# REPORT: ENVIRONMENTAL IMPACT ASSESMENT SCOPING REPORT AND ENVIROMENTAL MANAGEMENT PLAN

Environmental Assessment Scoping Report

**TITLE OF PROJECT:**

PROPOSED MINERAL EXPLORATION ACTIVITIES ON EPLS 7072 AND 7122, OKARUKAMBE CONSTITUENCY OMAHEKE REGION-NAMIBIA ENVIRONMENTAL SCOPING REPORT AND ENVIRONMENTAL MANAGEMENT PLAN

**REPORT PREPARED FOR**

*Office of the Environmental Commissioner*
Ministry of Environment and Tourism
Namibia

**APPLICATION NO:**

**(Proponent)**
New Horizon Investment Group

**(Environmental Consultant)**

Cuvepalm Consulting cc
**Contact person: T. Kasinganeti**

**Phone:** +264 (0) 813634904

**Email address:** ekasinganetie@gmail.com

| | |
|---|---|
| DOCUMENT VERSION | 001 |
| PROJECT NAME | **PROPOSED MINERAL EXPLORATION ACTIVITIES ON EPLS 7072 AND 7122, OKARUKAMBE CONSTITUENCY OMAHEKE REGION-NAMIBIA ENVIRONMENTAL SCOPING REPORT AND ENVIRONMENTAL MANAGEMENT PLAN** |
| REPORT TITLE | **ENVIRONMENTAL IMPACT ASSESMENT SCOPING REPORT AND ENVIRONMENTAL MANAGEMENT PLAN** |
| PROPONENT | **NEW HORIZON INVESTMENT GROUP NAMIBIA**<br>**CONTACT PERSON: Mr Ben Biwa**<br>**PHONE NO:+264811282636**<br>**EMAIL ADDRESS:** benbiwa@hotmail.com |
| ENVIRONMENTAL CONSULTANT | **CUVEPALM CONSULTING CC**<br>**POSTAL BOX:** 20 Joseph Ithana Mukwayu Street, Ludwigsdorf<br>**PHONE NO:** +264 (0) 813634904<br>**EMAIL ADDRESS:** ekasinganetie@gmail.com |
| MET PROJECT NO. | **APP-0002413** |
| AUTHORS | **TENDAI E. KASINGANETI**<br>**MARTIN LUTHER SHIKONGO** |
| DATE OF SUBMISSION | **29 September 2021** |

**LIST OF FIGURES**

## ACRONYMS

| TERMS | DEFINITION |
|---|---|
| BID | Background Information Document |
| CE,V, E | Critically Endangered, Vulnerable, Endangered |
| CPC | Cuvepalm Consulting cc |
| EAP | Environmental Assessment Practitioners |
| ECC | Environmental Clearance Certificate |
| ECO | Environmental Control Officer |
| EIA (R) | Environmental Impact Assessment (Report) |
| ESIA | Environmental and Social Impact Assessment |
| EMP | Environmental Management Plan |
| EMPr | Environmental Management Plan Report |
| GHGs | Greenhouse Gasses |
| IUCN | International Union for Conservation Network |
| ISO | International Organization for Standardization |
| I&Aps | Interested and Affected Parties |
| MAWLR | Ministry of Agriculture Water Land Reform (Namibia) |
| MEFT: DEA | Ministry of Environment Forestry and Tourism's (Directorate of Environmental Affairs) |
| MME | Ministry of Mines and Energy(Namibia) |
| NHC | National Heritage Council |
| ToR | Terms of Reference |
| UNFCCC | United Nations Framework Convention on Climate Change |
| mamsl | Meter above mean sea level |
| mbgl | Meter below ground level |
| RWL | Rest water level |
| S-P-R | Source-Pathway-Receptor linkage |
| TOR | Terms of Reference |

**DEFINITION OF TERMS**

- Biodiversity - this refers all the different kinds of life you'll find in one area—the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world
- The 'Consultant' – this refers to the team that is conducting the ESIA and the preparation of the EMP for the development
- The 'Proponent' – this refers to the institutions/departments that are directly involved in the implementation of the project, i.e., NGIG.
- The 'Stakeholders' – this refers to the people, organisations, NGOs that are directly or indirectly affected and interested by the project.
- The 'Environment' – this refers to the ecology, economy, society, and politics.
- Rehabilitation - this refers to the repair of disturbed ecosystem, but not necessarily to its pre-disturbance biodiversity.
- Restoration -To re-instate the pre-disturbance biodiversity pattern and process.

**Purpose of This Environmental Impact Assessment Report**

This Environmental Scoping Report (ESR) follows on the Scope of Work delineated by Ministry of Environment Forestry and Tourism (MEFT) and New Horizon Investment Group for the proposed exploration activities. Existing information and input from commenting authorities, Interested and Affected Parties (I&APs) were used to identify and evaluate potential environmental impacts (both social and biophysical) associated with the proposed project.

Environmental flaws associated with the proposed project were identified through the ESR. A conscious decision was made based on the recommendations and guidelines by the Directorate of Environmental Affairs EIA guidelines to assess both significant and less significant environmental impacts proposed by the development. The developed Environmental Management Plan (EMP) for this proposed activity will have to be effectively implemented by the client, to ensure that adverse environmental impacts are considered and effectively mitigated.

The detailed assessment of the anticipated impacts was undertaken with the purpose of highlighting any areas of concern regarding to the proposed project during its construction, operation, and decommissioning phases. In addition, an independent sensitivity analysis of the geohydrology associated with project site was undertaken. This analysis characterised the development site on the significant environmental aspects to reflect the sites suitable and unsuitable (no-go) development footprint areas. This action guided the final footprint of the proposed cattle feedlot.

This ESR will also be used to motivate and define the previously identified, project alternatives (i.e., site, technology,) based on the findings of the environmental baseline study and the suitability of the site to the type of development. This ESR has been compiled in accordance with the regulatory requirements stipulated in the EIA Regulations (2012), promulgated in terms of the Namibian environmental legislation (Environmental Management Act (No. 7 of 2007).

The EIAR aims to:

- Provide an overall assessment of the social, physical, and biophysical environments of the areas affected by the proposed exploration activities
- Undertake a detailed environmental assessment, in terms of environmental criteria and impacts (direct, indirect, and cumulative), and based on environmental sensitive recommend sites for the establishment of staging areas or field camps.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
- Undertake a fully inclusive Public Participation Process (PPP)
- GIS sensitivity mapping to identify potential impacts, propose mitigation, and inform the sensitivity analysis.
- A systematic approach was adopted for the successful completion of the EIA in line with the regulated process.

**Assumptions and Limitations**

The following assumptions and limitations underpin the approach to this EIA study:

- The information received from the stakeholders, desktop surveys and baseline assessments are current and valid at the time of the study.
- A precautionary approach was adopted in instances where baseline information was insufficient or unavailable.
- Mandatory timeframes will apply to the review and adjudication of the reports by the competent authority and other government departments; and
- Mandatory Environmental compliance control and Reporting will be undertaken each month once project is operational and this ESIA Report will be upgraded if new project features are proposed.

*NB: The EAP does not accept any responsibility if additional information comes to light at a later stage of the EIA process. All data from unpublished research utilised for the purpose of this project is valid and accurate. The scope of this investigation is limited to assessing the potential biophysical, social, and economic impacts associated with the proposed project*

## EXECUTIVE SUMMARY

New Horizon Investment Group cc (NHIG) proposes to undertake mineral prospecting and exploration activities in Omaheke Region, Namibia. The Ministry of Mines and Energy (Namibia) granted the company w two (2) adjoining exclusive prospecting licences (EPLs) 7072 and 7122. The two EPLs are located approximately 40 -70 km north and northwest of Witvlei, Okorukambe constituency, Omaheke Region (Namibia). The total and combined surface area of the EPLs is 39 340.6 hectares (ha). The area previously underwent preliminary exploration activities that ended in the 1970s. Based on results of initial geophysical survey and mineral assessment reports, the EPLs have a potential for base and rare metals, industrial minerals, non-nuclear fuel minerals, and precious metals. The proponent has preliminarily identified key exploration targets within the EPL area. Mechanical excavations or trenching will be assumed for the purpose of detailed analysis of specific areas. According to NHIG, commodities of interest is primarily base metals (copper and iron) only. Should exploration result prove that mineral deposits are economically viable to mine, NHIG would then lodge an application for a mining licence with MME.

