manage the solid waste. All solid waste should be disposed off at the designated landfill site of Leonardville as approved by the local authority.

8.2.9. Storage and Utilisation of Hazardous Substances

Hazardous substances are regarded by the Hazardous Substance Ordinance (No. 14 of 1974) as those substances which may cause injury or ill-health to or death of human beings by reason of

their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure in certain circumstances. It covers manufacture, sale, use, disposal and dumping as well as import and export. During the construction period, the use and storage of these types of hazardous substances, such as shutter oil, curing compounds, types of solvents, primers and adhesives and diesel, on-site, could have negative impact on the surrounding environment, if these substances spill and enter the environment.

8.2.10. Social-economic

The project will result in long-term positive impacts as far as the social welfare of the affected community is concerned. There is potential of an influx of migrant workers into Leonardville and nearby settlements / communities. This would boost the local economic development of the village and communities as a result of an increase in consumers of goods, and spending power. Potential spin-offs from of the project development are summarised below:

- Employment: The local community will benefit through preferential recruitment of local labour and procurement as far as possible. It is estimated that the new jobs will improve the livelihoods of the new workers and their families. Given the unemployment rate of 46.6% in the region, this in itself is regarded as a significant benefit to the socio-economic situation in the region.

- Skills development: As the construction of the development requires specialised work and skills it can be expected that experts will be training locals in certain skills during this phase.

- Contribution to economic development (e.g. supply of materials and goods for construction purposes; new businesses, employment etc.).

- Technology transfer to Namibia: The new laboratory facility is very unique to Namibia and includes state-of-the-art technology. The construction of these new technologies will expose local artisans and industries to these technologies. This can have a positive effect on the village and surroundings.

- General enhancement of the quality of life in Omaheke region and the Aminius constituency, especially the village of Leonardville, businesses and local communities; and

- Expansion of trade and industrial activity in the area.

8.3. Operational Phase Impacts

The operational phase impacts that have been identified are: surface and ground water; air quality; noise; solid waste management; radioactive waste management; human health and safety impacts, infrastructure; socio-economic; and visual impact.

A Radiation Management Plan (RMP) has been developed for this development by a competent person. It has been submitted to the competent authority, Namibia Radiation Protection Authority (NRPA), for approval. The RMP forms the basis of the assessment for many of the components in this phase. Mitigations measures that will be developed in the Environmental Management Plan (EMP) must be read and implemented together with the RMP.

The main source of radiation at the laboratory will be uranium ore samples from the exploration and X-ray Florence (XRF) analyser. The XRF has a voltage of up to 60kV. Thus, the radioactive element of interest that will be present is uranium. Uranium is a Natural Occurring Radioactive Material (NORM) found in nature and gives off three types of radiation, Alpha, Beta and Gamma (RMP, 2023).

Alpha particles (α) are positively charged and are made up of two protons and two neutrons from the atom's nucleus. Alpha radiation travels a very short distance through air and thus is not able to penetrate skin. Alpha-emitting materials can be harmful to humans if the materials are inhaled, swallowed, or absorbed through open wounds (RMP, 2023).

Beta particles (ß) are small, fast-moving particles with a negative electrical charge. Beta particles are more penetrating than alpha particles, but are less damaging to living tissue and DNA because the ionizations they produce are more widely spaced. They travel farther in air than alpha particles, but can be stopped by a layer of clothing or by a thin layer of a substance such as aluminium. Some beta particles are capable of penetrating the skin and causing damage such as skin burns. However, as with alpha-emitters, beta-emitters are most hazardous when they are inhaled or swallowed (RMP, 2023).

Gamma rays (γ) are weightless packets of energy called photons. Unlike alpha and beta particles, which have both energy and mass, gamma rays are pure energy. Gamma rays are similar to visible light, but have much higher energy. Gamma rays are often emitted along with alpha or beta particles during radioactive decay.

Gamma rays are a radiation hazard for the entire body. They can easily penetrate barriers that can stop alpha and beta particles, such as skin and clothing. Gamma rays have so much penetrating power that several inches of a dense material like lead, or even a few feet of concrete may be required to stop them. Gamma rays can pass completely through the human body; as they pass through, they can cause ionizations that damage tissue and DNA (RMP, 2023).

