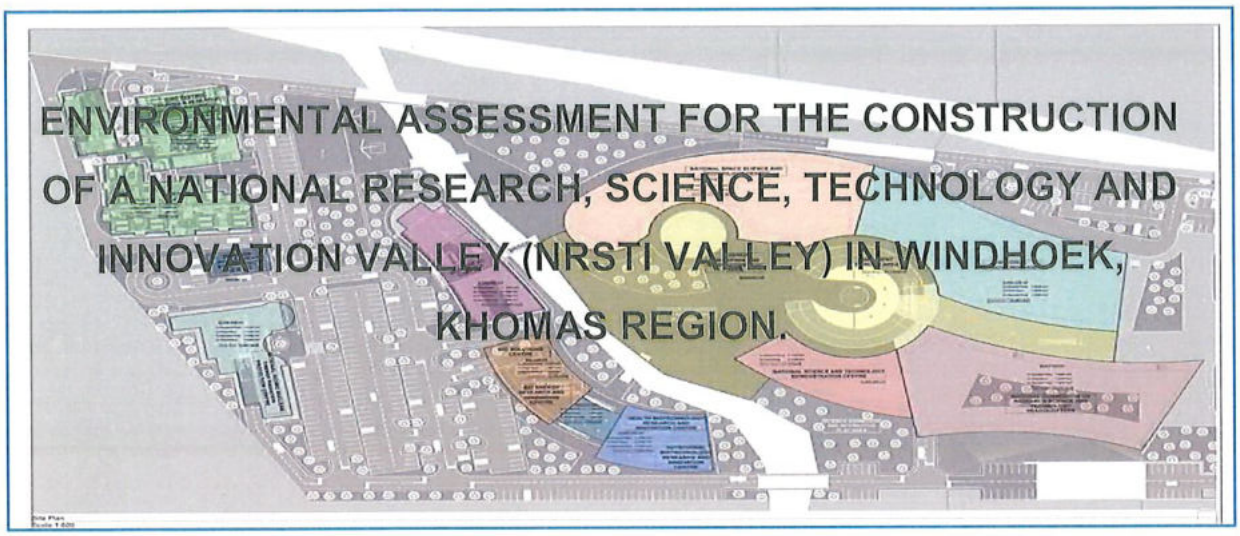

ENVIRONMENTAL ASSESSMENT FOR THE CONSTRUCTION OF A NATIONAL RESEARCH, SCIENCE, TECHNOLOGY AND INNOVATION VALLEY (NRSTI VALLEY) IN WINDHOEK, KHOMAS REGION.

ENVIRONMENTAL ASSESSMENT REPORT

ECC Application Reference: APP- 002651

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09/01/2025

EAP Signature and Date

09/01/2025

Proponent Signature and Date

2025

EXECUTIVE SUMMARY

National Commission on Research, Science and Technology (The Proponent) has applied to the Ministry of Environment, Tourism and Forestry (MEFT) to be granted an Environmental Clearance Certificate (ECC) for the proposed development activity: Construction of a National Research, Science, Technology and Innovation Valley (NRSTI Valley) consisting of new Genetically Modified Organisms laboratories for the National Council on Research and Technology (NCRST) in Windhoek, Khomas Region. Excel Dynamic Solutions (Pty) Ltd (The Consultant) was appointed to act on behalf of the proponent in revising the EIA reports produced in 2016 and in obtaining the ECC. The Valley covers a total surface area of 6.74 hectares (ha) and will be located right adjacent to the University of Namibia Main Campus (UNAM) in Windhoek, with the Western Bypass (B1) found to its west and UNAM Main Campus buildings to its east as shown in (Figure 1).

The application for the ECC was compiled and submitted to the competent authority (Ministry of Environment, Forestry and Tourism (MEFT)) as the environmental custodian for project registration purposes. Upon submission of an Environmental Scoping Assessment (ESA) Report and Draft Environmental Management Plan (EMP), an ECC for the proposed project may be considered by the Environmental Commissioner at the MEFT's Department of Environmental Affairs and Forestry (DEAF).

This Detailed Environmental Scoping Report presents information on the project area and its surroundings; the proposed improvements; legislation applicable to the study conducted; the EA approach and methodology followed; public consultation process; the sensitivity of the receiving environment; nature and extent of potential impacts (environmental and social) and required mitigations as well as a conclusion and recommendations based on the EA findings.

Brief Project Description

The NRSTI Valley will consist of the (a) NCRST's Headquarters, (b) the National Biotechnology Testing, Training and Research Laboratories; (c) the National Innovation Hub; (d) the National Space Science and Technology Centre; and the National Science Technology Demonstration Centre. Each sector will be developed in different phases over a period of approximately 5 years.

- ***The Headquarters for the NCRST (-+12,173.00m²):*** NCRST started its operations officially on the 1st July 2013. The headquarter office will make provision for modern office spaces for current and future staff members, and all the amenities, such as ablution facility, boardrooms, cafeteria and others alike. Provisions will also be made for sufficient parking for NCRST staff and visitors to accommodate different types of vehicles. Central amenities like a garden and water stream feature are also incorporated in the overall layout.
- ***National Biotechnology Testing, Training and Research Laboratory (-+11,736.35m²):*** Provision is made for the Testing, Training and Research laboratory that is a This facility will be used for testing of GMOs as per the provisions of the Biosafety Act (Act 7 of 2006). Furthermore, this facility will also house several units in different fields where other Natural Science tests and research will be conducted. The facility will be accessible to academia, industry and private sector institutions who want to conduct research and development type of work.
- ***National Innovation Hub (-+23,961.00m²):*** The focal point of the National Innovation Hub will be to provide state-of-the art facilities to attract research and development activities within the hub and increase the wealth of the Namibian community, by promoting the culture of innovation and the competitiveness of its associated business and knowledge – based institution. It will also create a synergistic environment where innovators and academia can share learning, create working partnerships and do business together. When operational, the hub will provide facilities in terms of office and working spaces for start-up companies from the knowledge-intensive sectors in order to fast track and compete in the global market. Services such as access to telephone, modern high tech equipment and high speed internet and all other necessary utilities will be offered. Provision for training/conference facilities and lounges should also be considered. This facility will be accessible by innovators, entrepreneurs (SME), academics and students.
- ***The National Space Science and Technology Centre; and the National Science Demonstration Centre (-+7,293.80m²):*** The most commonly used method of advancing the concept of edutainment is the educational experience that includes a hands-on, and

minds-on interactive exhibitions. This is an all-inclusive manner in which a learner engages all the aspects of his/her being in order to learn, remember and most importantly to apply the information they interact with. The National Science and Technology Demonstration Centre, will provide edutainment which will give learners, students, teachers, parents, scientific community and the general public the opportunity to engage in scientific and technological innovations while at the same time encouraging attitude and behavioral change. The Centre will present science and technology in a stimulating and engaging environment that truly combines entertainment with education. By providing halls for interactive exhibition, spaces for demonstration workshops, and mini theatre for science plays tailored to Namibia science curriculum. This facility will be accessible by learners of all ages, students, grandparents and the general public.

Public Consultation

Public Consultation Activities

Regulation 21 of the EIA Regulations details steps to be taken during a public consultation process and these have been used in guiding this process. The public consultation process assisted the Environmental Consultant in identifying all potential impacts and aided in the process of identifying possible mitigation measures and alternatives to certain project activities. The communication with I&APs about the proposed NRSTI Valley development activities was done through the following means in this order to ensure that the public is notified and allowed to comment on the proposed project:

- A Background Information Document (BID) containing information about the proposed NRSTI Valley was compiled and emailed upon request to all registered Interested and Affected Parties (I&APs).
- Project Environmental Assessment notices were published in New Era Newspaper **(20 September 2024 and 27 September 2024),** and The Namibian Newspaper **(20 September 2024 and 27 September 2024),** briefly explaining the activity and its locality, inviting members of the public to register as I&APs and submit their comments/concerns.
- Consultation meetings were scheduled and held with the National Commission on Research, Science and Technology on 16 October 2024 at 10h00 am and City of Windhoek on 17 October 2024 at 10h00 am.

- The issues and concerns raised were noted and used to form a basis for the ESA Report and EMP.

Potential Impacts identified

The following potential impacts are anticipated:

- **Positive impacts**: Socio-economic development through employment creation (primary, secondary, and tertiary employment) and skills transfer; Opens up other investment opportunities and infrastructure-related development benefits; Produces a trained workforce and small businesses that can serve communities and may initiate related businesses; Boosts the local economic growth and regional economic development and; Increased support for local businesses through the procurement of consumable items such as Personal Protective Equipment (PPE), machinery spare parts, lubricants, etc. State of the art testing, training and research laboratory,
- **Negative impacts**: Physical land/soil disturbance; Impact on local biodiversity (fauna and flora); Habitat disturbance and in the area; Potential impact on water resources and soils particularly due to pollution; Air quality issue: potential dust generated from the project; Potential occupational health and safety risks, Vehicular traffic safety and impact on services infrastructures such as local roads, Vibrations, and noise associated with construction activities may be a nuisance to locals; Environmental pollution (solid waste and wastewater), Archaeological and heritage impact and Potential social nuisance and conflicts (theft, damage to properties, etc.).

The potential negative impacts were assessed, and mitigation measures were provided accordingly.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The potential impacts that are anticipated from the proposed project activities were identified, described, and assessed. For the significant adverse (negative) impacts with a medium rating, appropriate management, and mitigation measures were recommended for implementation by the Proponent, their contractors, and project-related employees.

The public was consulted as required by the EMA and its 2012 EIA Regulations (Sections 21 to 24). This was done via the two newspapers (New Era and The Namibian) used for this environmental assessment. A consultation through a face-to-face meeting with directly affected landowners whereby they raised concerns and comments on the proposed project activities.

The issues and concerns raised by the registered I&APs formed the basis for this Report and the Draft EMP. The issues were addressed and incorporated into this Report whereby mitigation measures have been provided thereof to avoid and/or minimize their significance on the environmental and social components. Most of the potential impacts were found to be of medium-rating significance. With the effective implementation of the recommended management and mitigation measures, will particularly see a reduction in the significance of adverse impacts that cannot be avoided completely (from medium rating to low). To maintain the desirable rating, the implementation of management and mitigation measures should be monitored by the Proponent directly, or their Environmental Control Officer (ECO) is highly recommended. The monitoring of this implementation will not only be done to maintain the reduced impacts' rating or maintain a low rating but to also ensure that all potential impacts identified in this study and other impacts that might arise during implementation are properly identified in time and addressed right away too.

It is crucial for the Proponent and their contractors as well as to effectively implement the recommended management and mitigation measures to protect both the biophysical and social environment throughout the project duration. All these would be done to promote environmental sustainability while ensuring a smooth and harmonious existence and purpose of the project activities in the community and environment at large.

Recommendations

The Environmental Consultant is confident that the potential negative impacts associated with the proposed project activities can be managed and mitigated by the effective implementation of the recommended management and mitigation measures and with more effort and commitment put into monitoring the implementation of these measures.

It is, therefore, recommended that the proposed development be granted an ECC, provided that:

- All the management and mitigation measures provided herein are effectively and progressively implemented.
- All required permits, licenses, and approvals for the proposed activities should be obtained as required. These include permits and consent for land use access agreements to utilise the area and ensure compliance with these specific legal requirements.
- The Proponent and all their project workers or contractors comply with the legal requirements governing their project and its associated activities and ensure that project permits and or approvals required to undertake specific site activities are obtained and renewed as stipulated by the issuing authorities.
- Site areas where NRSTI Valley activities have ceased are rehabilitated, as far as practicable, to their pre-excavation state.
- Environmental Compliance monitoring reports should be compiled and submitted to the DEAF Portal as per the provision made on the MEFT/DEAF's portal.

Disclaimer

Excel Dynamic Solutions (EDS) warrants that the findings and conclusion contained herein were accomplished following the methodologies outlined in the Scope of Work and Environmental Management Act (EMA) of 2007. These methodologies are described as representing good customary practice for conducting an EIA of a property to identify recognized environmental conditions. There is a possibility that even with the proper application of these methodologies there may exist subject property conditions that could not be identified within the scope of the assessment, or which were not reasonably identifiable from the available information. The Consultant believes that the information obtained from the record review and during the public consultation processes concerning the proposed development work is reliable. However, the Consultant cannot and does not warrant or guarantee that the information provided by the other sources is accurate or complete. The conclusions and findings outlined in this report are strictly limited in time and scope to the date of the evaluations. No other warranties are implied or expressed.

Some of the information provided in this report is based on personal interviews, and research of available documents, records, and maps held by the appropriate government and private

agencies. This report is subject to the limitations of historical documentation, availability, and accuracy of pertinent records, and the personal recollections of those persons contacted.

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
AMSL	Above Mean Sea Level
BID	Background Information Document
CV	Curriculum Vitae
DEA	Department of Environmental Affairs
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EDS	Excel Dynamic Solutions
ESA	Environmental Scoping Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
GG	Government Gazette
GN	Government Notice
I&APs	Interested and Affected Parties
MEFT	Ministry of Environment, Forestry, and Tourism
PPE	Personal Protective Equipment

Reg	Regulation
S	Section
TOR	Terms of Reference

DEFINITION OF TERMS

Alternative	A possible course of action, in place of another would meet the same purpose and need of the proposal.
Baseline	Work done to collect and interpret information on the condition/trends of the existing environment.
Biophysical	That part of the environment does not originate with human activities (e.g. biological, physical, and chemical processes).
Cumulative Impacts/Effects Assessment	About an activity, means the impact of an activity that in it may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Decision-maker	The person(s) entrusted with the responsibility for allocating resources or granting approval to a proposal.
Ecological Processes	Processes play an essential part in maintaining ecosystem integrity. Four fundamental ecological processes are the cycling of water, the cycling of nutrients, the flow of energy, and biological diversity (as an expression of evolution).

Environment	As defined in the Environmental Management Act - the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including – (a) the natural environment that is land, water, and air; all organic and inorganic matter and living organisms and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.
Environmental Management Plan	As defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environments effects are to be mitigated, controlled, and monitored.
Interested and Affected Party (I&AP)	Concerning the assessment of a listed activity includes - (a) any person, group of persons, or organization interested in or affected by the activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity. Mitigate - practical measures to reduce adverse impacts. Proponent – as defined in the Environmental Management Act, a person who proposes to undertake a listed activity. Significant impact - means an impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.
Fauna	All of the animals that are found in a given area.
Flora	All of the plants are found in a given area.