To satisfy the requirements of Namibia's *Environmental Management Act No.7* of *2007* aimed at ensuring that the natural environment is not adversely affected, NHIG appointed Cuvepalm Consulting cc (CPC) to conduct the Environmental Impact Assessment (EIA) for the mineral exploration activities and apply for an Environmental Clearance Certificate. Based on the assessment method employed, land degradation due to exploration activities is regarded of high significance as it can adversely affect the ecological setting. Based on the analysis, most impacts are anticipated to be localized and can be effectively mitigated through the implementation of mitigation measures recommended in the Environmental Management Plan (EMP). Observance of ultimate control measures in respect of environmental pollution that may manifest is paramount to ensuring environmental sustainability and particularly the welfare and livelihood of the farming community. With the correct implementation of EMP, a financial commitment for progressive rehabilitation, a comprehensive monitoring program and a robust occupation health and safety programme, impacts of a "*high*" significance rating are not expected. This EIA report has been prepared for NHIG and forms part of an application for an Environmental Clearance Certificate submitted to the Ministry of Environment Forestry and Tourism (Office of Environmental Commissioner, Republic of Namibia).

# 1. CHAPTER ONE: BACKGROUND

## 1.1. Introduction

The proponent, New Horizon Investment Group (NHIG) is an indigenous Namibian enterprise that is involved in the mining sector since 2010. The company has identified the economic potential of mineral deposits found in Omaheke. NHIG is a holder of a licence to explore a land area of 39 340.6 hectares (ha). The area covered by Exclusive Prospecting Licence (EPL 7122 and 7072), consisting of thirteen (13) commercial farms. The EPLs were granted by the MME in 2018. At the time of producing the report, no exploration has been conducted in respect of the above stated EPLs. In addition, the outcome of EPL (7122 renewals is pending. In this respect, NHIG plans to undertake mineral exploration activities, primarily targeting copper ore deposits. As per the requirements of the Environmental Management Act No. 7 of 2007, an environmental clearance certificate is needed prior to commencement of exploration activities. Cuvepalm Consulting cc (CPC) was appointed by NHIG on 18 February 2021 to conduct an Environmental and Social Impact Assessment (ESIA) and develop an Environmental & Social Management Plan (ESMP) for the proposed project. This has been followed by the registration of an application for Environmental Clearance Certificate (ECC) with the Ministry of Environment and Tourism (MET): Directorate of Environmental Affairs (DEA).

Subsequently, this document forms part of the application to be made to the DEA's office for an Environmental Clearance certificate for the proposed activity, in accordance with the guidelines and statutes of the Environmental Management Act No.7 of 2007 and the environmental impacts assessment regulations (GN 30 in GG 4878 of 6 February 2012).

## 1.2. Project Location

The project site is situated approximately 40 and 70 km north of Witvlei (Omaheke Region). Access to exploration site can be obtained by gravel roads turning off from the National Road No. B 6 linking Windhoek and Gobabis. The EPLs comprise of commercial farmland. The maps below (Fig 1 and Fig 2) depict the area for proposed exploration activities.

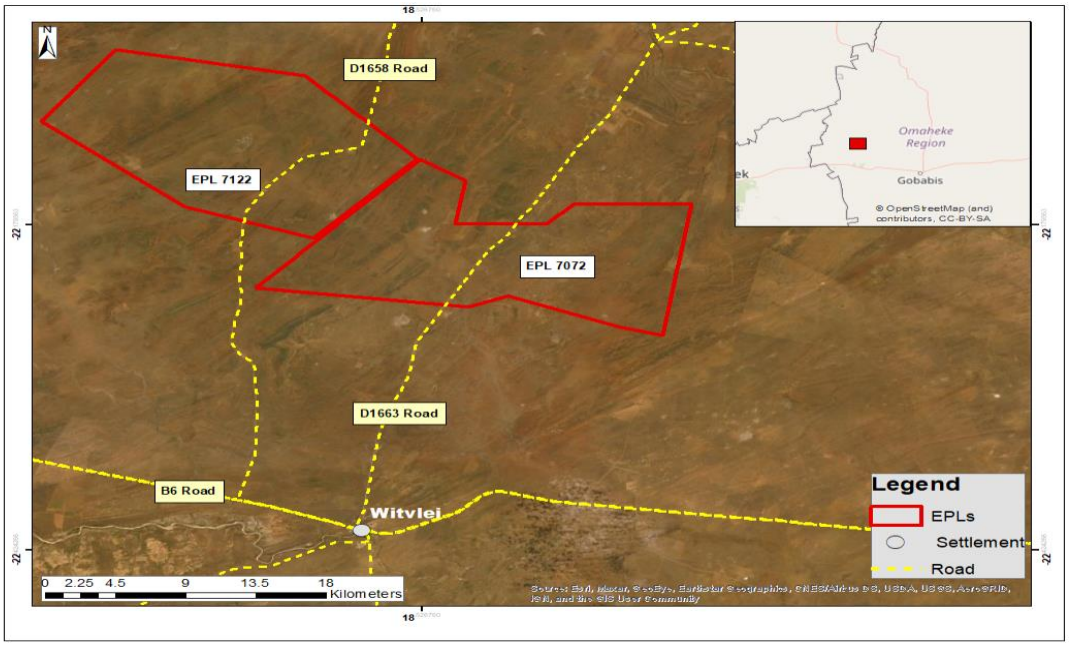


**Figure 1:Overview of project site, EPL 7122 and 7072**

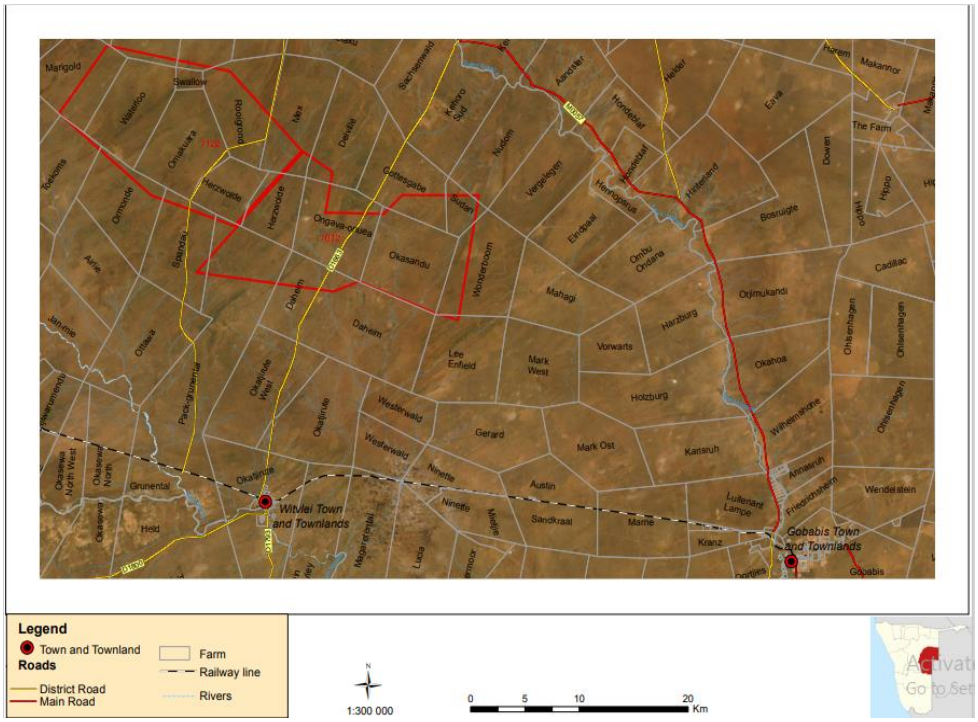


**Figure 2:Commercial farms relating to EPLs**

## 1.3. Project Activities

Explorations comprise various phases. For this EIA, the phase-based activities were categorized to enable impact assessment and analysis. The different project sections are as follows:

### 1.3.1. Construction Phase (Site Preparation)

Access agreements will guide the working relationship between landowners and exploration team. The exploration team will undertake initial site visits to identify appropriate sites for the establishment of field camps. The field camps are for the safe keep of exploration equipment and vehicles before use. No employees will be housed in the EPLs. Site preparation activities will begin once surface drainage and ground water conditions are understood by. Exploration will only commence after ecological sensitive areas are known and agreed jointly with landowners.

*Land clearing:* Small land parcels will be cleared for the establishment of base or field camps and staging areas. Proponent shall ensure that areas identified are those that present minimal disturbance to the natural environment and wildlife.

*Creation of access routes and haul tracks*: Apart from the existing farm roads network leading to target areas, additional tracks (extensions from farm roads) may be created. Additional roadways may be considered for the purposes of accessing target sites. Where deemed necessary, graveling, and compaction of vehicle track's surfaces may be considered to allow for less track maintenance and seam less flow of traffic. No roads of bitumen standard exist in the EPL area. No permanent structures will be built for exploration works.