Exposure Pathways and Exposure Groups

Radiation exposure pathways refers to the situation where the body is exposed to radiation. There are two types of radiation exposure that the personnel at the laboratory could be exposed to. This is the internal exposure and external exposure.

External exposure refers to the radiation that comes from radioactive materials existing on the ground or in the air, or attached to clothes or the surface of the body. This will arise mainly from gamma exposure emitted from the samples. Average dose rates on contact of the uranium ore samples of HSI is 0.6 µSv/hr (RMP, 2023).

Internal exposure occurs during the following:

i. when a person has a meal and takes in radioactive materials in the food or drink (ingestion). Ingestion exposure pathway could be generated during sample preparation could settle on the items in the laboratory and the workers will come in contact with the dust and potentially ingest it.
ii. when a person breathes in radioactive materials in the air (inhalation). Inhalation of radioactive dust will be present during the crushing of the uranium core samples
iii. when radioactive materials are absorbed through the skin (percutaneous absorption).
iv. when radioactive materials enter the body from a wound (wound contamination).
v. Exposure due to radon decay products. This exposure could be encountered mainly where the ore samples are stored. Radon may potentially expose personnel to radiation when the decay products (progeny) are inhaled.

There will be two types of exposure groups in the mobile laboratory mainly the radiation workers and non-radiation workers.

Radiation workers at the laboratory refers to workers with direct contact with the radioactive materials (ore samples) and non-radiation workers refers to administrative and laboratory staff who do not have any contact with the radioactive materials. Control measures to ensure that both group of workers are protected from radiation at detailed in sections 3 and 5 of the RMP respectively (RMP, 2023).

8.3.1. Surface and Ground Water Impacts

Surface and ground water impacts may be encountered during the operational phase, especially if the infrastructure is poorly constructed and maintained. Another potential source of surface and groundwater pollution is radioactive liquids from the test work i.e., process waste water The provision of properly designed and constructed services, especially wastewater, which are regularly monitored and maintained, to the development will minimise the potential pollution of water sources.

The liquid (fluid) from the laboratory wet chemical process will be collected in the two designated septic tanks of a combined 8 000 L capacity. The water in the tank will be analyzed for radioactive contamination and should there be any radioactive contamination, it will be taken to the mobileprocessing plant, until all remaining radioactive content (uranium) is extracted. The amount ofwastewater to be generated is estimated at less than 0.855 m^3 per day (RMP, 2023). HSI EPL's has water monitoring boreholes, including on Farm Tripoli where the laboratory will be located. The monitoring will continue and the results will be included in the annual report, and availed to the relevant authorities (RMP, 2023).

The Ministry of Agriculture, Water and Land Reform has compiled Water Quality Guidelines for the Evaluation of Drinking Water for Human Consumption with regard to Chemical, Physical and Bacteriological Quality. This outlines requirements in terms of water supplies for drinking water and for waste water treatment and discharge into the environment. The proponent has to adhere to these requirements.

8.3.2. Air Quality

The air quality in the area is considered to be fairly good. Various types of activities within the development will result in increased dust and emission impacts, if not managed correctly. Dust and emissions associated with the proposed development will be generated by vehicle movements; Dust is likely to have a larger impact when the internal road network is not paved. The risk of inhalation of radioactive dust will be present during the crushing of the uranium core samples, e.g., when a person breathes in radioactive materials in the air. For management purposes Area air sampler(s) will be used for monitoring dust for long-lived alpha and beta particles. This will be done weekly as part of the workplace monitoring programme. All monitoring equipment will be calibrated at an approved metrology laboratory in accordance with a standard schedule and calibration certificates will be maintained (RMP, 2023).

The entire 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).

8.3.3. Noise Impacts

Operational noise associated with the proposed development is likely to be limited to general laboratory operational noise levels. It is however important that mitigation measures are applied to bring noise levels to acceptable limits, which are generally addressed by applicable local laws.