Mitigation	The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.
Monitoring	Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).
Proponent	Organization (private or public sector) or individual intending to implement a development proposal.
Public Consultation/Involvement	A range of techniques can be used to inform, consult or interact with stakeholders affected by the proposed activities.
Scoping	An early and open activity to identify the impacts that are most likely to be significant and require specialized investigation during the EIA work. Can, also be used to identify alternative project designs/sites to be assessed, obtain local knowledge of the site and surroundings, and prepare a plan for public involvement. The results of scoping are frequently used to prepare a Terms of Reference for the specialized input into full EIA.
Terms of Reference (ToR)	Written requirements governing full EIA input and implementation, consultations to be held, data to be produced, and form/contents of the EIA report. Often produced as an output from scoping.

1 INTRODUCTION

1.1 Project Background

National Commission on Research, Science and Technology (The Proponent) has applied to the Ministry of Environment, Tourism and Forestry (MEFT) to be granted an Environmental Clearance Certificate (ECC) for the proposed development activity: Construction of a National Research, Science, Technology and Innovation Valley (NRSTI Valley) consisting of new Biotechnology laboratories for the National Council on Research and Technology (NCRST) in Windhoek, Khomas Region. Excel Dynamic Solutions (Pty) Ltd (The Consultant) was appointed to act on behalf of the proponent in revising the EIA reports produced in 2016 and in obtaining the ECC. The Valley covers a total surface area of 6.74 hectares (ha) and will be located right adjacent to the University of Namibia Main Campus (UNAM) in Windhoek, with the Western Bypass (B1) found to its west and UNAM Main Campus buildings to its east as shown in (Figure 1).

Section 27 (1) of the Environmental Management Act (EMA) (No. 7 of 2007) and its 2012 Environmental Impact Assessment (EIA) Regulations, provides a list of activities that may not be carried out without an EIA undertaken and an ECC obtained. Therefore, individuals or organizations may not carry out listed activities without an ECC awarded to the Proponent.

The application for the ECC was compiled and submitted to the competent authority (Ministry of Environment, Forestry and Tourism (MEFT) as the environmental custodian for project registration purposes. Upon submission of an Environmental Scoping Assessment (ESA) Report and Draft Environmental Management Plan (EMP), an ECC for the proposed project may be considered by the Environmental Commissioner at the MEFT's Department of Environmental Affairs and Forestry (DEAF).

This Detailed Environmental Scoping Report presents information on the project area and its surroundings; the proposed improvements; legislation applicable to the study conducted; the EA approach and methodology followed; public consultation process; the sensitivity of the receiving environment; nature and extent of potential impacts (environmental and social) and required mitigations as well as a conclusion and recommendations based on the EA findings.

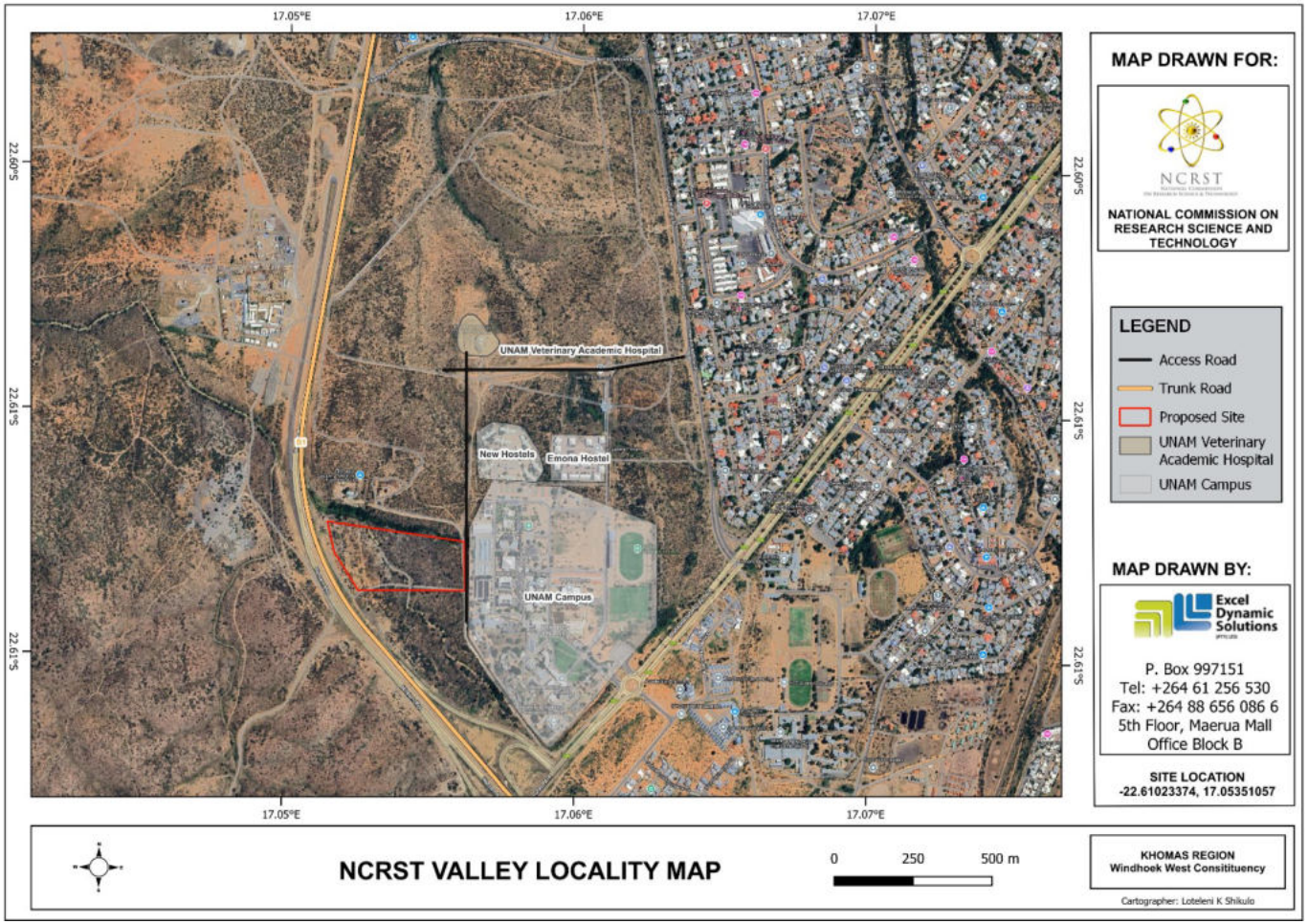

Figure 1: Locality map of the project site

1.2 Terms of Reference, Scope of Works, and Appointed EA Practitioner

To satisfy the requirements of the EMA and its 2012 EIA Regulations, The Proponent appointed EDS to conduct the required Environmental Assessment (EA) process on their (Proponent's) behalf, and thereafter, apply for an ECC for Construction works on the allocated site. There were no formal Terms of Reference (ToR) provided to EDS by the Proponent. The consultant, instead, relied on the requirements of the Environmental Management Act (No. 7 of 2007) (EMA) and its EIA Regulations (GN. No. 30 of 2012) to conduct the study.

The application for the ECC (**Appendix A**) is compiled and submitted to the Ministry of Environment, Forestry, and Tourism (MEFT), the environmental custodian for project registration purposes. Upon submission of an Environmental Scoping Assessment (ESA) Report and Draft Environmental Management Plan (EMP) (**Appendix B**), an ECC for the proposed project may be considered by the Environmental Commissioner at the MEFT Department of Environmental Affairs and Forestry (DEAF).

The EIA project is headed and conducted by Ms. Iyaloo Nakale, the company's EAP and reviewed by Mr. Nerson Tjelos, a qualified and experienced Geoscientist and experienced EAP. The EAP CV is presented in **Appendix C.**

1.3 Motivation for the Proposed Project

The NRSTI Valley will consist of (a) NCRST's Headquarters, (b) the National Biotechnology Testing Laboratory, Training and Research Laboratories; (c) the National Innovation Hub; (d) the National Space Science and Technology Centre; and the National Science Demonstration Centre. The rationale of this proposed NRSTI Valley is to facilitate linkages and collaboration between different stakeholders in RSTI by providing a platform for exchange and transfer of knowledge and technology experiences. The NRSTI Valley will further promote the art of science to the broader public as well as to students from UNAM, NUST and elsewhere in order to gain more information on what is currently taking place in the World as well as how Namibia can contribute and benefit on a more scientific level. This Project also supports the goals to be achieved in Vision 2030, because the NRSTI Valley will allow for good governance, capacity enhancement in the scientific and research fields as well as promote better partnerships across stakeholders. The Biotechnology facility will specifically cater towards promoting food security in order to alleviate drought and food hunger in Namibia. This project therefore forms the first of its kind in Namibia

and achieves the goals of the NCRST's as set out in the Research Science and Technology Act, 2004.

The education sector forms a vital part of some of Namibia's development plans, namely: Vision 2030, National Development Plan 5 (NDP5), and Harambee Prosperity Plans (HPPs) I and II. Innovation is essential to the development goals of Namibia in contributing to meeting the ever-increasing global demand for innovation and national prosperity. Successful completion of the NCRST valley would lead to the first step of NCRST's goals, which would also contribute towards achieving the goals of the national development plans.

2 PROJECT DESCRIPTION

The NRSTI Valley will consist of the (a) NCRST's Headquarters, (b) the National Biotechnology Testing, Training and Research Laboratory; (c) the National Innovation Hub; (d) the National Space Science and Technology Centre; and the National Science Technology Demonstration Centre. Each sector will be developed in different phases over a period of approximately 5 years.

2.1 The Headquarters for the NCRST (-+12,173.00m²).

NCRST started its operations officially on the 1st July 2013. The headquarter office will make provision for modern office spaces for current and future staff members, and all the amenities, such as ablution facility, boardrooms, cafeteria and others alike. Provisions will also be made for sufficient parking for NCRST staff and visitors to accommodate different types of vehicles. Central amenities like a garden and water stream feature are also incorporated in the overall layout.

2.2 National Biotechnology Testing, Training and Research Laboratory; (-+11,736.35m²).

Provision is made for the Testing, Training and Research laboratory. This facility will be used for testing of GMOs as per the provisions of the Biosafety Act (Act 7 of 2006). Furthermore, this facility will also house several units in different fields where other Natural Science tests and research will be conducted. The facility will be accessible to academia, industry and private sector institutions who want to conduct research and development type of work.

2.3 National Innovation Hub (-+23,961.00m²).

The focal point of the National Innovation Hub will be to provide state-of-the art facilities to attract research and development activities within the hub and increase the wealth of the Namibian community, by promoting the culture of innovation and the competitiveness of its associated business and knowledge – based institution. It will also create a synergistic environment where

innovators and academia can share learning, create working partnerships and do business together. When operational, the hub will provide facilities in terms of office and working spaces for start-up companies from the knowledge-intensive sectors in order to fast track and compete in the global market. Services such as access to telephone, modern high tech equipment and high speed internet and all other necessary utilities will be offered. Provision for training/conference facilities and lounges should also be considered. This facility will be accessible by innovators, entrepreneurs (SME), academics and students.

2.4 The National Space Science and Technology Centre; and the National Science Demonstration Centre (-+7,293.80m²).

The most commonly used method of advancing the concept of edutainment is the educational experience that includes a hands-on, and minds-on interactive exhibitions. This is an all-inclusive manner in which a learner engages all the aspects of his/her being in order to learn, remember and most importantly to apply the information they interact with. The National Science and Technology Demonstration Centre, will provide edutainment which will give learners, students, teachers, parents, scientific community and the general public the opportunity to engage in scientific and technological innovations while at the same time encouraging attitude and behavioral change. The Centre will present science and technology in a stimulating and engaging environment that truly combines entertainment with education. By providing halls for interactive exhibition, spaces for demonstration workshops, and mini theatre for science plays tailored to Namibia science curriculum. This facility will be accessible by learners of all ages, students, grandparents and the general public.

3 Project Methods

The proposed project methods are divided into the following categories:

3.1 Phase 1: Pre-development (Site acquisition and preparation phase)

This will include the Proponent ensuring that the site for the proposed project is legitimately acquired from the relevant authority (City of Windhoek), and the land has been cleared by the appointed contractor in a sustainable and ecologically safe manner to enable the commencement of the construction phase.

3.2 Phase 2: Construction phase

This phase will involve the conventional construction of the proposed project by qualified and experienced contractors through following the approval project plan(s). This is also the phase

where building inspections will be conducted at various stages of the construction phase. Once the construction phase of the project is completed, the proposed project will then be in operation.

3.3 Phase 3: Operational Phase

This is the phase whereby NCRST will be carrying out its intended purpose.

3.4 Human Resources, Services and Infrastructure

The following services and infrastructure as provided below will be required for the project activities:

3.4.1 Human resources and accommodation:

- During the construction phase (over a period of approximately 5 years), the project will employ an estimated -+500 people (i.e. Main Contractor/Specialist Installation Contractors, Site Engineers, Electricians, Plumbers and General Workers), and during the operation phase the project will employ an estimated -+50 people. Construction workforce will be accommodated in Windhoek or on site upon reaching an agreement and consent is signed between the Proponent and the respective landowner or custodian (Khomas Regional Council) before setting up accommodation structures (tented camps).Services and Infrastructure.

3.4.2 Working Space (Administration and Control):

- Temporary office facilities will be erected on site (subject to the approval of the landowner/custodian or authority).

3.4.3 Water supply:

- Water for the construction phase will be sourced from City of Windhoek Water Network, through an agreement. Around 20 000 liters of water will be required for the construction of the proposed project per month. This water will be used for washing equipment, ablution and providing water for construction-related activities.

3.4.4 Fuel Supply (machinery and equipment):

- City of Windhoek Electricity Network. Fuel storage and handling on site will be critical, ensuring a reliable and safe fuel supply for construction equipment and machinery. It will involve on-site fuel tanks .
- Construction contractors and employees will stick to environmental and safety regulations relating to fuel storage. Regular inspection and maintenance of fuel storage tanks will be mandatory to ensure timely mitigation measures, prevent spils and grondwater contamination.