*Fencing:* Where deemed feasible, fences will be erected around field camps and target areas. Fencing will serve to keep out livestock from target sites

### 1.3.2. Operational Phase

The phase typifies an advance level of exploration. Sampling will serve to validate prior exploration results of the mineral deposits. The appropriate ness of the bulk sample will be related to the deposit morphology. Stripping will involve the removal of overburden material overlaying the ore deposits. The overburden material will comprise of topsoil and rock material. A bulldozer will be used to move over burden material

Trenches will be excavated mechanically up to a maximum depth of 5 meters, exposing the ore deposit. Trenches will be 50m long and 5m wide. Backhoe excavators will be used for excavations. Waste rock will be stockpiled adjacent to trenches.

The ores (oxides) anticipated are namely Malachite, Cuprite, Chrysocolla and Azurite. At the exploration site (staging areas), a primary crusher unit and an ore screen will be installed. Primary crushed ore will be crushed further to obtain a product of -150 mm and + 50mm to liberate the high-grade ore. Front end -Loaders will used to load the ore onto 30 tonne haulage trucks. The crushed ore will be required for performing processing trials part of metallurgical testing programme. The final objective is the acquisition of quantitative information required for evaluating the deposit as part of NHIG research and development programme and ultimately inform decision that leads to a profitable operation.

*Site Rehabilitation*: Dug out trenches will be back filled with waste rock (gangue). Stockpiled top soil will be returned to the backfilled areas. Sites will also be re-vegetated and returned to a pre-exploration state. Rehabilitation will be done concurrent with exploration (ore removal etc).

*Water requirements:* Water will be sourced from existing boreholes. About 80,000 litres (80 $m^3$) per day would be required. This amount of water is aimed at suppressing dust around tipping areas and vehicle tracks. Approximately 200 *liters* of domestic water will be needed per day.

Waste management: Waste material generated will be in the form of rock material (non-mineral) and derived from trenching activities. Insignificant amounts of domestic waste will be generated by the exploration team. Domestic or general waste will be transported out of the EPL area on a daily basis and disposed at an approved land fill site. There are no licenced waste disposal sites in the project area.

Sewage Management: During exploration, sufficient portable chemical toilets will be provided for workers and appropriately emptied according to their manufacturer's operational standards and legislated occupational sanitary provisions. Licenced waste contractors will provide sewage removal services.

**Exploration equipment, Materials and Services:**

Construction equipment will be sourced from contractors proximate to the project site. Were deemed essential, equipment will need to be sourced from elsewhere in the country and/or abroad as per the required and approved operating standards.

Labour sourcing: Temporary employment opportunities will be created during the duration of exploration activities. Most labourers will be sourced from Witvlei (approximately 40 to 70 km from project site). The exact number of people to be employed could not be secured at the time of preparing this report as work will be outsourced to contractors as per NHIG procurement policy. Contractors will determine the exact number of the workers required. However, employment of locals is encouraged.

**Housing**: Personnel will not be accommodated in the EPL area but will commute daily from Witvlei.

### 1.3.3. Decommissioning/Closure Phase

This phase will involve the removal of equipment and dismantling of facilities and safe closure. All trenches will be backfilled. The surface affected by exploration will be rehabilitated and re-vegetated in accordance with applicable standards.

## 1.4. Need and Desirebility

Namibia's economic model continues to be influenced by the exploitation of mineral resources. According to the National Planning Commission Report (2021), the average contribution of the mining sector to GDP between 1990 and 2018 is significant and favourably stand at 11.1 %. Mining remains the largest earner of Namibia's foreign exchange at about 45%. Mineral prospecting is enshrined in National Development Plan (NDP V), Vision 2030. The Harambee Prosperity Plan II plan (Pillar 2) place emphasis on economic advancement with view to enhance the productivity of priority sectors such as mining. However, mining development can be constraint by insufficient investment in mining exploration. The project inherently promote economic socio- advancement through employment creation. The 2018 Labour Force Survey 2018 indicates that mining employs 1.7% of the total employed persons (NSA, 2019). Mining exploration is thus encouraged so that the sector can contribute more to the Namibian economy (NPC, 2021.

At a global level, Industrialization continues to drive a high demand for industrial minerals. Notably mineral production continues to contribute significantly towards job and wealth creation amongst various nations. Copper prices traded at US 10 747 per tonne in May 2021 (Malango, 2021). Enabling the availability of mineral sources in combination of favourable prices worldwide has a positive effect on the world's economy. It's anticipated that copper and other minerals such as lead, and zinc will be Namibia's top performing exports in 2021. The proposed project presents an exciting market opportunity in respect of copper sales. Explorations relating to base and earth metals such as copper can contribute to national income as achieved through direct and indirect tax income (corporate, personal, VAT, secondary, others) levies and customs. Several long-term trends are presently driving growth in mineral demand and are expected to continue to do so in the coming decades. According to the World Bank (2017), a ten-fold rise in demand for metals by 2050.

Omaheke ranks low and falls within the category of least of developed administrative regions in Namibia. The economy of Omaheke is centred on commercial production of livestock. Exploration presents an interesting prospect for expanding and diversifying the regional economy that remains largely dependent on cattle production. Living conditions are expected to increase through economic spinoffs/investments.Equally the proposed development can have an impact on direct and induced employment realized through the supply chain, and provision of support services. The project would require approximately 15 employees during the initial phase. Indirect jobs will manifest due to the out-sourcing of short-term services (maintenance, transportation) to sub-contractors. Highly skilled workforce may be sourced from the broader region. Based on the assumption that exploration takes place over a period of 12 months, this can create additional income for local and distant communities alike. However, the impact of exploration is expected to be felt at household level with people in fulltime employment. The positive impact of job creation is considered to be of high significance due to the high unemployment prevalence rate amongst unskilled or semi-skilled population group of the Region.

# 2. CHAPTER TWO: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

To ensure that the proposed development comply with the legal requirements for good practice and preservation of the environment, a review of applicable Namibian and international legislation, policies and guidelines have been consulted. This review serves to inform the project Proponent, Interested and Affected Parties and the decision makers at the DEA of the requirements and expectations, as laid out in terms of these instruments.

The project triggers the following Namibian legal instruments.

The Constitution of the Republic of Namibia (1990).

Environmental Assessment Policy of Namibia 1994.

Environmental Management Act No. 07 of 2007.

EIA Regulations GN 57/2007 (GG 3812).

The Water Act 54 of 1956.

The Water Resources Management Act No. 11 of 2013.

Pollution Control and Waste Management Bill.

Atmospheric Pollution Prevention Ordinance 11 of 1976.

National Solid Waste Management Strategy.

Soil Conservation Act 76 of 1969.

Road Traffic and Transport Act, No. 22 of 1999.

Forest Act 12 of 2001.

Mineral Policy of Namibia

National Policy on Climate Change for Namibia (2011).

National Climate Change Strategy & Action Plan 2013 – 2020.

Nature Conservation Ordinance (1996).

National Biodiversity Strategy and Action Plan (NBSAP2) 2013 – 2022.

Labour Act 11 of 2007.

Health and Safety Regulations GN 156/1997 (GG 1617).

Public Health Act 36 of 1919.

Public and Environmental Health Act 1 of 2015; and

National Heritage Act 27 of 2004.

**These above-listed legislations and policies and their inclusion in the proposed project assessment are further presented in Table 2 below.**

**Table 1: Policies, Legal and Administrative Regulations**

| LEGISLATION/POLICY | PROVISION/SUMMARY | PROJECT APPLICABILITY |
|---|---|---|
| The Constitution of the Republic of Namibia (1990) | The articles 91(c) and 95 (i) commits the state to actively promote and sustain environmental welfare of the nation by formulating and institutionalising policies to accomplish the Sustainable objectives which include:<br>Guarding against overutilization of biological natural resources,<br>Limiting over-exploitation of non-renewable resources,<br>Ensuring ecosystem functionality,<br>Maintain biological diversity. | Exploration activities can interfere with ecological processes. Attention should be given to the state of water resources and biodiversity |
| Environmental Assessment Policy of Namibia 1994 | The Environmental Assessment Policy of Namibia states Schedule 1: Screening list of policies/ plans/ programmes/ projects subject to environment must be accompanied by environmental assessments. "The development activities" are on that list. | The activity triggers an environmental impact assessment prior to commencement |
| | The policy provides a definition to the term "Environment" broadly interpreted to include biophysical, social, economic, cultural, historical, and political components and provides reference to the inclusion of alternatives in all projects, policies, programmes, and plans. | The proposed development requires the assessment of all possible environmental and social impacts to avoid, minimise or compensate environmental damage associated with the activities. |
| Environmental Management Act No. 07 of 2007 | Requires that activities with significant environmental impact are subject to an environmental assessment process (Section 27).<br>Requires for adequate public participation during the environmental assessment process stakeholders to give their opinions about a project (Section 2(b-c)).<br>According to Section 5(4) a person may not discard waste as defined in Section 5(1)(b) in any way other than at a disposal site declared by the<br>Section 3 (2) (b) states that "community involvement in natural resources management and the sharing of benefits arising from the use of the resources, must be promoted and facilitated" is key.<br>Section 3 (2) (e) states that "assessments must be undertaken for activities which may have a significant effect on the environment or the use of natural resources". | The nature of the proposed exploration and interrelated activities has potential to cause adverse environmental impacts to the surrounding environment. Activities such as trenching can cause significant environmental impacts. Therefore, proper assessments should guide project planning<br>The EIA study considered full stakeholder participation. Stakeholder consultation was fully conducted.<br>The proposed development is involving the utilisation of natural resources (water and land). Therefore, benefits from the implementation of the project must be shared equally.<br>Environmental cost relating to project shall not be borne by communities found in the project area and surroundings.<br>Project shall not commence without an environmental clearance certificate |