8.3.4. Waste Management

The operational activities will likely generate a reasonable amount of solid waste. An adequate number of refuse receptacles should be placed on the property for the collection of waste, which should be emptied frequently and taken to the designated landfill site.

8.3.5. Radioactive Waste Management

Radioactive waste includes substances, materials, mixtures, and products which are not subject to further use. The radioactive waste that will be produced in the laboratory emanates from the analysis of the uranium ore samples that has approximately 250 ppm and average activity of 0.14 MBq of Uranium (RMP, 2023).

8.3.5.1. Radioactive waste categorisation

The following radioactive waste will be produced at the laboratory (RMP, 2023):

- Unused primary core samples
- Solid radioactive waste produced from test work and during cleaning
- Liquids from the test work i.e process waste water
- All potentially contaminated process items emanating from the process (residues from the dust extraction system)
- Surface contaminated materials generated during operations, e.g., used PPE, cleaning cloths, disposable items – seals, liners, filter cloths, etc.

The unused primary core samples will be stored at the core sample storage yard in marine shipping container within farm Tripoli. The solid radioactive waste will be placed into heavy-duty plastic bags, sealed with a cable tie and then will be stored in 210L drums. The drums will be labelled and stored securely at the core sample storage yard in marine shipping container. The 210L drums will be placed on surfaces lined with High-Density Polyethylene (HPDE) material within the containers, which will contain the waste in case of any incident (RMP, 2023).

The liquid (fluid) from the laboratory wet chemical process will be collected in the designated septic tank. The water in the tank will be analysed for radioactive contamination and should there be any radioactive contamination, it will be taken to the mobile processing plant.

8.3.5.2. Release of items out of the laboratory site

Prior to any item leaving the laboratory site, the items will be screened for contamination. Items with surface contamination exceeding the limits specified below be retained in the laboratory and be disposed-off in the drums.

- 0.04 Bq/cm^2 for low toxicity alpha contamination (i.e., those from uranium-bearing materials)
- 0.4 Bq/cm^2 for beta contamination

When averaged over a contaminated surface area of 300 cm^2 (RMP, 2023).

8.3.6. Human Health and Safety Impacts

There will be two types of exposure groups in the mobile laboratory mainly the radiation workers and non-radiation workers.

Radiation workers at the laboratory refers to workers that have direct contact with the radioactive materials (ore samples) and non-radiation workers refers to administrative and laboratory staff who do not have any contact with the radioactive materials. Control measures to ensure that both group of workers are protected from radiation are detailed in sections 3 and 5 of the Radiation Management Plan respectively (RMP, 2023).

Personnel Protective Equipment (PPE) are paramount in reducing radiation exposure to staff. With the exception of gamma radiation exposure, alpha and beta radiation exposures can be minimised with the use of correct PPE and implementing established laboratory procedures (RMP, 2023).

All radiation workers will be provided with the following PPE.

- Full Overall (jacket and suit)
- Dust masks
- Safety glasses

- Safety shoes
- Gloves
- Hair cap

Personnel will not only rely on the PPE but will be required to implement the radiation safety procedures in Appendix 4 of the RMP. The laboratory will implement the following programmes as part of continuous professional development:

- **Annual radiation refresher course** -The training will encompass the risks associated with ionising radiation, basic principles of radiation protection, responsibilities regarding radiation risk management and the principal elements of the RMP. Records will be maintained of each person trained. Prior to commencement of operations, an induction training will be conducted.
- **Bi-annual procedures refresher course**- this will review the procedures such as sample preparation and analysis of the laboratory. This will also include review of the health and safety procedures (RMP, 2023).

The laboratory will apply the dose limit for workers and members of the public stipulated in the IAEA General Safety Requirements (IAEA, 2014) and the Radiation Protection and Waste Disposal Regulations (MoHSS, 2011) indicated in Table 1 below:

	Public exposure	**Public exposure**
Effective Dose	20 mSv per year on average for any consecutive 5 years, but not more than 50 mSv per year.	1 mSv per year on average for any consecutive 5 years, but not more than 5 mSv per year.