3.4.5 Accessibility (roads):

- The NRSTI Valley will be located right adjacent to the University of Namibia Campus (UNAM) in Windhoek. The Western Bypass (B1) found to its west and UNAM to its east. Project-related vehicles will be using existing roads to access the site. Therefore, the proponent may need to do some upgrades on the site access road to ensure that it is fit to accommodate project-related vehicles, such as heavy trucks.

3.4.6 Waste management:

Different waste will be handled as follows:

- **Sewage:**
  Mobile chemical ablution facilities will be provided on-site. The wastewater will then be transported offsite to the sewage treatment facility either by the Proponent or a designated/appointed external waste management contractor.
- **General and domestic waste:**
  Sufficient waste containers will be made available on site and campsites for waste storage. Upon reaching full capacity, the bins will be emptied into the main onsite container for disposal at the nearest landfill site.
- **Hazardous waste:**
  All vehicles, machinery, and fuel-consuming equipment will be provided with drip trays to capture potential fuel spills and waste oils. The waste fuel/oils will be carefully stored in a standardized container until such a time that they can be disposed of at the nearest approved hazardous waste management facility. A waste disposal agreement will be reached between the Proponent and City of Windhoek.

3.4.7 Health and Safety:

- Adequate and appropriate Personal Protective Equipment (PPE) will be provided to every project personnel while working at the site. A minimum of two first aid kits will be readily available at site to attend to potential minor injuries, while major injuries will need to be attended by transporting the injured to the nearest healthcare facility for treatment and necessary care.
- **Potential Accidental Fire Outbreaks:**

A minimum of basic firefighting equipment, i.e., two fire extinguishers will be readily available in vehicles, at the working sites and campsite.

4 ENVIRONMENTAL ASSESSMENT

This ESA process is conducted following the provisions stated in the Environmental Management Act (No 7 of 2007) and its Environmental Impact Assessment Regulations (2012). The primary objective of the EA will be to identify potential negative impacts associated with the proposed activity, assess them, and recommend practical and effective mitigation measures to be implemented by the Proponent, to minimize these impacts while maximizing positive impacts.

The main objectives of this ESA are to:

- Comply with Namibia's Environmental Management Act (2007) and its EIA regulations (2012).
- Identify potential impacts associated with the proposed activity.
- Inform Interested and Affected Parties (I&APs) and relevant authorities about the development activities and provide them with a reasonable opportunity to participate during the EA process.
- Assess the significance of issues and concerns raised.
- Compile a report addressing all identified issues and potential impacts related to various aspects of the activity.
- Compile a Draft Environmental Management Plan (EMP) which includes impacts management and mitigation measures.

5 PROJECT ALTENATIVES

5.1 The "No-go" Alternative

The ‘no-go’ alternative is the baseline against which all alternatives / options are assessed. The ‘no-go’ alternative would essentially entail maintaining the current situation, whereby no development will take place on the proposed site. The NCRST has been mandated by the Research, Science and Technology Act (Act no 23 of 2004) to develop specific Research and Scientific type facilities in order to promote Namibia on this front and to become more globally aware as well as more competitive. If the ‘no-go’ option is to take place then this could cause negative economic impacts as well as cause the NCRST to not fulfil their mandate.

With no growth or development in the of Research, Science and Technology fields, there will be no enhancement of Namibia globally and we would be left behind as the world evolve better and newer technologies. Furthermore no construction or operational jobs will be created during the construction or operational phase of the project. Thus the ‘no-go’ option will not be a viable alternative for Namibia as a whole in regards to the current need for this project.

6 Project Location

The NRSTI Valley will be located right adjacent to the University of Namibia Campus (UNAM) in Windhoek, with the Western Bypass (B1) found to its west (Figure 2). It makes sense that the project links up with the University in order to provide an educational hub with science, technology and creativity going hand in hand. The site further boasts good accessibility as well as visual exposure from the surrounding areas. The site also has available land to the south for possible future expantion.

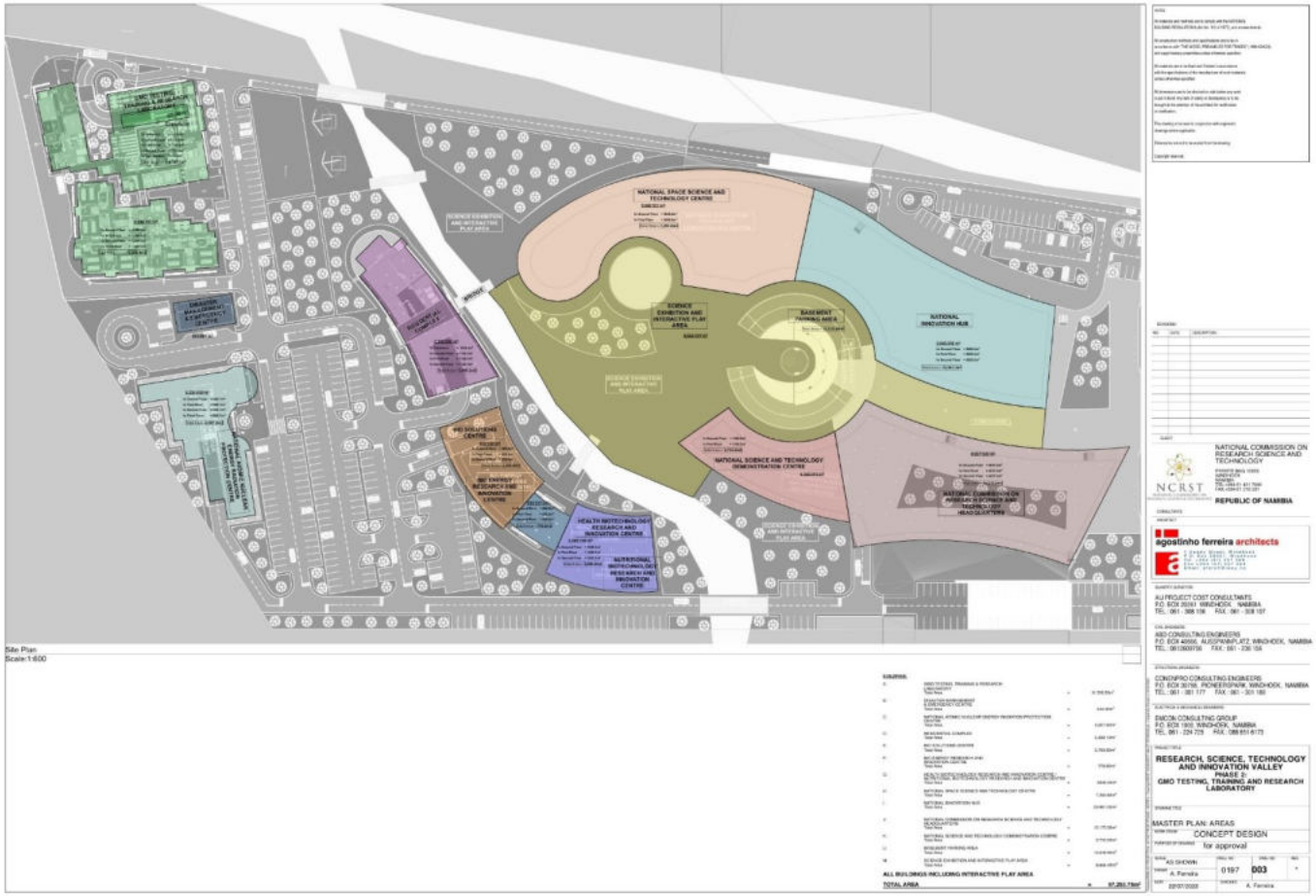

Figure 2: Site layout

7 LEGAL FRAMEWORK: LEGISLATION, POLICIES AND GUIDELINES

Listed activities have legal implications associated with certain applicable legal standards. A summary of applicable and relevant international policies and Namibian legislation, policies, and guidelines for the proposed development is given in this section (**Table 2**). This summary serves to inform the project Proponent, Interested and Affected Parties, and the decision-makers at the DEAF, of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled to establish the proposed NRSTI Valley.

7.1 The Environmental Management Act (No. 7 of 2007)

This EIA was carried out according to the Environmental Management Act (EMA) and its Environmental Impact Assessment (EIA) Regulations (GG No. 4878 GN No. 30).

The EMA has stipulated requirements to complete the required documentation to obtain an ECC for permission to undertake certain listed activities. These activities are listed under the following Regulations:

- *Listed activity 2.1 The construction of facilities for waste sites, treatment of waste and disposal of waste.*
- *Listed activity 2.3 The import, processing, use and recycling, temporary storage, transit or export of waste*
- *Listed activity 4 The clearance of forest areas, deforestation, aforestation, timber harvesting or any other related activity that requires authorisation in term of the Forest Act, 2001 (Act No. 12 of 2001) or any other law.*
- *Listed activity 5.1 (d) use for nature conservation or zoned open space to any other land use.*
- *Listed activity 7.3 The genetic modification of any organism with the purpose of fundamentally changing the inherent characteristics of that organism.*
- *Listed activity 7.4 The import, processing and transit of genetically modified organisms.*
- *Listed activity 7.5 Pest control.*
- *Listed activity 7.6 The release of genetically modified organisms into the environment where an environmental assessment is required by law.*
- *Listed activity 7.7 The release of any organism outside its natural area of distribution that is to be used for biological pest control.*
- *Listed activity 8.11 Alteration of natural wetland systems.*

- *9.1 The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974.*
- *9.4 The storage and handling of a dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic meters at any one location.*
- *10.1 The construction of (a) oil, water, gas and petrochemical and other bulk supply pipelines*

The Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878) detail requirements for public consultation within a given environmental assessment process (GN 30 S21). The EIA regulations also outline the required details of a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).

Other legal obligations that are relevant to the proposed activities of constructing the NCRST valley and related activities are presented below**.**

Table 1: Applicable local, national and international standards, policies and guidelines governing the proposed activities

Legislation / Policy / Guideline: Custodian	**Relevant Provisions**	**Implications for this project**
The Constitution of the Republic of Namibia, 1990 as amended: **Government of the Republic of Namibia**	The Constitution of the Republic of Namibia (1990 as amended) addresses matters relating to environmental protection and sustainable development. Article 91(c) defines the functions of the Ombudsman to include: "…the duty to investigate complaints concerning the over-utilization of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia…"	By implementing the environmental management plan, the establishment will be conformant to the constitution in terms of environmental management and sustainability. Ecological sustainability will be the main priority for the proposed development.

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
	Article 95(l) commits the state to actively promoting and maintaining the welfare of the people by adopting policies aimed at the: "…Natural resources situated in the soil and on the subsoil, the internal waters, in the sea, in the continental shelf, and in the exclusive economic zone are property of the State."	
Research Science and Technology (RST) Act, 2004 (Act 23 of 2004).	To provide for the promotion, co-ordination and development of research, science and technology in Namibia; to establish the National Commission on Research, Science and Technology and the National Research, Science and Technology Fund; and to provide for incidental matter	The proponent should comply with the act in relevance to the project.
Environmental Management Act EMA (No 7 of 2007): **Regulated under the Ministry of Environment, Forestry and Tourism (MEFT).** Environmental Impact Assessment (EIA) Regulations Government Notice 28-30 (Government Gazette 4878) of	-The Act and its 2012 EIA Regulations aims to ensure that the potential impacts of the development on the environment are carefully considered. -The Act aims at promoting sustainable management of the environment and use of natural resources. The Environmental Management Act (EMA) is broad; it regulates land use development through environmental clearance certification and/or Environmental Impact Assessments.	The EMA should inform and guide this EMP development and its implementation for: -ECC Amendment/Transfer and Renewal: Should the Proponent consider amending/Transferring the Project activities -The ECC needs to be renewed every 3 years (at least 3 months prior to its expiry date).

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
February 2012: **Regulated under the MEFT.**	-For new projects, the Act requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27). Regardless to the site, mitigation measures should be developed for implementation during operations.	The applications as deem necessary should be made with the Department of Environmental Affairs and Forestry (DEAF) as follows:
Nature Conservation Amendment Act, No. 3 of 2017: **Ministry of Environment, Forestry and Tourism (MEFT)**	National Parks are established and gazetted following the Nature Conservation Ordinance, 1975 (4 of 1975), as amended. The Ordinance provides a legal framework concerning the permission of entering a state-protected area, as well as requirements for individuals damaging objects (geological, ethnological, archaeological, and historical) within a protected area. Though the Ordinance does not specifically refer to construction of GMOs facilities as an activity within a protected area (PA) or recreational area (RA), it does restrict access to PAs and prohibits certain acts therein as well as the purposes for which permission to enter game parks and nature reserves may be granted.	The Proponent will be required to enhance the conservation of biodiversity and the maintenance of the ecological integrity of protected areas and another State land in the Project Site area. The Proponent will also be required to comply with the existing and planned local operational management plans, regulations, and guidelines.
The Parks and Wildlife Management Bill of 2008**: Ministry of Environment,**	Aims to provide a regulatory framework for the protection, conservation, and rehabilitation of species and ecosystems, the sustainable use and sustainable management of	

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
Forestry and Tourism (MEFT)	indigenous biological resources, and the management of protected areas, to conserve biodiversity and contribute to national development.	
The Biosafety Act (Act No. 7 of 2006)	The act provides for measures to regulate activities involving the research, development, production, marketing, transport, application and other uses of Genetically Modified Organisms (GMOs) and specified products derived from GMOs; to establish a Biosafety Council and define its powers, functions and duties; and to make provision for incidental matters	The Proponent should comply with all regulations concerning the project.
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)**: Ministry of Mines and Energy (MME)**	Regulation 3(2)(b) states that "No person shall possess [sic] or store any fuel except under the authority of a license or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 liters or less in any container kept at a place outside a local authority area"	The Proponent should obtain the necessary authorization from the MME for the storage of fuel on-site.
The Regional Councils Act (No. 22 of 1992)**: Ministry of Urban and Rural Development (MURD)**	This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning perspective, their duties include, as described in section 28 "to undertake the planning of the development of the region for which it	The relevant Regional Councils are IAPs and must be consulted during the Environmental Assessment (EA) process. The project site falls under the Khomas