| LEGISLATION/POLICY | PROVISION/SUMMARY | PROJECT APPLICABILITY |
|---|---|---|
| EIA Regulations GN 57/2007 (GG 3812) | Details requirements for public consultation within a given environmental assessment process (GN No 30 S21).<br>Details the requirements for what should be included in an Environmental Scoping Report (GN No 30 S8) and an EIA report (GN No 30 S15). | The implementation of the project triggers the need for consultation of all affected and interested stakeholders regarding the development at all project development phases from planning to operation of the facility. A public consultation meeting was held in respect to this, and all the concerns and issues were noted and addressed in this report. |
| The Water Act 54 of 1956 | The Act was formulated to consolidate and amend the laws relating to the control, conservation and use of water for domestic, agricultural, urban, and industrial purposes; to make provision for the control, in certain respects, of the use of sea water for certain purposes; for the control of certain activities on or in water in certain areas. | The proposed development has a daily requirement of approximately 80 000 litres. The activities directly affecting water conservation, management and use therefore, requires the implementation of water conservation measures. |
| Minerals (Prospecting and Mining) Act, 1992 (Act no. 33 of 1992) | Act provides the licensing procedures, the rights of holders, the administration, and the ownership of minerals. In addition, the Act requires mining companies to provide detailed studies on the potential impact of the operations to the surrounding environment, how to mitigate them and rehabilitations plans | Prospecting or mining operations shall not commence except in accordance with license granted.<br>Renewals of EPLs are accommodated twice for two-year periods, with the area decreasing by 25 per cent with each renewal |
| Pollution Control and Waste Management Bill | 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."<br>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 proposed activity triggers Section 21 and 22 of the bill. Activities such as trenching transportation, primary crushing may require the robust adoption of in-situ pollution mitigation measures.<br>Contractors of the civil works of the project should make it mandatory that they manage their waste in a manner that do not cause environmental harm and risk both to the surroundings and the local communities. |
| Atmospheric Pollution Prevention Ordinance 11 of 1976 | The law provides for the prevention of atmospheric pollution, and for matters incidental thereto. The law regulates and prohibit pollution from industries particularly smoke and dust. The ordinance considers air pollution from point sources but does not address air quality standards, | Mineral exploration processes will most likely affect ambient air quality. Efforts to suppress and monitor dust should be adopted as recommended in the EMP. |

| LEGISLATION/POLICY | PROVISION/SUMMARY | PROJECT APPLICABILITY |
|---|---|---|
| National Solid Waste Management Strategy | The Strategy ensures that the future directions, regulations, funding, and action plans to improve solid waste management are properly co-ordinated and consistent with national policy, and to facilitate co-operation between stakeholders<br>Waste disposal presents a challenge to solid waste management in Namibia. The top priority is to reduce risks to the environment and public health from current waste disposal sites and illegal dumping in many areas of Namibia. | Exploration activities can potentially generate significant amount of waste material that need careful management. The obligation to meet waste management objectives should be borne by both proponent and contractors.<br>The proponent should limit the exposure of waste to the natural environment and surrounding.<br>In-situ waste management plans should be adopted and implemented prior the commencement of operations.<br>Rock waste and other non-mineral waste should be stored and disposed in an environmental friendly manner. Waste should be carted away to licences waste disposal sites. |
| Soil Conservation Act 76 of 1969 | The Act established to consolidate and amend the law relating to the combating and prevention of soil erosion, the conservation, improvement, and manner of use of the soil and vegetation and the protection of the water sources in the Republic of Namibia. | The construction of auxiliary infrastructure such as access roads or tracks to exploration targets should include systems and mechanism for preventing erosion. |
| Road Traffic and Transport Act, No. 22 of 1999 | 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. | Mitigation measures should be provided for if the roads and traffic impacts cannot be avoided. Should the proponent wish to undertake activities involving road transportation or creation new access adjoining national roads, relevant permits will be required from the Ministry of Works and Transport |
| Forest Act 12 of 2001 | Section 10 (1) set out the aim of the forest management as to:<br>The purpose for which forest resources are managed and developed, including the planting of trees where necessary in Namibia is to conserve soil and water resources, maintain biological diversity and to use forest produce in a way which is compatible with the forest's primary role as the protector and enhancer of the natural environment. | The proposed project will likely result in the disturbance of indigenous vegetation of conservation significance including the disruption of biological processes. |
| | (b) any living tree, bush or shrub growing within 100 metres of a river, stream, or watercourse. | The project will not result in the removal of living trees, bushes and shrubs growing within 100m of a river, stream, or watercourse. |

| LEGISLATION/POLICY | PROVISION/SUMMARY | PROJECT APPLICABILITY |
|---|---|---|
| | (2) A person who wishes to obtain a licence to cut and remove the vegetation referred to in subsection (1) shall, in the prescribed form and manner, apply for the licence to a licensing officer who has been designated or appointed for the area where the protected area is situated. | The removal of trees in the above instances would require the contractors or sub-contractors to acquire necessary permits first. |
| National Policy on Climate Change for Namibia (2011) | The National Policy on Climate Change pursues constitutional obligations of the Government of the Republic of Namibia, namely for "the state to promote the welfare of its people and protection of Namibia's environment for both present and future generation." | Measure should be adopted by NHIG to prevent or minimise toxic emissions into the atmosphere. Dust suppression and monitoring will be employed, to ensure that air quality objective tied to climate change mitigation are met. |
| National Climate Change Strategy & Action Plan 2013 - 2020 | The Strategy outlines Namibia's response to climate change. The strategy aims to address and plan for action against climate change, both through mitigation and adaptation actions. In its adaptation strategy, the Strategy recognises the role of a sustainable water resource base. | The development should adopt measures that strengthen sustainable utilization of water resource The implementation should be very careful on not to cause harm to the available water resources but improve the management through various conservation technics. |
| | The Strategy proposed strategies that aim to:<br>Strategic Aim 1: Further improve the overall climate change understanding and related policy responses in water resources sector.<br>Strategic Aim 2: Monitoring and data collecting technologies of surface and underground water are developed and implemented at basin/watershed level. | The proponent should invest capital on strengthening climate change and adaptation through cleaner production systems implementation.<br><br>Certification by international standards such as ISO14001 can help with climate sustainability, and is recommended. |
| Nature Conservation Ordinance (1996) | This ordinance relates to the conservation of nature; the establishment of game, parks, and nature reserves; the control of problem animals; and highlights matters incidental thereto. | The activities of the project are highly localized. The likelihood of project activities interference with any protected parks and nature reserves objectives is non-existent. However, there is need for proper designing and planning of the drainage and water network of the project to make sure that any service infrastructure is not in conflict with the provisions listed in the Nature Conservation Ordinance.<br>All species of birds are protected except the huntable game birds mentioned in Schedule 6 and expect the following birds:<br>Weavers (All Ploceus spp.)<br>Sparrows (All Passet spp.)<br>Mousebirds (Colius colius; Urocolius indicus)<br>Redheaded Quelea (Quelea quelea) |