- All radiation workers will be provided with a summary of their annual occupation exposure.
- The annual occupational exposure will be documented in the annual report.
- Monthly work place monitoring records will be compiled (RMP, 2023).
- Records of samples received at the laboratory will be kept.
- The XRF will be stored securely in the laboratory, which will be kept closed at all times when not in use.

8.3.6.1. Public Exposure Monitoring Programme

The mobile laboratory is situated on farm Tripoli. The farm is maned with security guard. The laboratory will be fenced off within farm Tripoli and have security personnel at the entrance gate. No members of the public will be allowed in the controlled areas of the laboratory.

The exposure group which serves as potentially exposed members of the public are the HSI personnel members on farm Tripoli that are categorizes as non-occupational exposure group

and do not come in contact with the uranium core samples. These are the security guard, office administrative staff and general workers. The exposure to these exposure group will be quantified by means of workplace monitoring on site. The quantification of exposure will be for all exposure pathways, external and internal and the radiation exposure will be compiled monthly (RMP, 2023).

8.3.7. Infrastructure

The mobile analytical laboratory will consist of six 40-foot marine tall shipping containers with overall dimensions of 12.0 x 2.4 x 2.8 m each, with a total footprint of approximately 400 m^2. The laboratory will consist of the following:

- Sample receiving area
- Core cutting and analysis area
- Drying department
- Crushing department
- Purification and storage area
- Area for determining carbonate content
- Sample preparation for the X-Ray Diffraction Analysis
- Uranium X-Ray Diffraction and Silicate Analysis
- Gamma spectrometry area
- Shower and bathroom
- Offices

The laboratory is designated into controlled and supervised areas. The controlled areas are the XRF analysis and silicate areas, drying and crushing areas, sample preparation and waste treatment facilities. Supervised areas consist of the corridor and offices areas. Appropriate radiation warning signage's will be posted at the entrance to supervised and controlled areas. The technical description, set up and equipment of the laboratory is detailed in Appendix 1 of the RMP (2023).

The proposed development will make use of added infrastructure specifically regarding electricity, sewer and water. This additional demand is expected to be fairly medium to low considering the type of activities envisaged. 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 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.

8.3.8. Socio-economic Impacts

The project will result in long-term positive impacts as far as the social welfare of the affected community is concerned. There is potential of an influx of migrant workers into Leonardville and nearby settlements / communities. This would boost the local economic development of the town and communities as a result of an increase in consumers of goods, spending power. Potential spin-offs from of the project development are summarised below:

- Employment: The local community will benefit through preferential recruitment of local labour and procurement as far as possible. It is estimated that the new jobs will improve the livelihoods of the new workers and their families. Given the high unemployment rate in the region, this in itself is regarded as a significant benefit to the socio-economic situation in the region.

- Skills development: As the operation of the development requires specialised work and skills it can be expected that experts will be training locals in certain skills during the operational phase.

- Contribution to economic development (e.g. supply of materials and goods for operational and maintenance purposes; new businesses, employment etc.).

- Technology transfer to Namibia: The new laboratory facility is very unique to Namibia and includes state-of-the-art technology. The operation, maintenance and support of these new technologies will expose local artisans and industries to these technologies. This can have a positive effect on the area.

- General enhancement of the quality of life in Omaheke region and the Aminius constituency, especially the village of Leonardville, businesses and local communities; and

- Expansion of trade and industrial activity in the area.

8.3.9. Visual and Sense of Place Impacts

The new development will be visually prominent from many angles. While there are some existing structures in the surrounding area, the additional infrastructure to be erected on site will cause a higher visual impact to the natural area. The development will have an impact on the sense of place of the local community. Therefore, the aesthetics quality of the new structures has to pleasing and designed to blend in with the natural surrounds.

9. SUMMARY OF POTENTIAL IMPACTS

A summary of the significance of the potential impacts from the proposed project assessed above is included in **Table 6**. The **Tables 7 - 9** provide a summary of the mitigation measures proposed for the impacts. Various reagents will be used in the laboratory, they will have Material Data Safety Sheets (MSDS) from the suppliers containing information on the potential hazards (health, fire, reactivity and environmental) and how to safely work with the respective chemicals. **Table 10** however provides an overview of key management actions expected for the different products.