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
	has been established with a view to physical, social and economic characteristics, urbanization patterns, natural resources, economic development potential, infrastructure, land utilization pattern and sensitivity of the natural environment.	Regional Council; therefore, they should be consulted.
Water Act 54 of 1956**: Ministry of Agriculture, Water and Land Reform (MAWLR)**	The Water Resources Management Act 11 of 2013 is present without regulations; therefore, the Water Act No 54 of 1956 is still in force: Prohibits the pollution of water and implements the principle that a person disposing of effluent or waste has a duly of care to prevent pollution (S3 (k)). Provides for control and protection of groundwater (S66 (1), (d (ii)). Liability of clean-up costs after closure/abandonment of an activity (S3 (l)). (l)).	The protection (both quality and quantity/abstraction) of water resources should be a priority. The permits and license required thereto should be obtained from MAWLR's relevant Departments (these permits include Borehole Drilling Permits, Groundwater Abstraction & Use Permits, and when required, Wastewater / Effluent Discharge Permits).
Water Resources Management Act (No 11 of 2013)**: Ministry of Agriculture, Water and Land Reform (MAWLR)**	The Act provides for the management, protection, development, use, and conservation of water resources; provides for the regulation and monitoring of water services, and provides for incidental matters. The objects of this Act are to: Ensure that the water resources of Namibia are managed, developed, used, conserved, and protected in a	

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
	manner consistent with, or conducive to, the fundamental principles set out in Section 66 - protection of aquifers, Subsection 1 (d) (iii) provide for preventing the contamination of the aquifer and water pollution control (S68).	
National Heritage Act No. 27 of 2004**: Ministry of Education, Arts, and Culture (MEAC)**	To provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.	The Proponent should ensure compliance with this act's requirements. The necessary management measures and related permitting requirements must be taken. This is done by consulting with the National Heritage Council (NHC) of Namibia. The management measures should be incorporated into the Draft EMP.
The National Monuments Act (No. 28 of 1969)**: Ministry of Education, Arts, and Culture (MEAC)**	The Act enables the proclamation of national monuments and protects archaeological sites.	
Soil Conservation Act (No 76 of 1969)**: Ministry of Agriculture, Water and Land Reform (MAWLR)**	The Act makes provision for the prevention and control of soil erosion and the protection, improvement, and conservation of soil, vegetation, and water supply sources and resources, through directives declared by the Minister.	Duty of care must be applied to soil conservation and management measures must be included in the EMP.
Local Authorities Act No. 23 of 1992	To provide for the determination, for purposes of traditional government, of traditional authority councils; the	City of Windhoek is the responsible local Authority

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
	establishment of such authority councils; and to define the powers, duties and functions of traditional authority councils; and to provide for incidental matters.	of the area therefore they should be notified.
Public Health Act (No. 36 of 1919)**: Ministry of Health and Social Services (MHSS)**	Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	The Proponent and all its employees should ensure compliance with the provisions of these legal instruments. This includes the provision of health and safety measures, wearing of Personal Protective Equipment (PPE), Health & Safety Trainings, etc
Health and Safety Regulations GN 156/1997 (GG 1617)**: Ministry of Health and Social Services (MHSS)**	Details various requirements regarding the health and safety of labourers.	
Public and Environmental Health Act No. 1 of 2015**: Ministry of Health and Social Services (MHSS)**	This Act provides with respect to matters of public health in Namibia. The objects of this Act are to: (a) promote public health and wellbeing; (b) prevent injuries, diseases and disabilities; (c) protect individuals and communities from public health risks; (d) encourage community participation in order to create a healthy environment; and (e) provide for early detection of diseases and public health risks. The Act also serves to protect the public from nuisance and states that no	The Proponent should ensure that the project infrastructure, vehicles, equipment, and machinery are designed and operated in a way that is safe, or not injurious or dangerous to public health and should remain at acceptable levels. Public and environmental health should be preserved and remain uncompromised.

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
	person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.	
Pollution Control and Waste Management Bill:**Regulated under the MEFT**	The bill aims to "prevent and regulate the discharge of pollutants to the air, water and land" Of particular reference to the Project is: Section 21 "(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of pollutants or waste into any water or watercourse." Section 55 "(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human health or the environment."	The Proponent and their workers/contractors should continue with the good waste management work (directly or indirectly) to ensure that the waste does not cause environmental threat and degradation. No permit or license required.
Atmospheric Pollution Prevention Ordinance (1976)**: Ministry of Health and Social Services (MHSS)**	This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, apart from East Zambezi, is proclaimed as a controlled area for section 4(1) (a) of the ordinance.	The proposed project and related activities should be undertaken in such a way that they do not pollute or compromise the surrounding air quality. Mitigation measures should be put in place and implemented on-site.
Hazardous Substance	The ordinance provides for the control of toxic substances. It covers	The Proponent should handle and manage the

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
Ordinance, No. 14 of 1974**: Ministry of Health and Social Services (MHSS)**	manufacture, sale, use, disposal, and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.	storage and use of hazardous substances on site so that they do not harm or compromise the site environment
Road Traffic and Transport Act, No. 22 of 1999**: Ministry of Works and Transport (Roads Authority of Namibia)**	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, the control and regulation of road transport across Namibia's borders; and for matters incidental thereto. Should the Proponent wish to undertake activities involving road transportation or access to existing roads, the relevant permits will be required.	Mitigation measures should be provided for, if the roads and traffic impact cannot be avoided, the relevant permits must be applied for.
Labour Act (No. 6 of 1992)**: Ministry of Labour, Industrial Relations and Employment Creation (MLIREC)**	Ministry of Labour, Industrial Relations and Employment Creation is aimed at ensuring harmonious labour relations through promoting social justice, occupational health and safety, and enhanced labour market services for the benefit of all Namibians. This ministry insures the effective implementation of the Labour Act No. 6 of 1992.	The Proponent should ensure that the proposed activities do not compromise the safety and welfare of workers.

7.2 International Policies, Principles, Standards, Treaties, and Conventions

The international policies, principles, standards, treaties, and conventions applicable to the project are listed in **Table 3** below.

Table 2: International Policies, Principles, Standards, Treaties and Convention applicable to the project

Statute	Provisions	Project Implications
Equator Principles	A financial industry benchmark for determining, assessing, and managing environmental and social risk in projects (August 2013). The Equator Principles have been developed in conjunction with the International Finance Corporation (IFC), to establish an International Standard with which companies must comply to apply for approved funding by Equator Principles Financial Institutions (EPFIs). The principles apply to all new project financings globally across all sectors. Principle 1: Review and Categorization Principle 2: Environmental and Social Assessment Principle 3: Applicable Environmental and Social Standards Principle 4: Environmental and Social Management System and Equator Principles Action Plan Principle 5: Stakeholder Engagement Principle 6: Grievance Mechanism Principle 7: Independent Review Principle 8: Covenants	These principles are an attempt to: '…encourage the development of socially responsible projects, which subscribe to appropriately responsible environmental management practices with a minimum negative impact on project-affected ecosystems and community-based upliftment and empowering interactions.'

	Principle 9: Independent Monitoring and Reporting Principle 10: Reporting and Transparency	
The International Finance Corporation (IFC) Performance Standards	The International Finance Corporation's (IFC) Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of the IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. As of 28 October 2018, there are ten (10) Performance Standards (Performance Standards on Environmental and Social Sustainability) that the IFC requires project Proponents to meet throughout the life of an investment. These standard requirements are briefly described below. Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts Performance Standard 2: Labour and Working Conditions Performance Standard 3: Resource Efficient and Pollution Prevention and Management	The Performance Standards are directed toward clients, guiding how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business sustainably, including stakeholder engagement and disclosure obligations of the Client (Borrower) concerning project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the

	Performance Standard 4: Community Health and Safety Performance Standard 5: Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources Performance Standard 7: Indigenous Peoples/Sub-Saharan African Historically Undeserved Traditional Local Communities Performance Standard 8: Cultural Heritage Performance Standard 9: Financial Intermediaries (FIs) Performance Standard 10: Stakeholder Engagement and Information A full description of the IFC Standards can be obtained from http://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-standards?cq_ck=1522164538151#ess1	business activities of the Corporation to achieve its overall development objectives.
The United Nations Convention to Combat Desertification (UNCCD) 1992	Addresses land degradation in arid regions with the purpose to contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change. The convention's objective is to forge a global partnership to reverse and prevent	The project activities should not be such that they contribute to desertification.

	desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability United Nations Convention.	
Convention on Biological Diversity 1992	Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, to ensure their conservation and sustainable use. Promote the protection of ecosystems, and natural habitats, and the maintenance of viable populations of species in natural surroundings.	Removal of vegetation cover and destruction of natural habitats should be avoided and where not possible minimized.
Stockholm Declaration on the Human Environment, Stockholm (1972)	It recognizes the need for: "a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.	Protection of natural resources and prevention of any form of pollution.

Relevant international Treaties and Protocols ratified by the Namibian Government

- Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES), 1973.
- Convention on Biological Diversity, 1992.
- World Heritage Convention, 1972.

8 ENVIRONMENTAL AND SOCIAL BASELINE

The project activities will be undertaken in specific environmental and social conditions. The undertstanding of these conditions helps in identifying the sensitive environmental features that may need to be protected through the implementation of certain managemet and mitigation measures. The summary of selected physical, biological and social baseline information of the project area is provided below as per the site visit conducted by the Environmental Consultant on the 28 of October 2024 and relevant published reports and books.

The climatic conditions of the project area is decribed using the available nearest data for the area obtained from the source:https://www.worldweatheronline.com/windhoek-weather-averages/windhoek/na.aspx

8.1 Biophysical Environment

8.1.1 Climate

Climate has a major influence on the construction activities for the proposed project. Understanding of climatic conditions helps to determine the appropriate and/or inappropriate times to conduct activities.

In general Namibia's climate can be described as hot and dry, substantial fluctuations during the seasons or even within one day are typical. The different regions show considerable climatic differences regarding precipitation and temperature though. The amount of precipitation increases from the southwest to the northeast from an annual 0mm to a maximum of 600mm (Info Namibia, 2014). The average maximum temperatures reaches 30ºC while the minimum can go as low as 6ºC, the hottest months are December and January while the coldest is July. The wettest months are January and February while June, July and August are the driest.

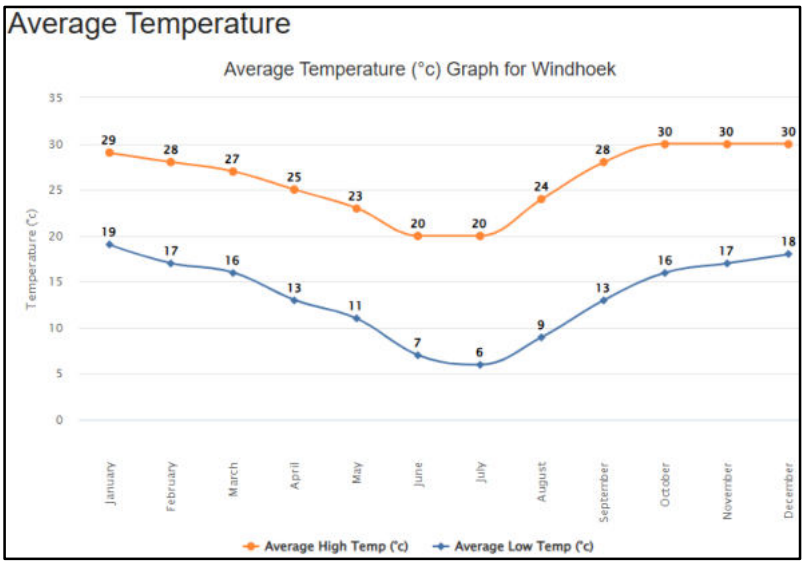

Figure 3: Average temperature windhoek

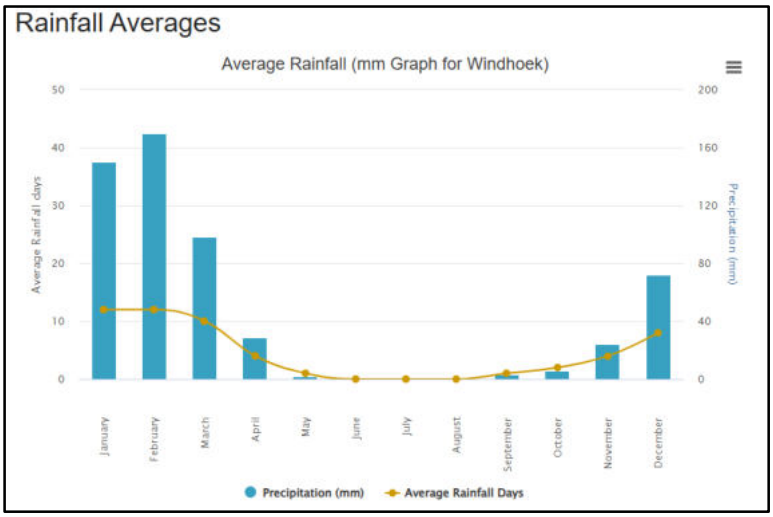

Figure 4: Average rainfall for windhoek

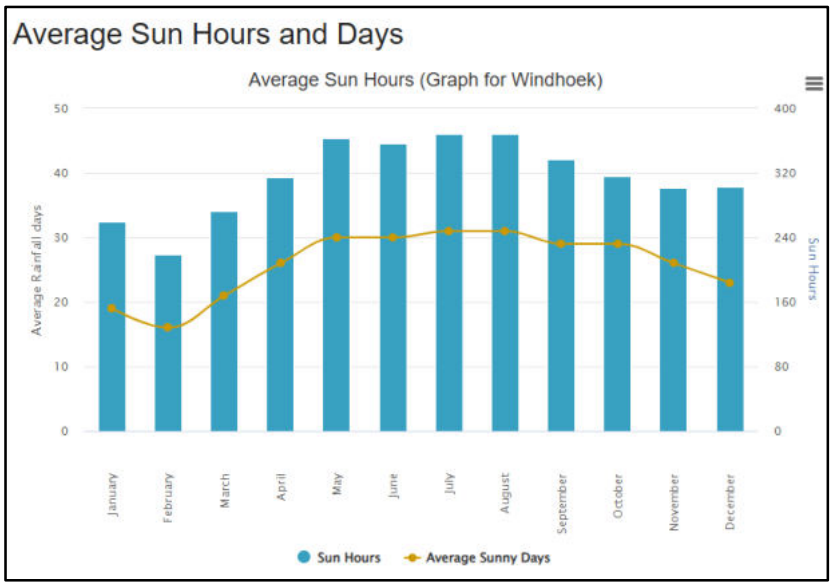

Figure 5: Average daylight for windhoek

8.1.2 Topography

Windhoek, the capital city of Namibia, is situated in a basin surrounded by the Khomas Highlands. The landscape is classified as the Khomas Highland Plateau, which is about 300km inland from the west coast of Namibia, and approximately 1540 metres above sea level (Lahnsteiner & Lempert, 2007). Located at an elevation of about 1,700 meters (5,577 feet) above sea level, which contributes to its relatively mild climate, the city itself is built on a plateau, which gives it a distinct layout characterized by rolling hills and valleys. The terrain can be steep in certain areas, particularly near the outskirts. The site has a slight drop in elevation from the B1 highway in a south-easterly direction. The project site elevation levels are between 1678-1710 meters as shown in **figure 6**.