| LEGISLATION/POLICY | PROVISION/SUMMARY | PROJECT APPLICABILITY |
|---|---|---|
| | | Bulbul (Pycnonotus nigricans; P. barbatus)<br>Pied Crow (Corvus albus). |
| National Biodiversity Strategy and Action Plan (NBSAP2) 2013 – 2022 | The action plan was operationalized in a bid to make aware the critical importance of biodiversity conservation in Namibia, putting together management of matters to do with ecosystems protection, biosafety, and biosystematics protection on both terrestrial and aquatic systems. | The proposed project during construction and operation phases, potentially triggers ecosystem threats from pollution. As such mechanisms for environmental compliance and monitoring will be put in place, ultimately aimed at protecting biodiversity. |
| Labour Act 11 of 2007. | Empowers the minister responsible for labour to publish regulations pertaining to health and safety of labourers (S135). Details requirements regarding minimum wage and working conditions (S39-47). | Explorations invite significant amount of laborious work. Therefore, there is need to ensure that proponent without charge to employees provide a working environment that is safe, and adequate facilities provided for the upkeep of employee welfare standards. The Ministry of Labour and Safety demands that a health management policy will be drafted and instituted. |
| Health and Safety Regulations GN 156/1997 (GG 1617) | Details various requirements regarding health and safety requirements. | -Occupational health and safety provisions during construction and operational phases should be clearly outlined.<br>-Compliance monitoring and responsibilities for compliance monitoring should be clearly stated |
| Public Health Act 36 of 1919 | 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.” | Compliance to the Public health act will be ensured in relation to the following:<br>- Sanitation facilities<br>-Communicable diseases<br>-Emergency healthcare provision<br>- Covid workplace measures |
| Public and Environmental Health Act 1 of 2015. | To provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters. | |
| National Heritage Act 27 of 2004 | Section 48(1) states that “A person may apply to the (Heritage) Council for a permit to carry out works or activities in relation to a protected place or protected object”<br>Protects and conserves cultural heritage and cultural resources with special emphasis on places and sources of National heritage including graves, artefacts, and any objects older than 50 years. | The project impacts are localized and there are no heritage or cultural artefacts relating to project area. However, if heritage resources (e.g., human remains etc.) discovered during implementation, guidelines dictate that a permit be acquired from the National Heritage Council of Namibia for relocation of any artefacts or specimen. |

| LEGISLATION/POLICY | PROVISION/SUMMARY | PROJECT APPLICABILITY |
|---|---|---|
| SANS 1929: 2005 | Dust particulates from excavations /ore crushing that are smaller than 1mm are deemed dangerous to both plants and humans. As such a dust monitoring following the ASTM D1739 method should be used for monitoring dust emissions from any crushing plant anticipated.<br><br>Dust chemical analysis and fallout quantities are specified for industrial and residential environs. | A dust fallout monitoring plan can be instituted around project area |

# 3. CHAPTER THREE: RECEIVING ENVIRONMENT

## 3.1. Introduction

In this chapter, the findings of the Environmental and Social Assessment Baseline study, public consultation and desk reviews undertaken are in respect to the ecology, society, economy, and geo-political set up of the proposed project area. The geological make up and meteorology of the project site will also be discussed in this chapter to give an in-depth understanding of the project area in question.

## 3.2. Socio -Economic Environment

### 3.2.1. Historic & Cultural Context

The proposed exploration area is situated in Omaheke Region. The name Omaheke (sand veld in Afrikaans) means 'deep sand' (Lindholm, 2006). Omaheke is derived from Otjiherero, a local indigenous language to characterize the sandy area. The San were the earliest inhabitants of Omaheke Region and practiced a nomadic lifestyle, relying on hunting and gathering (Sylvain 1999: 22). Around the turn of the 18th century, new inhabitants, mainly Mbanderu, Herero and Tswana people, started settling in the area. At the beginning g of the 20$^{th}$ century and just after the Herero-German war (1904-1907), the biggest influx of settling communities were of European and South African descent . By the 1950s, more than 700 farms were established in the area, with fencing being well advanced (Sylvain 2001: 719). The nearest administrative center relative to EPL 7022 and 7122 is Witvlei. The latter is a district capital of the Okarukambe Constituency. Witvlei is a place of historically significant as it is the place where the first battle ( *Battle of Witvlei* ) took place during the Herero-Nama War in March 1864(LAC,2006).

### 3.2.2. Demographics, Culture and Literacy

The population of Omaheke is estimated at 75,734 (NSA, 2018). The population growth in the entire Omaheke Region is expected to decrease gradually from 3.21% in 2001 to 1.37% in 2021. The population growth in rural areas, however, is negative because most of the productive age groups have moved to urban areas, leaving behind the elderly and very young people. By comparison, the region has more males (52.9%) than females (47.1%). Given the growing households population, it is projected that there are about It is estimated that there are about 17613 households in the region, equating to a household size of 4.3 people (NHIES, 2015). The literacy rate for the age group between 15 and above is estimated at 71.8%. Most of the inhabitants are of Herero descent, but there are Damara, Ovambo, Herero, Kavango, and inhabitants of mixed ethnicity. Otjiherero is the language predominantly spoken in the region.

### 3.2.3. Economic Activities

The regional economy continues to be dominated by three (3) economic drivers i.e. livestock production (Fig, transportation and logistic. Extensive cattle ranching dominates land-use. As such, inhabitants of the region refer to it as the 'cattle country' as it has some of the best grazing areas in Namibia" (Werner and Odendaal 2010: 54).

In Namibia livestock production is the largest contributes to the total agricultural output. In 2018, the cattle industry fetched an income of N$ 2.7 billion (Shikangalah & Mopani , 2020). Farms within the proposed project area have stocking density ranges between 0-19 per km² and 20-39 per km² (Fig 3). In recent times, commercial livestock farmers have increasingly diversified their income strategies by expanding into game farming, hunting and tourism activities, wood and charcoal production. Namibia ranks amongst the world's top 12 charcoal producing countries contributing 2.6 % of the world's output. Hence, charcoal production remain a source of income especially farmers combating bush-encroachment driven by invader bush, lack of game browsers and overgrazing by cattle. The density of the invader bush species (Acacia mellifera) is estimated at 2000 per hectare (Shikangalah & Mopani , 2020). Charcoal and wood is sold at about N$ 1000 per tonnage ( Shikongo, 2021).

Due to scarcity of water, rain-fed agriculture is not very reliable due to poor soil quality. Also, the region is unsuitable for crops due to low dependable growing period and sandy soils. Significant investments have been made in relation to tourism, crop production. Additional farm income is generated through charcoal production as seen at Farm Waterloo (Figure 4) and dry land agriculture (farm Rooi grond. In recent times, consumptive tourism (Trophy Hunting) and non-consumptive (eco-tourism) tourism has been negatively affected by the Covid pandemic. Landowners are generally regarded economically affluent. Farm workers and their respective families receive monthly income. Anecdotal evidence suggest that monetary resources (wages) of farm works are relatively small when compared to that of more effluent land owners such that little or nothing is left for investment. Anecdotal evidence also suggest that most farm workers have to manage with extremely small amounts of cash for most days of the month.

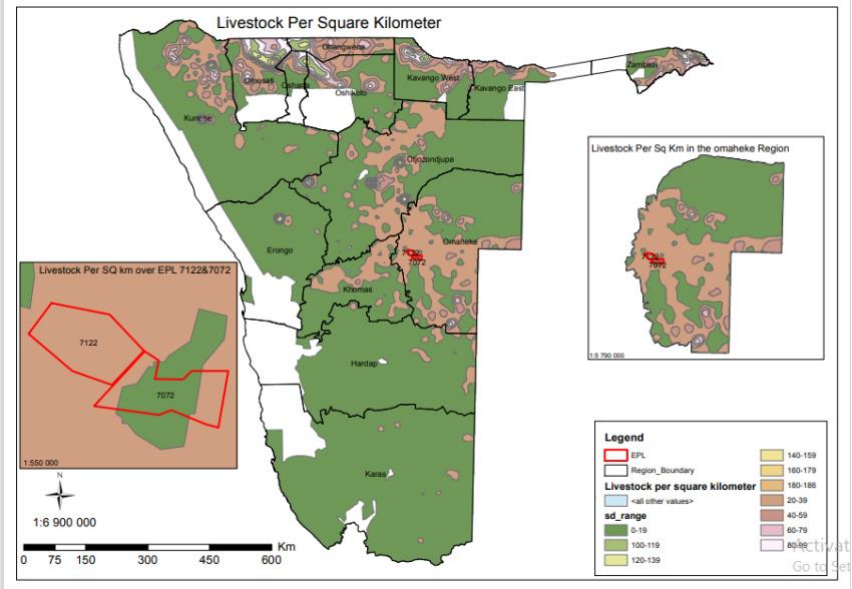


**Figure 3: Livestock density (number of livestock per km²)**

**Figure 4: Charcoal production- Farm Waterloo**

### 3.2.4. Employment

The economically active population in Omaheke is estimated at 65 percent, 42.3 percent of which is unemployed. About 45 percent of the employed population is in the agriculture sector. Tourism accounts for 5 percent of the employed population in the region, while manufacturing and logistics each account for 2 percent. Construction is a key sector, yielding about 7 percent of the region's employment. The National Labour Survey (2018) revealed a 46.6 percent unemployment rate amongst the youthful age group (15 to 34 years).

Omaheke has a high poverty prevalence rate. The severe poverty rate is above the national average of 10.7%.

### 3.2.5. Infrastructure and Services

Roads: An open road network exists in proposed exploration area. Primary access can be gained from the existing D1663 (EPL 7072) road and D1658 (EPL 7122) (Figure 5). The roads width is adequate for transportation services and two-way vehicular traffic. Access to the pre-identified targets (exploration areas) will secured through access agreements prepared in conjunction with the landowners.