Table 6: summary of the mitigation measures

Impacts	Negative		Positive		No Impact
	Short Term	Long Term	Short Term	Long Term	
Planning and Design Phase					
1. Surface and ground water		X			
2. Fauna and flora	X				
3. Existing infrastructure	X				
4. Traffic	X				
Construction Phase					
5. Fauna and flora	X				
6. Pressure on existing infrastructure	X				
7. Surface and groundwater	X				
8. Health, safety and security	X				
9. Air quality	X				
10. Noise	X				
11. Traffic	X				
12. Waste management	X				
13. Hazardous substances	X				
14. Socio-economic				X	
Operational Phase					
15. Surface and ground water		X			
16. Air quality		X			
17. Noise	X				
18. Solid waste management		X			
19. Radioactive waste management		X			
20. Human health and safety		X			
21. Infrastructure				X	
22. Socio-economic				X	
23. Visual				X	

Table 7: Proposed mitigation measures for the planning and design phase

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
Surface and ground water	• 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	• 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. • 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.
Existing Service Infrastructure	• 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.

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
	• 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	• 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.

Table 8: Proposed mitigation measures for the construction phase

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Fauna and flora	• 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	• Educate workforce on water saving measures. • Ensure all potable water points are metered and regularly read.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Ensure that the workforce is provided with temporary toilets during the construction phase.
Surface and Ground Water Impacts	• 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. • 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	• 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.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation 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	• 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 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	• 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	• 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.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Cover any stockpiles with plastic to minimise windblown dust. • Ensure construction vehicles are well maintained to prevent excessive emission of smoke.
Waste management	• 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 basis. • 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	• 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	• 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.

Table 9: Proposed mitigation measures for the operational phase

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
Surface and Ground Water	• 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 leak proof 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. • Installation of suitable containment structures around all storage tanks and other operational areas. • 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 wastewater. • 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.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
Air quality	• 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	• Limit the types of activities that generate excessive noise. • Adhere to relevant laws, and regulations.
Solid waste management	• 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	• 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. • 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 (HPDE) 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.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• 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	• 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.
Infrastructure	• 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.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Water saving mechanisms should be incorporated within the proposed development's design and plans in order to further reduce water demand
Socio-economic	• 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. • 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.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Secure accreditation for in-house skills transfer which recognizes and certifies any training courses.
Visual and Sense of Place	• 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.

Table 10: Chemicals and reagents management actions

CHEMICAL	MANAGEMENT ACTIONS
Acetone	• 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	• 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 **Waste Disposal Recommendations** • 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.

CHEMICAL	MANAGEMENT ACTIONS
Kerosene	• 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.

CHEMICAL	MANAGEMENT ACTIONS
Sulphuric acid	**Environmental Precautions** • 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. **Containment and Clean-Up Methods** • 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. **Waste Disposal Recommendations** • 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.

CHEMICAL	MANAGEMENT ACTIONS
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.

Ammonium hydroxide	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. **Personal precautions, protective equipment and emergency procedures** • 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. **Environmental precautions** • Do not let product enter drains. **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 material • Dispose of properly. • Clean up affected area.

CHEMICAL	MANAGEMENT ACTIONS

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.

CHEMICAL	MANAGEMENT ACTIONS
	• 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.

CHEMICAL	MANAGEMENT ACTIONS
Isodecanol	• 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. **Environmental precautions** • 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. **Methods for cleaning up** • 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.

CHEMICAL	MANAGEMENT ACTIONS
Distilled or deionized water	• 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.
Sodium chlorate	This chemical is not considered hazardous. **Personal Precautions** • Ensure adequate ventilation. • Use personal protective equipment as required. • Avoid dust • formation. **Environmental Precautions** • Should not be released into the environment. **Methods for Containment and Clean Up** • Sweep up and shovel into suitable containers for disposal. • Avoid dust formation.

Manganese dioxide	**After inhalation:** • Remove the victim into fresh air. • Respiratory problems: consult a doctor/medical service. **After skin contact:** • Rinse with water. • Soap may be used. • Take victim to a doctor if irritation persists. **After eye contact:** • Rinse with water. • Do not apply neutralizing agents. • Take victim to an ophthalmologist if irritation persists. **After ingestion:** • 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. **Environmental precautions:** • 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. **Methods and material for containment and cleaning up:** • 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.