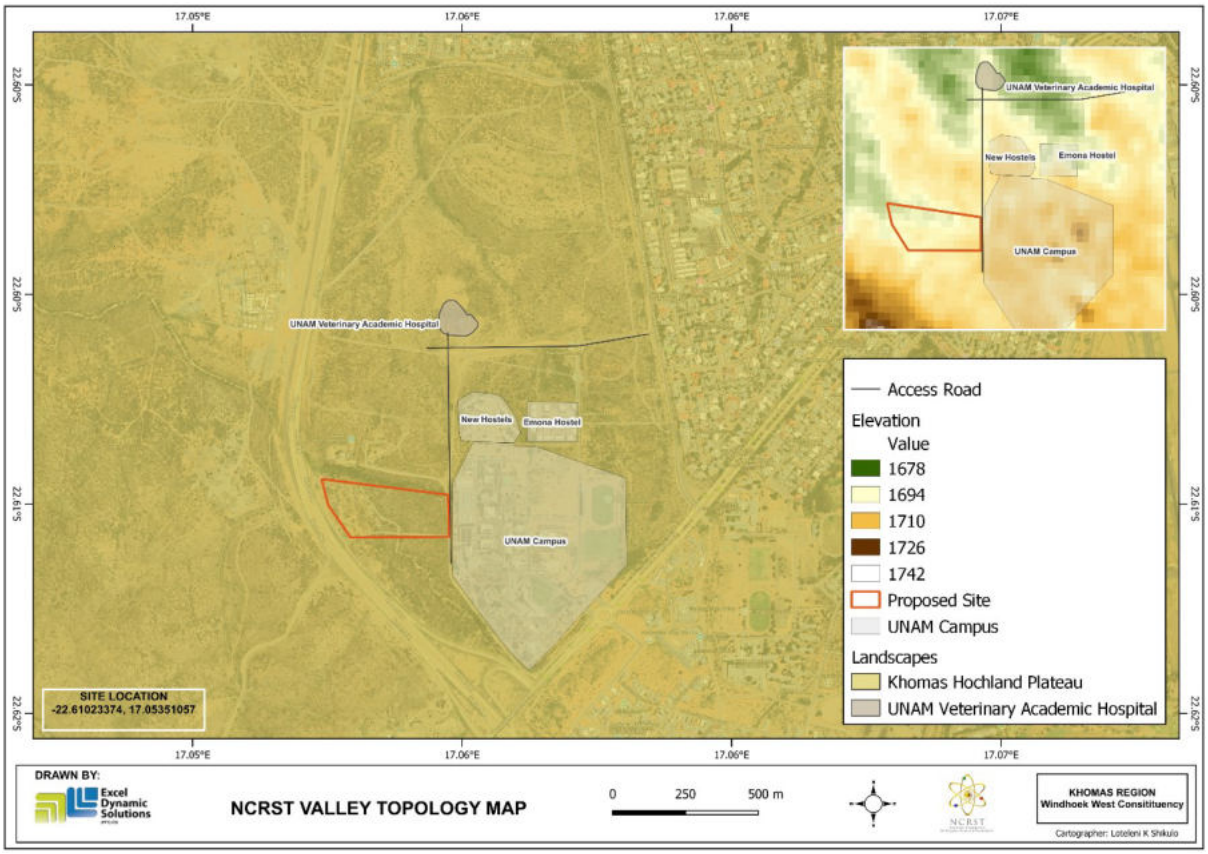

Figure 6: Topography Map

8.1.3 Geology

The area is comprised of pre-Damaran gneissic basement and Damara Supergroup metasediments (Miller, 2008a). Both were subjected to multiple deformation events and metamorphism during the Pan African Damara Orogen (Mapani et al., 2014) as a result of the collision between the Congo (to the north) and Kalahari Cratons (to the south), which has resulted in a complex geological setting for the entire Windhoek region. It is highly characterised by low-temperature-high pressure (LTHP) stratotectonic Southern Zone (SZ) and Southern Margin Zone (SMZ) of the Damara Belt (Miller, 2008a). The Windhoek geology, in local geology terms, is made up of the Auas Formation which is composed of deepwater fans of the Auas Mountains south of the city. The Kuiseb Formation caps the Swakop Group in the Khomas highlands where Windhoek is situated. The Kuiseb Formation possesses several layers of thin quartzites that alternate with schist that can range in thickness to tens of meters. The Windhoek area has an interesting geological setting due to historical folding, faulting, thrusting and rifting episodes (Miller, 2008). The last major tectonic events that have had an impact on urban geology are the intrusion of the post tectonic alkaline plugs, mainly trachytes and phonolites that intrude the schists and the rifting that happened during the

Cretaceous, around 132 Ma. This rifting event led to the development of the Windhoek graben and horst structure; which is mainly defined by north-south trending faults. These faults are sites of seismic activity in the city and have an impact on the structures that are built in the valley (Mapani, 2020). The study area is likely to be traversed by minor north-south running fault lines that have less structural significance (also discussed under structural geology subsection). No seismic activity has been recorded in or around the proximity of the site, and the faults, if any, would be generally regarded as inactive, although buildings constructed in other parts of Windhoek where inactive faults are known to occur, periodically crack. **Figure 7** below show the Geology map of the proposed site.

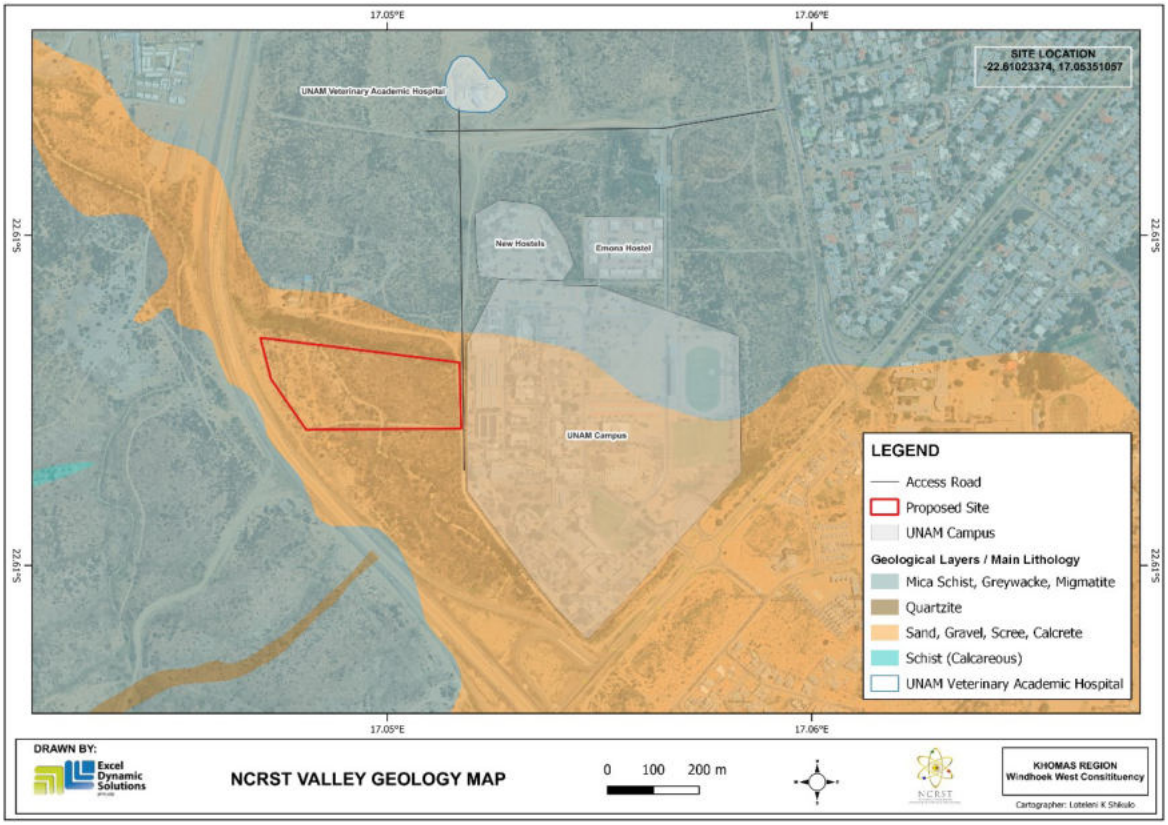

Figure 7: General geology map

8.1.3.1 Structures: Faults and Fractures

North-south (including NW-SE and NNE-SSW) trending faults cross-cut the area (Murray, 2002; Miller et al., 2018), which were formed during Damara Orogen folding and thrusting and have been reactivated during Cretaceous-aged uplift due to the break-up of the Gondwana supercontinent (Murray, 2002; Miller, 2008c). The N-S trending faults are variable but are typically high-angled (65°-87°), and generally dip towards the east in the study area, contributing potentially to the graben structure. These N-S trending faults are variably

cemented, which affects their openness, and has important implications for groundwater flow. However, unconsolidated and uncemented fault breccias have been encountered during drilling (Miller et al., 2018).

8.1.3.2 Hydrogeology

The study area is underlain by the Kleine Kuppe aquifer, which is one of the thickest subaquifers of the greater Windhoek Aquifer. The Kleine Kuppe hydrostratigraphic units dip from the Auas Mountains in a northwestward direction at an angle of between 15-30° and have developed secondary porosity and permeability due to folding and faulting (N-S, NW-trending, and NNE-trending faults, some of which have NW- SW- or SE-trending splays 45° to the fault [Miller et al., 2018]). The Kleine Kuppe aquifer thus forms a secondary fractured aquifer, with an interconnective fracture network across the aquifer extent. The micaceous quartzites of the Kleine Kuppe Formation form the Kleine Kuppe aquifer.

8.1.3.2.1 Aquifer Vulnerability to Pollution

In terms of groundwater vulnerability risk to pollution, this is assessed based on aquifer type, groundwater flow, depth to groundwater and annual recharge. The areas that are underlain by low potential groundwater rock bodies have a moderate vulnerability to pollution status. This status could be explained by the absence of fractured/faulted bedrocks that would hinder or minimize the spreading of potential pollutants from the ground surface into groundwater systems.

For the City areas with a high groundwater vulnerability to pollution could be explained by the fractured nature of the bedrocks/rock formations that underlie these areas as well as major surface water bodies such as rivers and riverbeds. Therefore, the types of formations and areas (rivers) could provide ready pathways for pollution transport (fast spreading of polluted water), if any pollution escape from the surface into the ground owing to developmental activities such as the poor handling of different pollutants such as hazardous substances (hydrocarbons) and wastewater.

8.1.3.2.2 Potential Sources of Pollution

Known potential sources of point pollution for Windhoek-south area (including the study area) are as follows:

- Industries,
- Waste disposal sites,
- Filling stations,
- Cemeteries,
- Eros Airport, the railway station, wastewater treatment plants,

- Luiperdsvallei military base, abattoirs,
- Petroleum storage facilities and the Windhoek truck port.
- A major pollution concern is the sewage network constructed in and along river courses, often damaged during floods and almost continuously leaking sewerage.

The above-listed land uses have a high potential of contributing to, and increase, the risk of groundwater pollution, and thus the aquifer's vulnerability.

8.1.4 Soil

The project site is dominated by Lithic Liptosols which are a specific type of soil classified under the World Reference Base for Soil Resources (WRB) system. Lithic Leptosols are shallow soils that have a hard, lithic (rocky) layer within 30 cm of the surface. This layer can be composed of bedrock or hard rock fragments. They typically form in areas with limited weathering and are often found in mountainous or hilly regions. The parent material is usually rocky, which restricts soil development. Lithic Leptosols usually have good drainage due to their coarse texture and the presence of rock fragments. However, their shallow depth can limit water retention. The vegetation supported by Lithic Leptosols is often sparse and consists of drought-resistant plants, as the soil's shallow depth and rocky nature can make it challenging for deep-rooted plants to thrive. **Figure 9** and **Figure 10** below shows the map of the soil type and the observed soil type on site.

It is notable that during the construction phase of the project, soil sampling may be conducted**.** *Therefore, the Soil Conservation Act (No 76 of 1969) should be taken into account to ensure that soils are conserved in a way that does not promote soil erosion.* (Refer to the EMP).