Water Supply: Safe drinking water is available and accessible to most households. Water for domestic use and livestock is sources from boreholes. The proponent will make use of borehole derived water for dust suppression and domestic use.

Sanitation: There are no centralized sewage treatment plants in the project area. Most landowners have constructed French drains (sewage facilities) on their farms. The proponent plans to introduce mobile chemical toilets.

Energy sources: A network of power lines (33kv and 19 kv) transverse the project site. Electricity infrastructure is owned by Namibia's national power utility company specializing in the generation and transmission of electricity. Energy will not be sourced from the existing power for the purpose of exploration. Charcoal and firewood is a common source of energy for cooking. According to the National Census Report (2011), approximately 73% of the communities in the Omaheke use wood/charcoal for cooking and heating and only 33% use electricity .Solar installations are commonly associated with residential homes

(farmhouses) and boreholes. Exploration teams will make use of diesel fuel to power equipment. For protecting exploration equipment, solar power will be used to light field camps during the evenings.

Telecommunication Services: The proposed project area is well connected to the rest of the country and world via local network service providers. The main providers of this service in the area are Telecom Namibia, Mobile Telecommunications Company (MTC Namibia) as well as satellite phones. Therefore, the site operations will be communicated smoothly between onsite and offsite project personnel using either of the communication services.

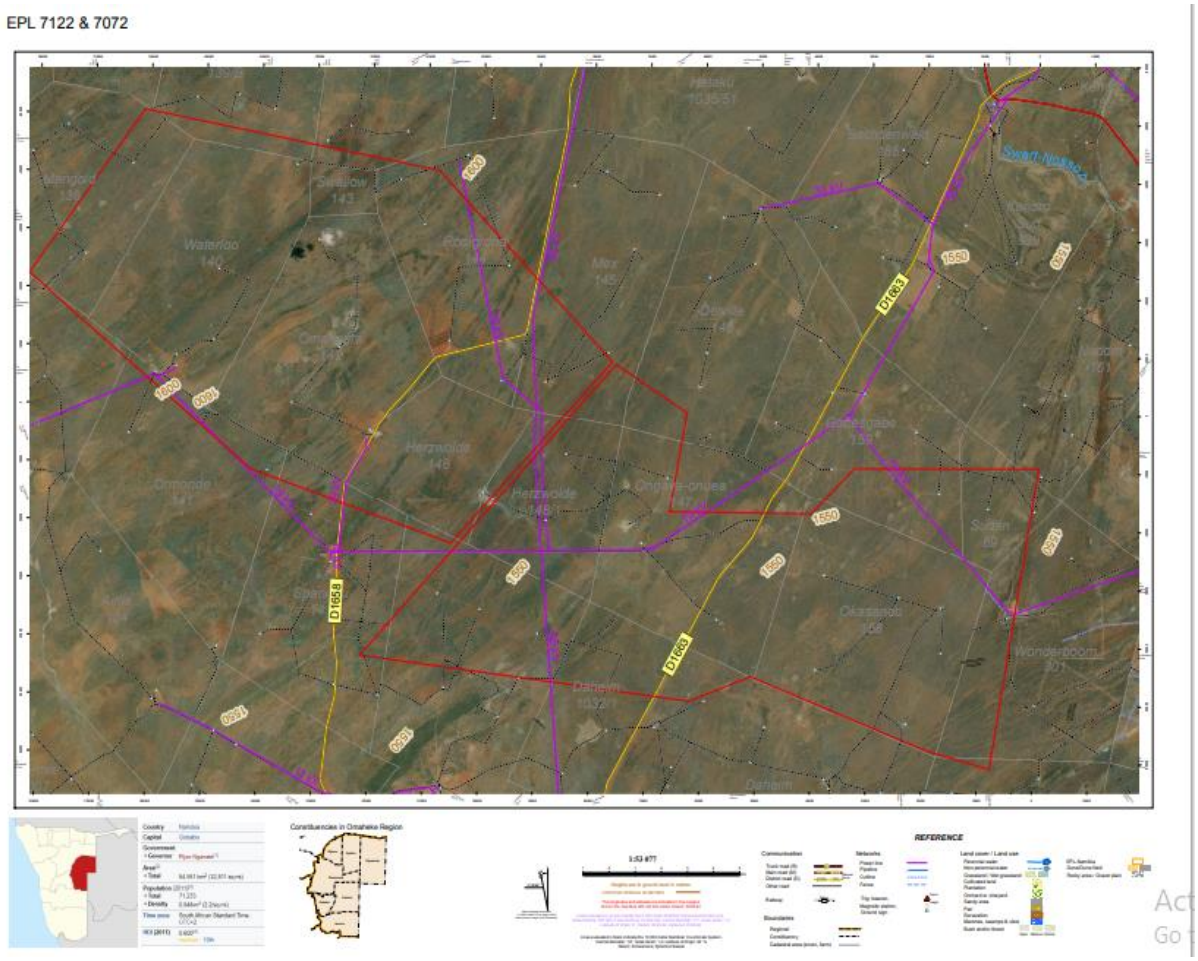


**Figure 5:Map denoting civic infrastructure**

## 3.3. Biophysical Environment

### 3.3.1. Climate

The project area has a semi-arid climate that is associated high temperature during summer months, which are from December to February, and lowest temperature in winter months, which are from June to August.

**Precipitation:** Summer rainfall varies from 350 – 400 mm per year.

**Temperature:** Warm climate. Average maximum temperatures is between 32$^{o}$ C and 34$^{o}$ C, whilst average minimum temperatures are around 8$^{o}$ C

**Wind & Evaporation:** High evaporation which peak in the windy months of September and October. Winds are however moderate and mostly from the east, throughout the year. 13 below shows a wind rose of wind speed and direction recorded in the project area over a 12 months period from March 2020 to March 2021. The wind rose shows that the prevailing wind speed is 15-24 kmph in the south westerly direction.

| | January | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Avg. Temperature (°C) | 25.5 | 25 | 24.5 | 23.6 | 20.4 | 17.6 | 17.4 | 20.1 | 24.3 | 26 | 26.1 | 25.7 |
| Min. Temperature (°C) | 19.2 | 19 | 18.1 | 16.1 | 11.5 | 8 | 7.5 | 10 | 14.8 | 17.8 | 18.9 | 19 |
| Max. Temperature (°C) | 31.8 | 31 | 31 | 31.1 | 29.4 | 27.3 | 27.4 | 30.3 | 33.8 | 34.3 | 33.4 | 32.4 |
| Avg. Temperature (°F) | 77.9 | 77.0 | 76.1 | 74.5 | 68.7 | 63.7 | 63.3 | 68.2 | 75.7 | 78.8 | 79.0 | 78.3 |
| Min. Temperature (°F) | 66.6 | 66.2 | 64.6 | 61.0 | 52.7 | 46.4 | 45.5 | 50.0 | 58.6 | 64.0 | 66.0 | 66.2 |
| Max. Temperature (°F) | 89.2 | 87.8 | 87.8 | 88.0 | 84.9 | 81.1 | 81.3 | 86.5 | 92.8 | 93.7 | 92.1 | 90.3 |
| Precipitation / Rainfall (mm) | 134 | 127 | 101 | 40 | 4 | 0 | 0 | 0 | 2 | 18 | 62 | 100 |

**Figure 6:Average temperature and rainfall (Source: https://www.meteoblue.com/)**

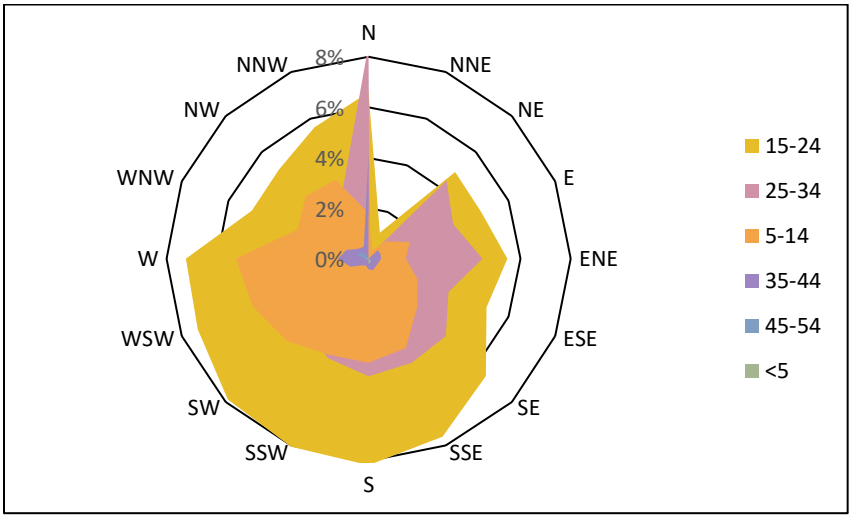


**Figure 7: Wind direction and speed (kmph) over a 12-month period.**

### 3.3.2. Climate Sensitivity

The following (Table 4) is a depiction of the area's climatic condition as well as potential sensitivities and impacts associated with the identified features.