CHEMICAL	MANAGEMENT ACTIONS
	a) Respiratory protection: • Dust production: dust mask with filter type P3. • High dust production: self-contained breathing apparatus. b) Hand protection: • Gloves. - materials (good resistance) Butyl rubber, chlorinated polyethylene, nitrile rubber, neoprene, PVC, chlorinated polyethylene. c) Eye protection: • Safety glasses. • In case of dust production: protective goggles. d) Skin protection: • Protective clothing. • Dustproof clothing.

Sodium chloride	**Eye Contact** • Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. • Get medical attention. **Skin Contact** • Wash off immediately with plenty of water for at least 15 minutes. • Get medical attention immediately if symptoms occur. **Inhalation** • Remove to fresh air. • Get medical attention immediately if symptoms occur. **Ingestion** • Get medical attention if symptoms occur. • Clean mouth with water and drink afterwards plenty of water. **Personal Precautions** • Ensure adequate ventilation. • Use personal protective equipment as required. • Avoid dust formation. **Environmental Precautions** • Should not be released into the environment. **Methods for Containment and Clean** • Sweep up and shovel into suitable containers for disposal. • Avoid dust formation. **Exposure Guidelines** • This product does not contain any hazardous materials with occupational exposure Limits established by the regulatory bodies. **Engineering Measures** • Ensure adequate ventilation, especially in confined areas. • Ensure that eyewash stations and safety showers are close to the workstation location.

CHEMICAL	MANAGEMENT ACTIONS
	Personal Protective Equipment ***Eye/face Protection*** • Wear appropriate protective eyeglasses or chemical safety goggles ***Skin and body protection*** • Wear appropriate protective gloves and clothing to prevent skin exposure. ***Respiratory Protection*** • Follow the relevant respirator regulations if exposure limits are exceeded or if irritation or other symptoms are experienced. ***Hygiene Measures*** • Handle in accordance with good industrial hygiene and safety practice.

Table 11: Proposed mitigation measures for the decommissioning phase

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
General Guidelines	• 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. • A decommissioning Hazard Tag should be affixed to the equipment to be moved when decontamination is complete.
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 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.

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	• 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. • 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. • 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	• 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.

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	• 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	• 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. • 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 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.

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
Hazardous Substances	• 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	• 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. • Remove all radioactive labels, stickers, and tape from all facility equipment, refrigerators, sinks, and hoods after final swipe tests results.
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.

10. CONCLUSION AND RECOMMENDATIONS

10.1. Construction Phase Impacts

With reference to **Table 8**, most of the construction phase impacts were deemed to have a negative impact without mitigation. However, these were mostly short-term and can be significantly reduced with the mitigation measures proposed.

10.2. Operational Phase

During the operational phase the impacts of surface and ground water; air quality; solid waste management, radioactive waste management; and human health and safety were assessed to have a long-term negative effect without mitigation. The impacts will however be significantly reduced when the recommended mitigation measures in the scoping report, Radiation Management Plan (RMP) and Environmental Management Plan (EMP) are implemented.

The impacts on the socio-economic, infrastructure, and visual are deemed to be high positive. This development is not only important to the national economy of the country, but it will also promote local economic development.

10.3. Level of Confidence in Assessment

With reference to the information available at this stage, the confidence in the environmental assessment undertaken is regarded as being acceptable for decision-making, in terms of the environmental impacts and risks. The Environmental Assessment Practitioner believes that the information contained within this ESR is adequate to allow MEFT: DEA to determine the environmental viability of the proposed project.

It is acknowledged that the project details may evolve during the detailed design and construction phases. However, these are unlikely to change the overall environmental acceptability of the proposed project and any significant deviation from what was assessed in this ESR should be subject to further assessment. If this was to occur, an amendment to the Environmental Authorisation may be required in which case the prescribed process would be followed.