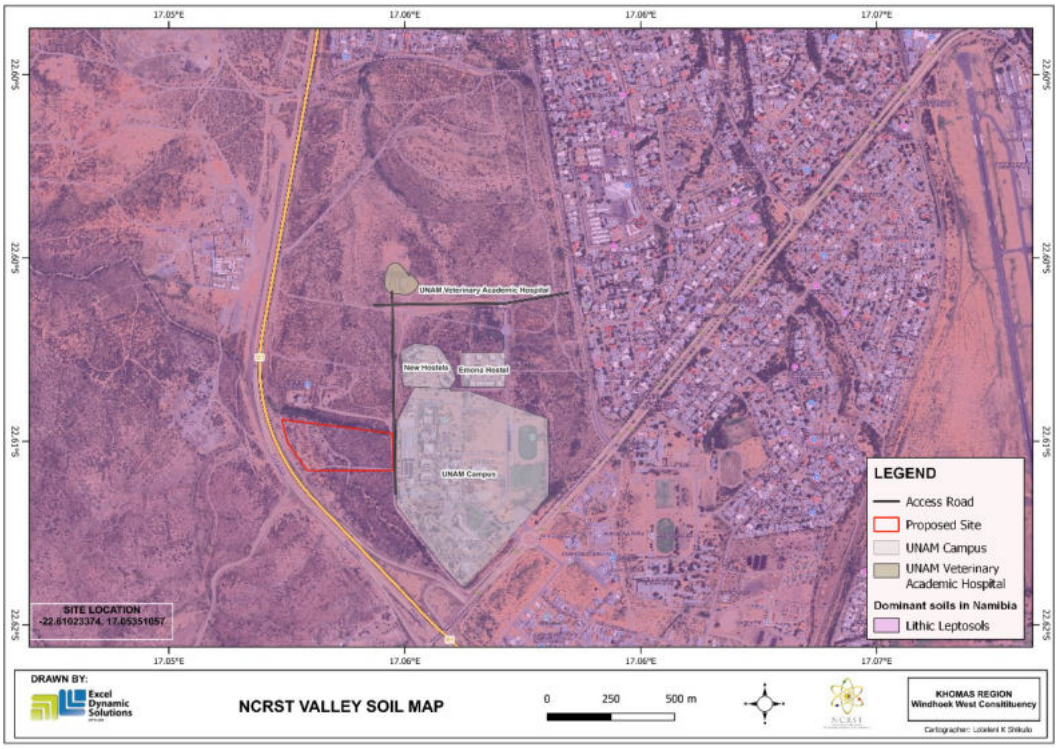

Figure 8: Dominant Soil Map

Figure 9: type of soil observed on site

8.1.5 Water Resources: Groundwater and Surface Water

8.1.5.1 Hydrology and Drainage

The study area lies in the central parts of Namibia, within the drainage/catchment area of the ephemeral Arebbusch River, which is generally flowing in northernly direction crossing the greater Windhoek Aquifer. The Arebbusch River and its tributaries are known to flow after heavy rains and drains into the Goreangab Dam (built in 1958 with a storage volume of 3.6 million m^3 and previously used for water supply to the CoW, although currently unused due to

water quality issues). **Figure 10 and figure 11** shows the hydrological map and observed stream that transverse the project site.

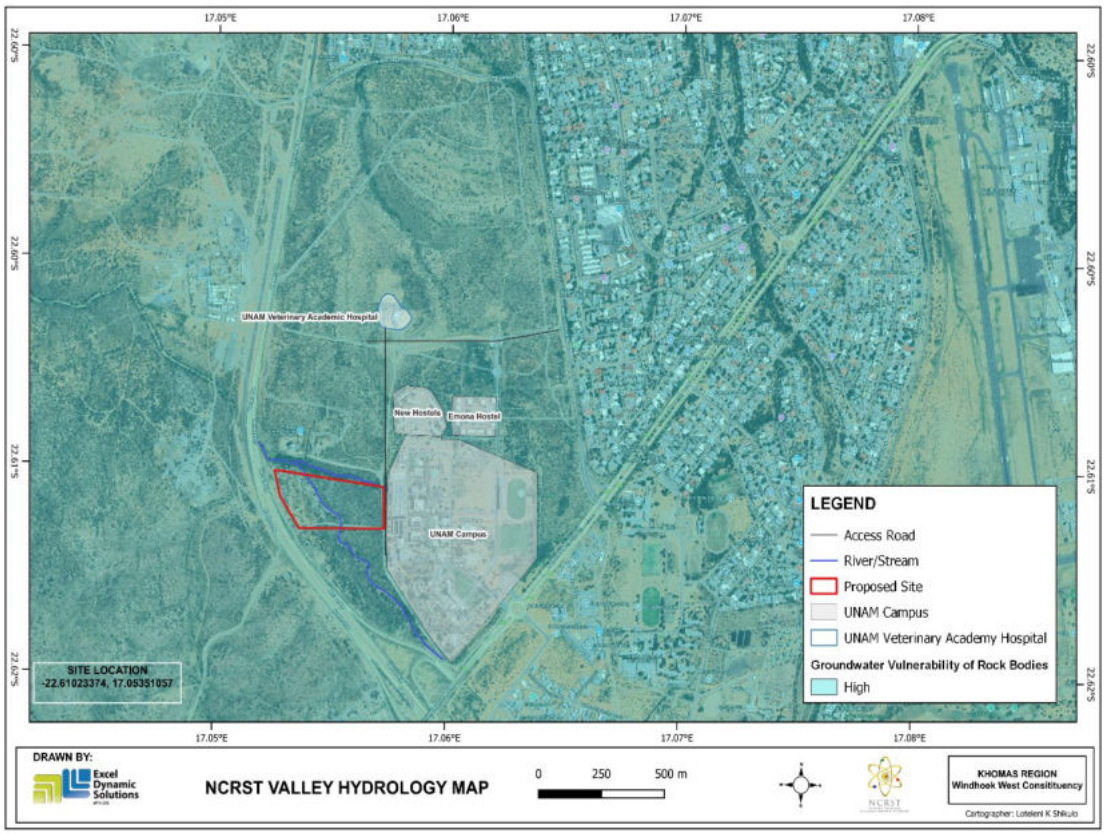

Figure 10: Hydrological map

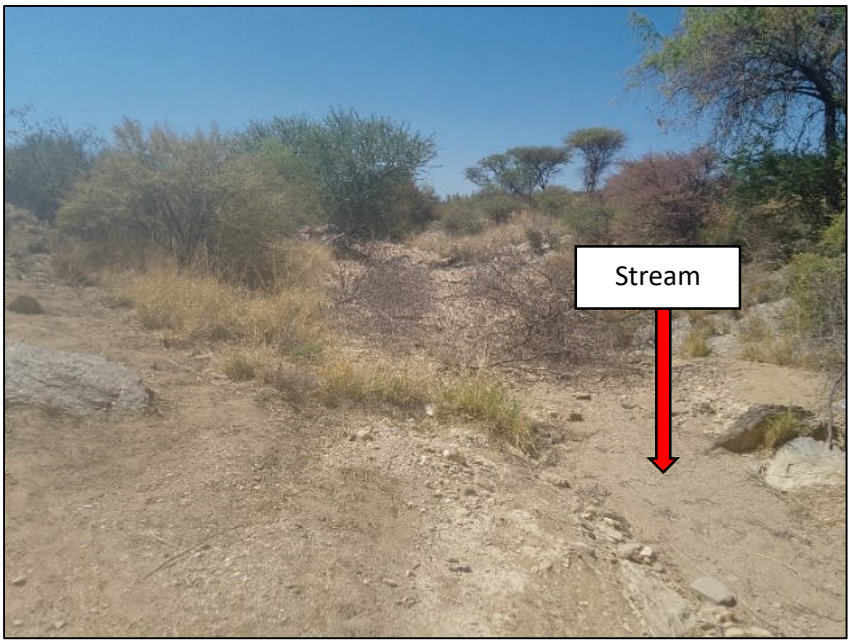

Figure 11: The stream observed on site (tributary to the Arebbusch River)

8.1.6 Flora and Fauna

8.1.6.1 Flora

The site project is classified as Highland Shrubland, a type of vegetation typically found in mountainous or elevated regions. The vegetation structure is classified as shrubs and low trees (Mendelsohn *et al.* 2002). Common vegetation found in Windhoek include, *Acacia erioloba* (Camel thorn), a prominent tree in the region, known for its distinctive thorns and ability to thrive in arid conditions, the *Acacia mellifera* (Black thorn), a smaller tree or shrub that provides shade and is often used for fencing and *Acacia karroo* (Sweet thorn) which forms nesting sites for birds and small vertebrates. This vegetation type can support a diverse range of plant and animal species, including endemic and specialized species adapted to the unique environmental conditions. There are no communal conservancies located in the immediate area (NACSO 2006, 2010) although freehold (commercial) conservancies – e.g. Aaus Oanob, Namatanga and Dordabis – occur in the general area (Mendelsohn *et al.* 2002, See: www.canam.iway.na). The closest Government protected area is the Daan Viljoen Game Park west of Windhoek with none found within the project area. **Figure 12** below shows the vegetation map for the project area, and **Figure 13** shows the observed vegetation on site.

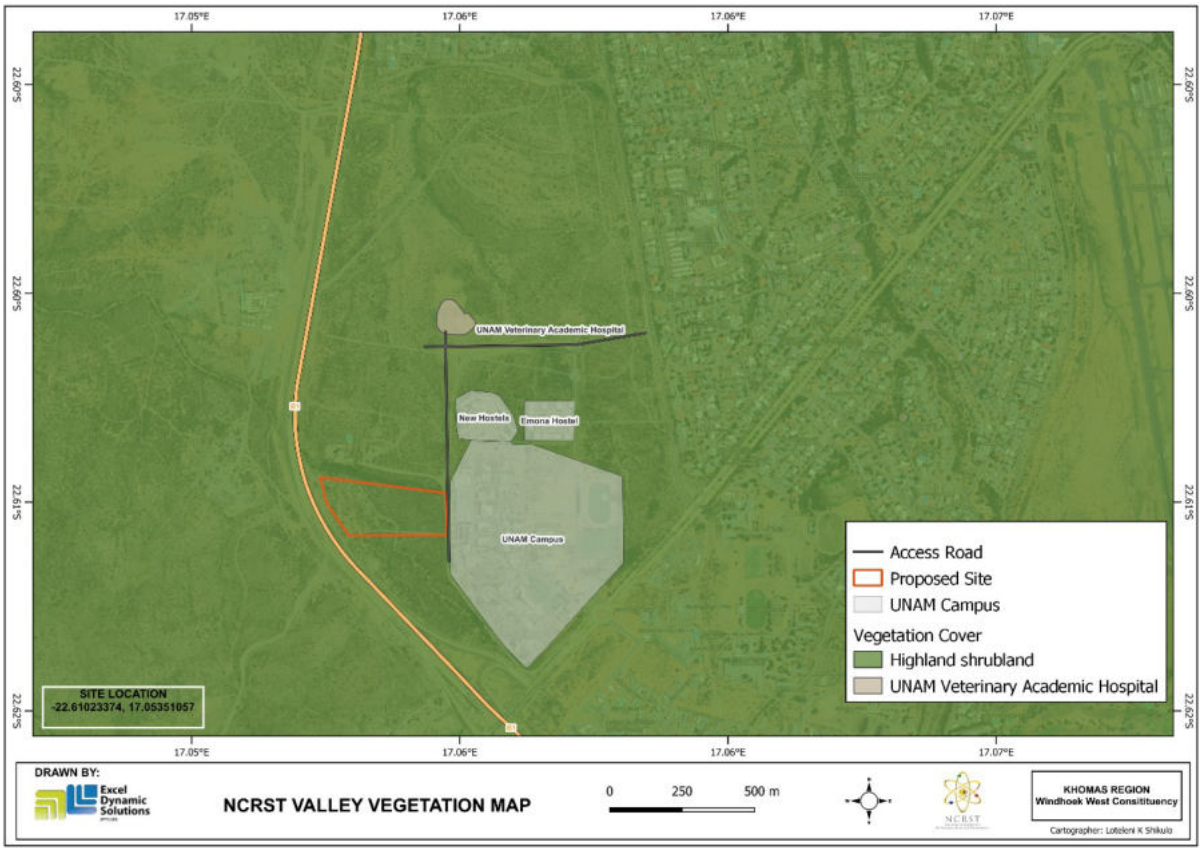

Figure 12: Vegetation map

Figure 13: Vegetation observed on site

8.1.6.2 Fauna

According to (Stubenrauch Planning Consultants, 2004), the Khomas Hochland harbours at least 20 recorded species of scorpions, 24 species of solifuges and 90 species of spiders, most of which may also occur in the southern portion of the Windhoek Basin. The ten species of frogs are known to occur, about 30 species of lizards, geckoes, skinks and agamas, and 40 species of snakes. A portion of these is likely to occur in the vicinity of drainage lines, while other reptiles occur mainly in rocky habitats associated with hills and ridges. Small mammals that may occur in the smaller landscape encompass several species of bats, shrews, mice, gerbills, hares, mongooses, rats, rock dassies, porcupines, ground squirrel and black backed jackal. Antelope sightings include kudu, duiker and steenbok, while troops of baboons are common. Although scarcer, sable and roan, oryx, zebras and eland do occur on the less accessible terrains of the Auas Mountains. The Auas Mountains are more important in terms of biodiversity potential in Namibia than generally realized and harbour a number of restricted plant and animal species, mostly only confined to the highest peaks.

8.2 Heritage and Archaeology

There are no nationally recognized archaeological sites recorded within the project site. However, there is a possibility that unrecorded or undiscovered archaeological features or artifacts may be discovered during the construction phase. In the case where an archaeological discovery is made on site during construction works, the procedures outlined in the National Heritage Act, No. 27 of 2004 are to be followed. Section 55 (4) of the National Heritage Act, No. 27 of 2004, requires that any archaeological or paleontological object or meteorite discovered is reported to the National Heritage Council as soon as practicable.

9 Surrounding Land Uses

The Proponent is required to secure a signed agreement from the landowner to gain access to the areas. The project site is leased to the proponent by the University of Namibia. During the site visit the consultants observed infrastructure that points to the existence of development in the area. The veterinary school on the north and the main University of Namibia on the east.

10 Socio-Economic conditions

Population Demographics

Windhoek is the capital of Namibia located in the central Namibia, in the Khomas region. According to the Namibia 2023 Population and Housing Census Main Report, Windhoek had a total population of 325,858 in 2011 and 486, 186 in 2023 (representing a growth rate of 3.3) of which are male 236, 044 while 250, 142 are female.

Trade & Industry

According to the Khomas Regional Council, Windhoek is the administrative, legislative, judicial and financial capital of the Republic of Namibia. Windhoek is also the national business hub where the majority of larger companies and corporate active in Namibia have their head offices situated. This makes Windhoek the nerve centre for most economic activities throughout the country. Windhoek accommodates most of the country's light industries and manufacturing. Windhoek is a well-developed city with excellent infrastructure in most parts and a well-established business sector that can provide for most of the requirements that may come from different sectors of the economy.