**Table 2:Climate Sensitivity Index**

| Environmental Features | Description | Sensitivities | Potential impacts of features on project |
|---|---|---|---|
| Average rainfall – 351 to 400 mm per year.<br><br>Evaporation averages 2800 – 3000 mm annually, exceeding precipitation by approximately 93%.<br><br>Typically, sporadic, and unpredictable.<br><br>Localized storm events. | Capacity of the environment to absorb impacts is lower than in wetter areas.<br><br>Groundwater is an important source of water | Exploration activities causes an increase in water demand.<br><br>Run-off from cleared areas causes erosion | Average rainfall – 351 to 400 mm per year.<br><br>Evaporation averages 2800 – 3000 mm annually, exceeding precipitation by approximately 93%.<br><br>Typically, sporadic, and unpredictable.<br><br>Localized storm events. |
| Temperature | In summer, the highest temperature range between 32C° and 34 C°.<br><br>Winter temperatures, measured in July with an average daily maximum of 20°C and minimum of 8°C | Contributes to high evaporation rate.<br><br>Semi-arid climate.<br><br>Water resource is a scarce commodity.<br><br>High temperatures in summer. | Wellness, health, and safety of the workforce. |
| Wind Direction | The wind blows mostly from North East throughout the year. | Dust can be a nuisance to approximate farm communities | Dust particles and nuisance |

### 3.3.3. Topography and Elevation

Namibia is divided into three main topographic elements, (a) An extensive plateau, b) A narrow coastal plain and (c) an eroded escarpment that is characterized by dissected and rugged topography (Bee Pee & SRK). The area falls under the Khomas Hochland Plateau, which is the ridge of higher ground found in the center of Namibia. The altitudes in the plateau range between 1700 m to 2000 m above mean sea level. The area has a flatter topography compared to the western parts of the plateau. The broad landscape is generally flat to rolling, with 6° – 9° slopes (Strobach et al,2004).Plains are incised by Omuramba valleys or alternated with vegetated fossil (no longer actively moving) dunes (Landholms**, 2006).** The project site has a generally flat terrain, and the area drains towards the Southeast.

### 3.3.4. Geology and Soil

Geology: The EPLs lie between the synclines of the Damara supergroup. These rocks are overlain by a Karoo and Kalahari succession (Miller, 2008). The rocks of the Damara supergroup are formed because of a collision between the Kalahari and Congo Cratons approximately 800- 500 Ma. The Karoo and

Kalahari Super groups formed between 300-200 million years ago and 70-65 million years ago respectively (Mendelsohn et. al.2002). The area is made up of Kamtsas quartzite and limestone of the Nossob Group and sediments of the Kuibis Subgroup (Nama Group), locally overlain by diamictites (tillites) and shale of the Dwyka Formation (Karoo Sequence) (Christelis & Struckmeier 2001). The general stratigraphy of the region is characterised by basement gneisses unconformably overlain by bimodal volcanics on which siliciclastic sediments and minor carbonates rest.

During the subduction of the Kalahari Craton, Hakos Zone, and the Southern Foreland, which are covered by EPLs 7072 and 7122, underwent several phases of deformation and metamorphism, (De Thierry, 1987) resulting in folding, fracturing, and thrusting. The Hakos Zone, especially, is characterized by an accretionary prism in which the intensity of deformation increases southwards and culminates in the gigantic, basement-cored nappe structures due to reverse faulting, which resulted in a regional Frontal Thrust marking running through the western periphery of EPL 7072 (Error! Reference source not found. above). The final compression was perpendicular to the strike of the belt. Only gentle deformation and low-grade metamorphism has affected the Southern (or Nama) Foreland to the south and southeast of the EPL 707( Tjelos (2021)).

**Soil:** The dominant soil type in the entire Namibian Kalahari is ferralic Arenosol. This type of soil is a typical dryland soil and has a high content of combined oxides of iron with a low relative soil fertility which makes it poor soil for crop production. This sandy soil dominates both the east and north-eastern regions of Namibia in what is mostly referred to as the Kalahari basin. It is formed from wind-blown sand and usually extends to a depth of one metre (Mendelsohn *et al*. 2002 as cited by IECN, 2012)). The sandy portion generally makes up more than 70% of the soil, and the rest of the soils consist of particles of clay and silt. Little run off and water erosion takes place on such soils. The project area is also characterized by young sand (alluvium and surficial deposits) .Sandy aerosols dominate the eastern part, while combisols are found in the western areas of the proposed project area. Soils reveal limited –run-off.

### 3.3.5. Geohydrology

The geohydrological assessment for the proposed exploration area was carried out by Tjelos and Shagama (2021). A summary on the geohydrology is presented in the sections below. Based on the literature review conducted, the project site (the EPLs) is within the groundwater basin of the Hochfeld-Dordabis-Gobabis, which according to Christelis and Struckmeier (2001, 2011) stretches from east of Windhoek to the eastern border of Namibia. It mainly includes sandveld between the Kalahari basins of northern Omaheke-Epukiro and the Stampriet artesian basin. The eastern Khomas Region, up to the Hosea Kutako International Airport, is mountainous, drained in an easterly and south-easterly direction.

The Hydrogeological map of Namibia with groundwater potential of rock units is shown in Error! Reference source not found. **9** below. According to this map, groundwater potential of rock bodies (as shown by the approximate red ellipse) in the project site area are generally low, locally moderate with moderate porous, fractured, fissured and karstified aquifers the ephemeral Seeis, White Nossob and Black Nossob.