10.4. Mitigation Measures

With the implementation of the recommended mitigation measures in this report as well as in the EMP and RMP, the significance of the planning and design, construction and operational phase impacts is likely to be reduced to a ***Low (negative)***. It is further extremely important to include an Environmental Control Officer (ECO) on site during the construction phase of the proposed project to ensure that all the mitigation measures discussed in this report and the EMP are enforced.

It is strongly advised that the proponent appoint a suitably qualified consulting engineer to design and supervise the construction of the service infrastructure, including storm water, and wastewater management.

It is noted that where appropriate, these mitigation measures and any others identified by MEFT: DEA could be enforced as Conditions of Approval in the Environmental Authorisation, should MEFT: DEA issue a positive Environmental Authorisation.

10.5. Opinion with respect to the Environmental Authorisation

Regulation 15(j) of the EMA, requires *that the EAP include an opinion as to whether the listed activity must be authorised and if the opinion is that it must be authorised, any condition that must be made in respect of that authorisation*.

Metallurgy of uranium in laboratory settings poses a low level of radiological risk and can be controlled easily. Uranium concentrates dust and uranium ore dust pose the greatest risks. Inhalation of radon and radon daughters is also possible, although it carries minor risks.

It is possible for substantial amounts of dust to be generated during sample preparation, including crushing, grinding, splitting, screening, sieving, and blending. Rooms for sample preparation should be isolated from other areas and equipped with dust control systems such as hoods and filters.

The amount of uranium concentrate dust handled in the laboratory is usually small, rarely exceeding a few hundred grams, so inhalation is less likely. In spite of this, it is important to handle dry concentrates with care, particularly when screening, blending, or performing any other operation that may cause dust to be generated.

The EMP and RMP should be used as an on-site tool during all phases of the development. Future environmental audits should be carried out to ensure compliance of the EMP, RMP and environmental regulations of Namibia.

The significance of negative environmental impacts can be reduced with the effective and appropriate mitigation provided in this report, the EMP and the RMP attached. If authorised, the implementation of the EMP and RMP should be included as a condition of approval. It is, therefore, recommended that this project be authorised.

11. REFERENCES

1. Burchart-Korol & Zawartka, 2019. Environmental life cycle assessment of septic tanks in urban wastewater system – a case study for Poland. Archives of Environmental Protection. Vol. 45 no. 4 pp. 68–77.
2. Cole, D.T. and Cole, N.A. 2005. Lithops Flowering Stones. Cactus and Co. Libri.
3. Craven, P. (ed.). 1999. A checklist of Namibian plant species. Southern African Botanical Diversity Network Report No. 7, SABONET, Windhoek.
4. Craven, P. 1998. Lichen diversity in Namibia. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
5. Crouch, N.R., Klopper, R.R., Burrows, J.E. and Burrows, S. M. 2011. Ferns of southern Africa – a comprehensive guide. Struik Nature, Cape Town, RSA.
6. Giess, W. 1971. A preliminary vegetation map of South West Africa. Dinteria 4: 1 – 114.
7. International Atomic Energy Agency (IAEA), 1990. Manual on Laboratory Testing for Uranium Ore Processing.
8. IUCN, 2015. IUCN red list of threatened animals, IUCN, Gland, Switzerland.
9. JICA 2002. A Study on the Groundwater Evaluation and Management Plan in the Southeast Kalahari (Stampriet) Artesian Basin. Final Report, Japan International Cooperation Agency. Four Volumes (Copies in the Department of Water Affairs & Forestry, Ministry of Agriculture, Water and Forestry, Windhoek).
10. Korhonen, K., V. Juola, Chakanga M. 1997. Woody Resources of East and South Tsumkwe, Otjinene and Okakarara Districts. National Forest Inventory Project. Windhoek: Directorate of Forestry.
11. Legal Assistance Centre (LAC), 2015. Scraping the Pot: San in Namibia Two Decades after Independence. Available at: http://www.lac.org.na/projects/lead/Pdf/scraping_two_chap4.pdf. Accessed (02/10/2015).
12. Leonardville climate: Temperature Leonardville & Weather By Month - Climate-Data.org.
13. Liebenberg, L. W. 1992. A field guide to the animal tracks of southern Africa. Cape Town: New Africa Books.
14. Lindholm, K-J., 2006. Wells of Experience. A pastoral land-use history of Omaheke, Namibia. Studies in Global Archaeology 9. Department of Archaeology and Ancient History. Uppsala University.
15. Mendelsohn, J., Jarvis, A., Roberts, A. and Robertson, T. 2002. Atlas of Namibia. A portrait of the land and its people. David Philip Publishers, Cape Town, RSA.
16. Meteoblue, 2023. Available at: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/leonardville_namibia_3355748
17. Ministry of Environment and Tourism (MET), 2011.LET'S ACT TO ADAPT. Dealing with Climate Change. A community information toolkit on adaptation. Available at: http://www.met.gov.na/AAP/TechnicalStudies/CCALeadershipTraining/Documents/Omaheke%20and%20Otjozondjupa%20toolkit-web.pdf (05/10/2015).
18. Ministry of Health and Social Services, 2015. The Namibia Aids Response Progress Report 2015: Reporting Period: 2013 – 2014
19. Ministry of Works and Transport (MWT), 2020. Ministry of Works & Transport: Tabulation of Climate Statistics for Selected Stations in Namibia" (PDF). 2012. *Available at:*