Agriculture

Windhoek is the major national manufacturing centre and hosts several industries that add value to agricultural produce. These include abattoir and meat processing, hide processing and leather manufacturing. These industries have major growth potential for the export market and consideration is being given as to whether to grant them EPZ status to encourage essential capital investment.

Transportation

Windhoek is connected to the rest of Namibia by means of the national Road Network. The major national roads connect the city with Namibia's southern, eastern and northern neighbours. The country's international airport, Hosea Kutako International Airport, is located

approximately 35km east of Windhoek, while the national airport, Eros, links Windhoek to the rest of Namibia and to Botswana and South Africa via Air Namibia flights, and small private air companies (KRC 2001). Windhoek forms an important railway junction, linking the city with the rest of the country`s rail network as well as South Africa.

Water and Sanitation- infrastructure

The large-scale industrial development in Windhoek is subject to the availability of water for industrial use, as the city is dependent on piped water from dams located outside the Khomas Region, especially the Von Bach and Swakoppoort Dams. Windhoek is said to have one of the best water reclamation plants in the world.

Tourism

Windhoek has a lively motor trade in new and second-hand cars as well as in motor spares. Other retail and wholesale activities abound, while the services sector is healthy. Telecommunication services, transport, tourism and security companies abound in the capital. Windhoek is the country's tourism capital and a number of tour operators operate from Windhoek. Trade is in many aspects heavily dependent on the tourist market. The important tourist gateway, the Hosea Kutako International Airport, is situated in this region. This is an area where already significant development of accommodation and facilities have taken place and limited potential for further development exists.

11 PUBLIC CONSULTATION PROCESS

Public consultation is an important component of the Environmental Assessment (EA) process. It provides potential Interested and Affected Parties (I&APs) with an opportunity to comment on and raise any issues relevant to the project for consideration in part of the assessment process. Public input assists the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and the extent to which further investigations are necessary. Public consultation can also aid in the process of identifying possible mitigation measures. Public consultation for this scoping study has been done following the EMA and its EIA Regulations.

11.1 Pre-identified and Registered Interested and Affected Parties (I&APs)

Relevant and applicable national, regional, and local authorities and other interested members of the public were identified. Pre-identified I&APs were contacted directly, while other parties who contacted the Consultant after project advertisement notices in the newspapers, were

registered as I&APs upon their request. Newspaper advertisements of the proposed Valley activities were placed in two widely read national newspapers in the region (New Era Newspaper and The Namibian Newspaper). The project advertisement/announcement ran for two consecutive weeks inviting members of the public to register as I&APs and submit their comments. The summary of pre-identified and registered I&APs is listed in **Table 4** below and the complete list of I&APs is provided in **Appendix D**.

Table 3: Summary of Interested and Affected Parties (I&APs)

National (Ministries and State-Owned Enterprises)
Ministry of Environment, Forestry and Tourism
Ministry of Agriculture, Water and Land Reform
Regional, Local, and Traditional Authorities
Khomas Regional Council
City of Windhoek Municipality
General Public
Landowners /Interested members of the public

11.2 Communication with I&APs

Regulation 21 of the EIA Regulations details the steps to be taken during a public consultation process and these have been used in guiding this process. Communication with I&APs concerning the proposed development was facilitated through the following means and in this order:

- A Background Information Document (BID) containing brief information about the proposed development works was compiled and emailed to registered and Identified Interested and Affected Parties (I&APs);
- Project Environmental Assessment notices were published in the New Era Newspaper **(20 September 2024 and 27 September 2024),** and The Namibian Newspaper **(20 September 2024 and 27 September 2024),** briefly explaining the activity and its locality and inviting members of the public to register as I&APs and submit their comments/concerns.
- Public notices at Unam (main campus), Khomas Regional Council, City of windhoek and at site (**Figure 13**) to inform members of the public about the EIA process.

- Meetings were scheduled and held at National Commission on Research, Science and Technology (NCRST) on 16 October 2024 at 10h00am and City of Windhoek on 17 October 2024 at 10h00am.

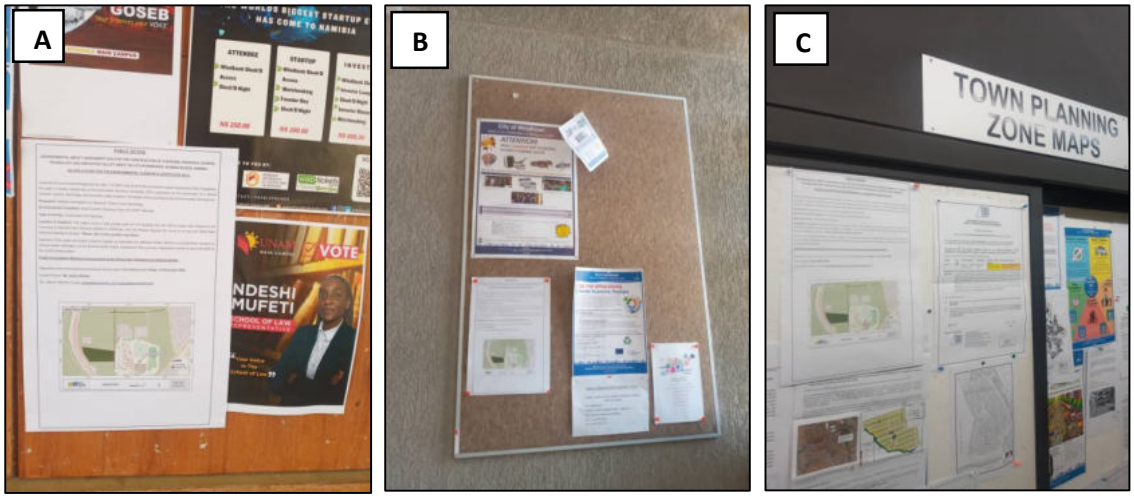

Figure 14: Public notice placed at (A) Unam main campus (B) Khomas Regional Council (C) City of Windhoek.

Issues raised by I&APs have been recorded and incorporated in the environmental report and EMP. The summarized issues raised during the public meeting are presented in **Table 5** below. The issues raised and responses by EDS are attached under **Appendix G.**

Table 4: Summary of main issues raised, and comments received during public meeting engagements

Issue	Concern
Will the project affect the underground water bodies?	The study should address the hydrological concerns of the proposed area.

12 IMPACT IDENTIFICATION, ASSESSMENT AND MITIGATION MEASURES

12.1 Impact Identification

Proposed developments/activities are usually associated with different potential positive and/or negative impacts. For an environmental assessment, the focus is placed mainly on the negative impacts. This is done to ensure that these impacts are addressed by providing adequate mitigation measures such that an impact's significance is brought under control while maximizing the positive impacts of the development. The potential positive and negative impacts that have been identified from the prospecting activities are listed as follows:

Positive impacts:

- Socio-economic development through employment creation and skills transfer,
- Opens up other investment opportunities and infrastructure-related development benefits,
- Produce a trained workforce,
- Boosting the local and regional economic development,
- State of the art testing, training and research laboratory

Negative impacts:

- Impact on local biodiversity (fauna and flora) and habitat disturbance: some vegetation may be disturbed e.g., by off-road driving or being removed to create access roads and working spaces.
- Potential impact on water resources and soils particularly due to pollution,
- Air quality issue: dust may be generated from driving on-site,
- Potential occupational health and safety risks- may occur due to the movement / operating of machinery and equipment on site.
- Vehicular traffic safety and impact on services infrastructure (local roads): the temporary potential increase in vehicular traffic during the construction phase may exert additional pressure on the local roads, especially by heavy vehicles such as trucks carrying project materials and equipment,
- Vibrations and noise associated with construction activities may be a nuisance to locals,
- Environmental pollution through different types of waste generated on the site, particularly from the mishandling of hydrocarbons (fuels) and wastewater,
- Archaeological or cultural heritage impact through unintentional uncovering of unknown archaeological objects by certain project activities such as excavation,
- Potential social nuisance and conflicts between affected parties and or neighboring land users and Proponents due to the lack of communication or cooperation on raised issues and land use during construction.

12.2 Impact Assessment Methodology

The Environmental Assessment process primarily ensures that potential impacts that may occur from project activity are identified and addressed with environmentally cautious approaches and legal compliance. The impact assessment method used for this project is following Namibia's Environmental Management Act (No. 7 of 2007) and its Regulations of 2012, as well as the International Finance Corporation (IFC) Performance Standards.

The identified impacts were assessed in terms of scale/extent (spatial scale), duration (temporal scale), magnitude (severity), and probability (likelihood of occurring), as presented in **Table 6**, **Table 7**, **Table 8,** and **Table 9** respectively.

To enable a scientific approach to the determination of the environmental significance, a numerical value is linked to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner so that a wide range of impacts are comparable. It is assumed that an assessment of the significance of a potential impact is a good indicator of the risk associated with such an impact. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact.
- Assessment of the pre-mitigation significance of the impact; and
- Description of recommended mitigation measures.

The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the project for various features of the biophysical and social environment. The following criteria were applied in this impact assessment:

12.2.1 Extent (spatial scale)

The extent is an indication of the physical and spatial scale of the impact. **Table 6** shows the rating of impact in terms of the extent of spatial scale.

Table 5:Extent or spatial impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
The impact is localized within the site boundary: Site only	The impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	The impact extends National or international boundaries

12.2.2 Duration

Duration refers to the timeframe over which the impact is expected to occur, measured concerning the lifetime of the project. **Table 7** shows the rating of impact in terms of duration.

Table 6:Duration impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	The impact is quickly reversible, and short-term impacts (0-5 years)	Reversible over time; medium-term (5-15 years)	Impact is long-term	Long-term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

12.2.3 Intensity, Magnitude/severity

Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. The magnitude of alteration can either be positive or negative. These ratings were also taken into consideration during the assessment of severity. **Table 8** shows the rating of impact in terms of intensity, magnitude, or severity.

Table 7:Intensity, magnitude, or severity impact rating

Type of criteria	Negative				
	H- (10)	M/H- (8)	M- (6)	M/L- (4)	L- (2)
Qualitative	Very high deterioration, high quantity of deaths, injury or illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat/diversity or resource, severe alteration or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat/biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species/habitat/diversity or resource, no or very little quality deterioration.

12.2.4 Probability of occurrence

Probability describes the likelihood of the impacts occurring. This determination is based on previous experience with similar projects and/or based on professional judgment. **Table 9** shows impact rating in terms of probability of occurrence.

Table 8:Probability of occurrence impact rating

Low (1)	Medium/Low (2)	Medium (3)	Medium/High (4)	High (5)
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	A possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, and continuous. High risk or vulnerability to natural or induced hazards.

12.2.5 Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact "without mitigation" is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this section, for this assessment, the significance of the impact without prescribed mitigation actions is measured.

Once the above factors (**Table 6**, **Table 7**, **Table 8,** and **Table 9**) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

SIGNIFICANCE POINTS (SP) = (MAGNITUDE + DURATION + SCALE) X PROBABILITY

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate, or low significance, based on the following significance rating scale (**Table 10**).

Table 9:Significance rating scale

Significance	***Environmental Significance Points***	***Colour Code***
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	1 to 30	L
Neutral	0	N
Low (negative)	-1 to -30	L

Significance	*Environmental Significance Points*	*Colour Code*
Medium (negative)	-30 to -60	M
High (negative)	-60<	H

Positive (+) – Beneficial impact

Negative (-) – Deleterious/ adverse+ Impact

Neutral – Impacts are neither beneficial nor adverse

For an impact with a significance rating of high (-ve), mitigation measures are recommended to reduce the impact to a medium (-ve) or low (-ve) significance rating, provided that the impact with a medium significance rating can be sufficiently controlled with the recommended mitigation measures. To maintain a low or medium significance rating, monitoring is recommended for a period to enable the confirmation of the significance of the impact as low or medium and under control.

The assessment of the development phases is done for pre-mitigation and post-mitigation.

The risk/impact assessment is driven by three factors:

Source: The cause or source of the contamination.

Pathway: The route taken by the source to reach a given receptor

Receptor: A person, animal, plant, ecosystem, property, or a controlled water source. If contamination is to cause harm or impact, it must reach a receptor.

A pollutant linkage occurs when a source, pathway, and receptor exist together. Mitigation measures aim firstly, to avoid risk and if the risk cannot be avoided, mitigation measures to minimize the impact are recommended. Once mitigation measures have been applied, the identified risk would reduce to lower significance (Booth, 2011).

This assessment focuses on the three project phases namely, pre-development (Site acquisition and preparation phase), construction phase and Operational Phase. The potential negative impacts stemming from the proposed activities of the proposed site are described and assessed and mitigation measures are provided thereof. Further mitigation measures in a form of management action plans are provided in the Draft Environmental Management Plan.

12.3 Assessment of Potential Negative Impacts

The main potential negative impacts associated with the operation and maintenance phase are identified and assessed below:

12.3.1 Disturbance to the unused land

The project site is located on unused land. Construction activities such as site clearing, trenching/pitting, and geotechnical coring (if required) plus other earth moving activities can potentially lead to the disturbance of the land.

The effect of construction work on the land (when done over a wider spatial extent), if not mitigated, may hinder the land areas. Under the status quo, the impact can consider being of a medium significance rating. With the implementation of appropriate mitigation measures, the rating will be reduced to a lower significance. The impact is assessed in **Table 11** below.

Table 10:Assessment of the impacts of Valley development on unused land

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: -4	M: -3	M: -4	M/H: 5	M: -55
Post mitigation	L/M: -2	L/M: -2	L/M: -4	L/M: 3	L: -24

12.3.2 Land Degradation and Loss of Biodiversity

Fauna: The pitting, geotechnical coring (if required) and other earth moving activities carried out during phase two would result in land degradation, leading to habitat loss for a diversity of flora and fauna ranging from microorganisms to large animals(unlikely) and trees. Endemic species are most at risk since even the slightest disruption in their habitat can result in extinction.

Flora: Direct impact of construction works on flora will mainly occur through clearing for access routes and associated infrastructure. The dust emissions from construction activities may also affect surrounding vegetation through the fall of dust, if excessive. Some loss of vegetation is an inevitable consequence of the development. However, given a moderate abundance of vegetations and site-specific areas of construction, the impact will be localized, therefore manageable.

Under the status, the impact can be of a medium significance rating. With the implementation of appropriate mitigation measures, the rating will be reduced to a low significance rating. The impact is assessed in **Table 13** below.