http://www.meteona.com/attachments/035_Namibia_Long-term_Climate_Statistics_for_Specified_Places%5b1%5d.pdf.

20. Namibia Statistics Agency (NSA), 2018. The Namibia Labour Force Survey 2018 Report –
21. NAMIBIA WATER RESOURCES MANAGEMENT REVIEW (NWRMR), 2000. THEME REPORT: STRATEGIC WATER RESOURCES ASSESSMENT IN NAMIBIA. Available at: http://www.iwrm-namibia.info.na/downloads/theme-report-strategic-water-resources-assessm.pdf
22. National Heritage Council Namibia (NHC), 2015. Declared National Monuments. Available at: www.nhc-nam.org (Accessed 02/10/2015).
23. National Statistics Agency (NSA), 2011. Namibia 2011 Population and Housing Census Main Report. Available at: *http://nsa.org.na/page/publications*.

NLFS

24. RADIATION MANAGEMENT PLAN (RMP), 2023. MARCH 2023. VERSION 1. PROJECT WINGS OF NAMIBIA HEADSPRING INVESTMENTS (PTY) LTD. FIELD MOBILE PHYSICAL AND CHEMICAL LABORATORY.
25. Risk Based Solutions (RBS), 2018. Final Updated Environmental Scoping and Environmental Management Plan (EMP) Report to Support the Application for Renewal of Environmental Clearance Certificate (ECC) for Ongoing Exploration / Prospecting in the Exclusive Prospecting License (EPL) No. 4655 Gobabis/Mariental Districts, Omaheke/Hardap Regions. SOUTH EASTERN NAMIBIA.
26. Rothmann, S. 2004. Aloes, aristocrats of Namibian flora. ST promotions, Swakopmund.
27. SADC Environmental Legislation Handbook (SELH), 2012. Environmental Legislation. EIA process flowchart for Namibia. Available at: www.saiea.com/dbsa_handbook_update2012/pdf/chapter11.pdf.
28. Schultz, M., Zedda, L. and Rambold, G. 2009. New records of lichen taxa from Namibia and South Africa. Bibliotheca Lichenological 99: 315-354.
29. Simmons R.E., Brown C.J. and Kemper J. 2015. Birds to watch in Namibia: red, rare and endemic species. Ministry of Environment and Tourism and Namibia Nature Foundation, Windhoek.
30. Simmons, R.E. 1998a. Important Bird Areas (IBA's) in Namibia. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
31. Simmons, R.E. 1998b. Areas of high species endemism. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
32. Sosiak A., and Dixon J., 2006. Impacts on water quality in the upper Elbow River. Water Science & Technology. 53:10. Pp 309-316.
33. Steyn, M. 2003. Southern African Commiphora. United Litho, Arcadia.
34. UNESCO, 2016. Stampriet Transboundary Aquifer System Assessment: Technical Report - Governance of Groundwater Resources in Transboundary Aquifers (GGRETA) - Phase 1