Table 11:Assessment of the impacts of proposed Valley development on biodiversity

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: -4	M: -4	M: -6	M/H: 4	M: -56
Post mitigation	L/M: -3	L/M: -3	L/M: -4	L/M: 3	L: -30

12.3.3 Generation of Dust (Air Quality)

Dust emanating from site access routes when transporting equipment and supply to and from the site may compromise the air quality in the area. Vehicular movements from heavy vehicles such as trucks would potentially create dust, even if it is not anticipated to be low. Additionally, activities carried out as part of the construction works would contribute to the dust levels in the air. The medium significance of this impact can be reduced to a low significance rating by properly implementing mitigation measures. The impact is assessed in **Table 13** below.

Table 12: Assessment of the impacts of Valley development on air quality

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: -3	M: -3	M/L: -4	M/H: 4	M: -40
Post mitigation	L - 2	L - 2	L- 2	L - 1	L - 6

12.3.4 Water Resources Use

Water resources are impacted by project developments/activities in two ways - through pollution (water quality) or over-abstraction (water quantity) or at times both.

There will be no abstraction of groundwater. The impact on groundwater use is low but not zero since the provider (in this case the City of Windhoek) does source some of its water from groundwater resources and new developments have an indirect impact of the quality required from the reserves.

The impact of the project activities on the quality of the groundwater and the integrity of the surface water in the site streams is a concern (also raised by stakeholders).

Without the implementation of any mitigation measures, the impact can be rated as medium to high, but upon effective implementation of the recommended measures, the impact significance would be reduced to low as presented in **Table 14** below.

Table 13: Assessment of the Valley project impact on water resource use and availability

Mitigation Status	Extent	Duration	Intensity	Probability	Significance

Pre mitigation	M - 3	M/H - 3	L/M - 4	M/H - 4	M - 40
Post mitigation	L/M - 1	L/M - 1	L - 2	L/M - 3	L - 12

12.3.5 Soil and Water Resources Pollution

The proposed activities are associated with a variety of potential pollution sources (i.e., lubricants, fuel, and wastewater) that may contaminate/pollute soils, and eventually, surface and groundwater. The anticipated potential source of pollution to water resources from the project activities would be hydrocarbons (oil) from project vehicles, machinery, and equipment as well as potential wastewater/effluent from facility-related activities.

The spills (depending on volumes spilled on the soils) from machinery, vehicles, and equipment could infiltrate into the ground and pollute the fractured or faulted aquifers on site, and with time reach further groundwater systems in the area. However, it should be noted that the scale and extent/footprint of the activities where potential sources of pollution will be handled is relatively small. Therefore, the impact will be moderately low.

Pre-implementation of the mitigation measures, the impact significance is medium to high and upon implementation, the significance will be reduced to moderate. The impact is assessed in **Table 15** below.

Table 14: Assessment of the Valley project impact on soils and water resources (pollution)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 5	M/L - 3	M/L - 3	M - 4	M - 44
Post mitigation	L - 3	M - 3	L - 3	L/M - 3	L - 27

12.3.6 Waste Generation

During the construction phase, domestic and general waste is produced on-site. If the generated waste is not disposed of responsibly, land pollution may occur on site or around the site. The site is in an area of moderate sensitivity to pollution. Improper handling, storage, and disposal of hydrocarbon products and hazardous materials at the site may lead to soil and groundwater contamination, in case of spills and leakages. Therefore, the project needs to have appropriate waste management for the site. To prevent these issues, any hazardous waste that may have an impact on fauna, flora, water resources, and the general environment should be handled cautiously. Without any mitigation measures, the general impact of waste generation has a medium significance. The impact will reduce to low significance, upon

implementing the mitigation measures. The assessment of this impact is given in **Table 16** below.

Table 15: Assessment of waste generation impact

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M - 2	M - 6	M - 5	M – 50
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

12.3.7 Occupational Health and Safety Risks

Project personnel (workers) involved in the construction activities may be exposed to health and safety risks. These may result from accidental injury, owing to either minor (i.e., superficial physical injury) or major (i.e., involving heavy machinery or vehicles) accidents. The site safety of all personnel is the Proponent's responsibility and should be adhered to as per the requirements of the Labour Act (No. 11 of 2007) and the Public Health Act (No. 36 of 1919). The heavy vehicle, equipment, and fuel storage area should be properly secured to prevent any harm or injury to the project workers or local animals.

The use of heavy equipment, especially during excavation, and the presence of hydrocarbons on sites may result in accidental fire outbreaks, which could pose a safety risk to the project personnel, equipment, and vehicles. It may also lead to widespread veld fires if an outbreak is not contained and if machinery and equipment are not properly stored, the safety risk may be a concern for project workers and residents.

The impact is probable and has a medium significance rating. However, with adequate mitigation measures, the impact rating will be reduced to low. This impact is assessed in **Table 17** below and mitigation measures are provided.

Table 16: Assessment of the impacts of Valley development/construction on health and safety

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/L - 2	M - 6	M/H - 4	M – 44
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

12.3.8 Vehicular Traffic Use and Safety

The NRSTI Valley will be located right adjacent to the University of Namibia Campus (UNAM) in Windhoek. The Western Bypass (B1) found to its west and UNAM to its east. These are some of the main transportation routes for all vehicular movement in the area and provide access to the site and connect the project area to other towns. Traffic volume will therefore increase on these district roads during construction as the project would need delivery of supplies and services on site.

Depending on the project needs, trucks, medium-sized vehicles, and small vehicles will frequent the area to and from the site. This would potentially increase slow-moving heavy vehicular traffic along these roads and add additional pressure on the roads. However, transportation of materials and equipment is expected to occur on a limited schedule and only for the duration of the project. Therefore, the risk is anticipated to be short-term, not frequent, and therefore of medium significance. Before mitigation, the impact can be rated medium and with the implementation of mitigation measures, the significance will be low as assessed in **Table 18** below.

Table 17: Assessment of the impacts of Valley development on-road use (vehicular traffic)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 4	M/H - 3	L/M - 4	M/H - 5	M - 55
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

12.3.9 Noise and vibrations

Construction works may be a nuisance to surrounding communities (especially the Main Campus population) due to the noise produced by the activity. Excess noise and vibrations can be a health risk to workers on site. The construction equipment used on site is of medium size and the noise level is bound to be limited to the site only, therefore, the impact likelihood is minimal. Without any mitigation, the impact is rated as of medium significance. To change the impact significance from the pre-mitigation significance to a low rating, mitigation measures should be implemented. This impact is assessed in **Table 19** below.

Table 18: Assessment of the impacts of noise and vibrations from Valley construction activities

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M - 2	M - 6	M/H - 3	M – 30
Post mitigation	L - 1	L/M - 2	L - 2	L/M -2	L - 10

12.3.10 Disturbance to Archaeological and Heritage Resources

There is a possibility of unveiling/discovering new archeological and/or cultural materials in the proposed project area. If such Materials are found the areas must be mapped out and coordinates taken to establish “No-Go-Areas”, due to their sensitivity and then documented. They may be protected either by fencing them off or demarcation for preservation purposes, or excluding them from any development i.e., no other construction activities should be conducted near these recorded areas through the establishment of buffer zones.

This impact can be rated as medium significance if there are no mitigation measures in place. Upon implementation of the necessary measures, the impact significance will be reduced to a lower rating. The impact is assessed in **Table 20**.

Table 19: Assessment of the impacts of Valley construction on archaeological & heritage resources

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	M - 6	M/H - 4	M – 52
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

12.3.11 Impact on Local Roads/Routes

Construction projects are usually associated with the movements of heavy trucks and equipment or machinery that use local roads. Heavy vehicles traveling on local roads exert pressure on the roads and may make the roads difficult to use. This will be a concern if maintenance and care is not taken during the construction phase. The impact would be short-term and therefore, manageable.

Without any management and or mitigation measures, the impact can be rated as medium and to reduce this rating to low, the measures will need to be effectively implemented. The assessment of this impact is presented in **Table 21**.

Table 20: Assessment of Valley development of local services (roads and water)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M/H - 4	M - 3	M - 6	M - 3	M – 39
Post mitigation	L - 1	L - 1	M/L - 4	M/L -2	L - 12

12.3.12 Social Nuisance: Local Property intrusion and Disturbance/Damage

The presence of some non-UNAM-associates (students, staff and contractors) may lead to social annoyance to the project community. This could particularly be a concern if they enter or damage private property (belonging to UNAM or UNAM members). The private properties of the locals may include any properties of economic or cultural value (cars, plus other belongings). The unpermitted and unauthorized entry to private property may cause crashes between the affected parties and the Proponent.

The impact is rated as of medium significance. However, upon mitigation (post-mitigation), the significance will change from a medium to a low rating. The impact is assessed below **(Table 22)**.

Table 21: Assessment of the social impact of community property damage or disturbance

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 2	M - 3	M - 4	M/H - 3	M – 27
Post mitigation	L - 1	L - 1	M/L - 4	M/L -2	L - 12

12.4 Cumulative Impacts Associated with Proposed Project

According to the International Finance Corporation (2013), cumulative impacts are defined as “impacts that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as “developments”) when added to other existing, planned, and/or reasonably anticipated future impacts”.

Like many other construction projects, some cumulative impacts to which the proposed project and associated activities potentially contribute, are the:

- **Impact on road infrastructure:** The proposed construction activity contributes cumulatively to various activities such as traveling associated with tourism and local daily routines. The contribution of the proposed project to this cumulative impact is however not considered significant, given the short duration, and spatial extent of the intended construction activities.
- **Use of water**: While the contribution of this project will be significant, mitigation measures to reduce water consumption during works is essential.

13 RECOMMENDATIONS AND CONCLUSION

13.1 Recommendations

The potential positive and negative impacts of the proposed activities were identified and assessed and appropriate management and mitigation measures (to negative impacts) were made thereof for implementation by the Proponent, their contractors, and project-related employees.

Mitigation measures for identified issues have been provided in the Environmental Management Plan, for the Proponent to avoid and/or minimize their significant impacts on the environmental and social components. Most of the potential impacts were found to be of medium-rating significance. With effective implementation of the recommended management and mitigation measures, a reduced rating in the significance of adverse impacts is expected from Medium to Low. To maintain the desirable rating, the implementation of management and mitigation measures should be monitored by the Proponent directly, or their Environmental Control Officer (ECO). The monitoring of implementation will not only be done to maintain a low rating but also to ensure that all potential impacts identified in this study and other impacts that might arise during implementation are properly identified in time and addressed right away.

The Environmental Consultant is confident that the potential negative impacts associated with the proposed project activities can be managed and mitigated by the effective implementation of the recommended management and mitigation measures and with more effort and commitment put into monitoring the implementation of these measures.

It is, therefore, recommended that in the case of granting an ECC for this project, the proposed construction and post development activities may be granted an ECC, provided that:

- All the management and mitigation measures provided in the EMP are effectively and progressively implemented.
- All required permits (for instance for GMOs), licenses, and approvals for the proposed activities should be obtained as required. These include permits and licenses for land use access agreements to develop such a facility within municipal boundaries of Windhoek and ensure compliance with these specific legal requirements.
- The Proponent and all project workers and contractors must comply with the legal requirements governing the project and ensure that all required permits and or approvals are obtained and renewed as stipulated by the issuing authorities.
- Site areas where construction activities have ceased are rehabilitated, as far as practicable, to their pre-used state.

13.2 Conclusion

It is crucial for the proponents and their contractors to effectively implement the recommended management and mitigation measures, to protect the biophysical and social environment throughout the project duration. This would be done to promote environmental sustainability while ensuring a smooth and harmonious existence and purpose of the project activities in the community and environment at large. It is also to ensure that all potential impacts identified in this study and other impacts that might arise during implementation are properly identified in time and addressed accordingly. Lastly, should the ECC be issued, the Proponent will be expected to be compliant with the ECC conditions as well as legal requirements governing the construction Genetically Modified Organisms laboratories and related support facilities in Namibia.

14 REFERENCES

Booth, P. (2011). Environmental Conceptual Site Model Exercise: Source – pathway – receptor. WSP Global: Semantic Scholar

Khomas Regional Council (2024). Economic & Investment Potentials. Available at https://khomasrc.gov.na/investment

Khomas Regional Council (2024). Infrastructures. Available at https://khomasrc.gov.na/infrastructures

Mapani, B., Cornell, D. and van Schijndel, V. (2014). Geochronology and tectonic evolution of the Hohewarte Complex, central Namibia: New insights in Paleoproterozoic to Early Neoproterozoic crustal accretion processes. Journal of African Earth Sciences, 99, 228-244.

Mendelsohn, J. (2002). Atlas of Namibia: A Portrait of the Land and its People. Windhoek: The Ministry of Environment and Tourism of Namibia.

Miller, R. M. (2008a). The geology of Namibia (Vol. 1, 1-1 – 11-2). Ministry of Mines and Energy, Geological Survey.

Miller, R. M. (2008c). The geology of Namibia (Vol. 3, 16-1 -28-1). Ministry of Mines and Energy, Geological Survey.

Miller, R. M., Carr, R., van der Merwe, B., Symons, G., Murray, R., and Amputu, M. (2018). Some Geological and Geophysical Aspects of the 2016/2017 Drilling Campaign in the Windhoek Aquifer. Communications of the Geological Survey of Namibia, 19, 8-19.

Murray, E. C. (2002). The Feasibility of Artificial Recharge to the Windhoek Aquifer. Unpublished PhD Thesis, University of Free State, South Africa.

Namibia Statistics Agency (2024). Namibia 2023 Population and Housing Census Main Report. Available at http://www.nsa.org.na/

Namibia Statistics Agency (2024). 2023 Population & Housing Census Preliminary Report. Available at http://www.nsa.org.na/

Stubenrauch Planning Consultants (2004). Consulting services for the environmental impact assessment for the establishment of extensions in the south of the Windhoek Basin. City of Windhoek: Department of Planning, Urbanisation and Environment. Windhoek, Namibia.

World Weather Online (2024) https://www.worldweatheronline.com/windhoek-weather-averages/windhoek/na.aspx

World Reference Base for Soil Resources (2014). International soil classification system for naming soils and creating legends for soil maps, update 2015. World Soil Resources Reports No. 106. FAO, Rome.