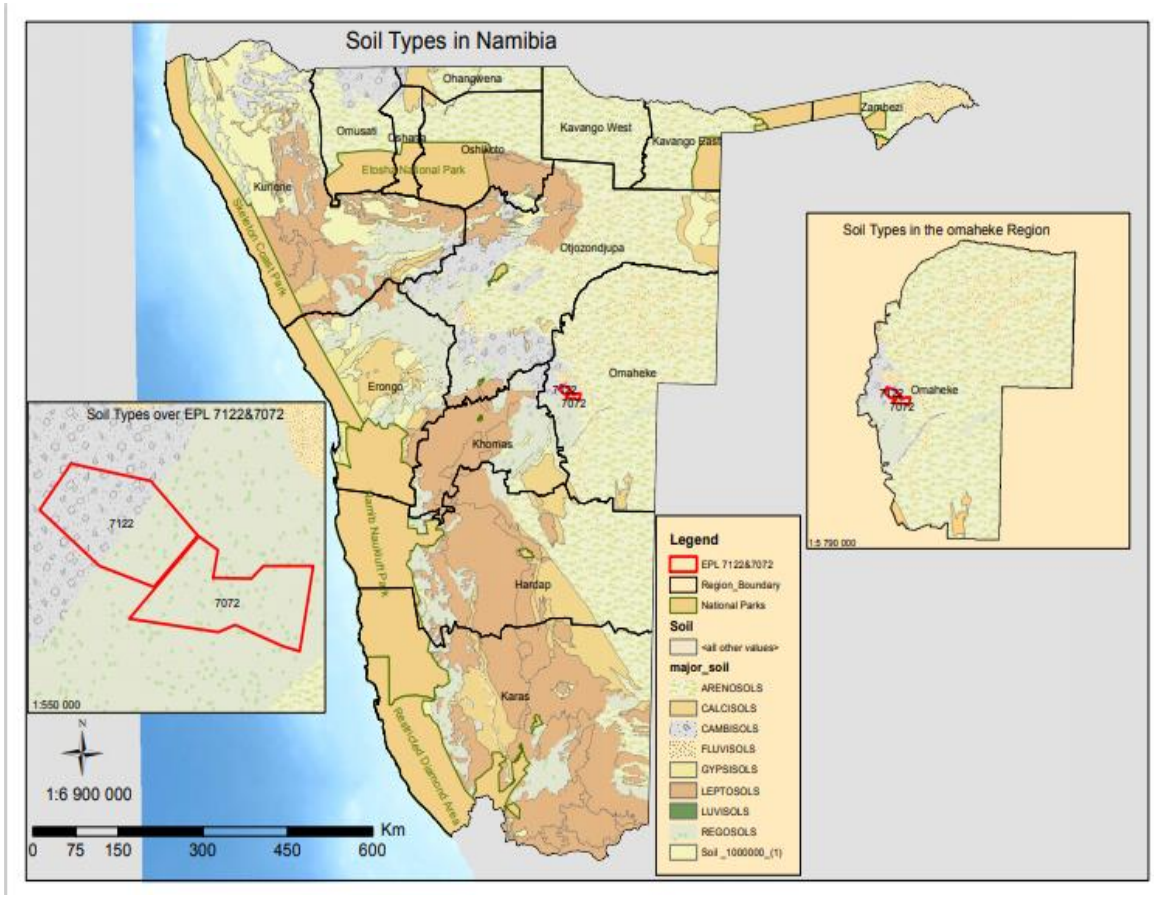


**Figure 8: Soil Profile**

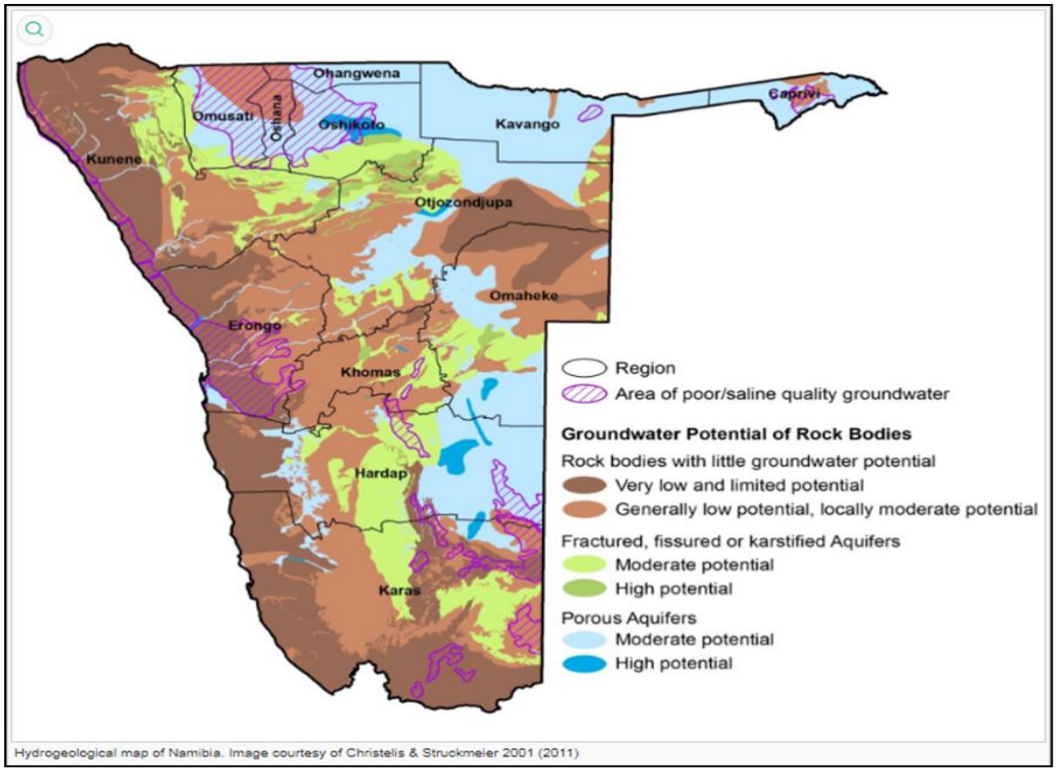


**Figure 9: Groundwater potential map of Namibia (Christelis & Struckmeier 2001 (2011)**

### 3.3.6. Aquifer Types

As detailed above, the study area (EPL 7072 and EPL 7122) stretches across the boundary between the Hakos Zone and the Southern Foreland where all the basement rock sequences have been affected by low temperature – high pressure metamorphism, which was associated with the reverse movements of the Damara Orogenesis. Therefore, the area is underlain by metamorphic rocks with no primary porosity such as Schists, phyllites, quartzites, Marbles, Metagryewackes, etc).

The sedimentary rocks such as sandstones, mudstones, limestones, shales, siltstones, etc., mainly restricted to the Nama Group, also do not possess primary porosity due to effects of tectonic deformation. The alluvial aquifers are absent locally in the area, as they are only restricted to the White and Black Nossob tens of kilometers to the southwest and northeast, respectively, where the thickness is ranging between 10 and 15 meters below ground level (mbgl).

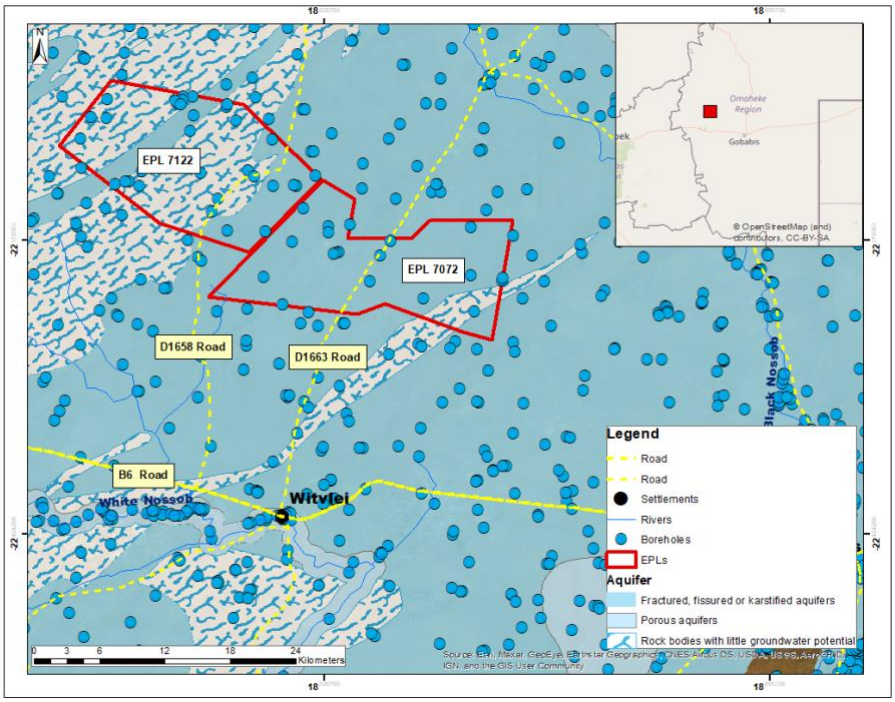


**Figure 10: Hydro-geological setting of the EPLs 7072 and 7122 area (Tjelos, 2021).**

The down warping of the Southern Foreland due to tectonic loading by the approaching Damara and Gariep Orogens caused faults and other secondary structures, which generally host groundwater as fractured aquifers in rocks like schist, sandstones, marbles, and quartzites. However, schists are incompetent and so they weather faster producing clayey residues in faults and fractures, hence reducing permeability in these fractured aquifers.

### 3.3.7. Groundwater Occurrence

Borehole logs have indicated clogging of shallower fractures by fine-grained residues from weathered schists, rendering shallower water strikes low-yielding and deeper water strikes (around 120 mbgl) moderate-yielding. As tabulated in **Table 1** below, the average borehole depths rest water levels (RWLs), and yields are 82 mbgl, 48mbgl, and 2.92m$^3$/h, respectively. Siting a borehole for such deeper intersections can be difficult as the structures are usually narrow and dipping. Therefore, the hydrogeological conditions must be correctly interpreted, and the appropriate geophysical investigation techniques must be employed to increase the borehole drilling success rates (Tjelos ,2021). It is, therefore, against the above-detailed regional and local geological and hydrogeological settings that the area is classified as moderate groundwater potential area, underlain by non-porous sandstones, conglomerates, and quartzites majorly.

## Table 3:Presentation of borehole information found within and around area of EPL 7072 and 7122

| No. | Borehole No. | Toposheet No. | Location | | Elevation (mamsl) | Drill year | Yield (m3/h) | RWL (mbgl) | Depth (mbgl) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Lat (dd) | Long (dd) | | | | | |
| 1 | 64341 | 2218BC | -22.251 | 18.5214 | 1524 | 1956 | 4.5 | 28.3 | 61.3 |
| 2 | 63969 | 2218AB | -22.134 | 18.3538 | 1599 | - | - | - | - |
| 3 | 63976 | 2218AB | -22.24 | 18.4381 | 1548 | 1940 | 0.5 | 55 | 65 |
| 4 | 63978 | 2218AB | -22.173 | 18.4778 | 1560 | - | 0.2 | 52 | 85 |
| 5 | 63979 | 2218AB | -22.172 | 18.4467 | 1576 | - | 3.3 | 55 | 104 |
| 6 | 63980 | 2218AB | -22.211 | 18.4762 | 1550 | 1956 | 1.1 | 43 | 62 |
| 7 | 63981 | 2218AB | -22.237 | 18.4629 | 1548 | 1960 | 4.5 | 30 | 53 |
| 8 | 63982 | 2218AB | -22.234 | 18.4922 | 1542 | 1961 | 4.5 | 34 | 55 |
| 9 | 63983 | 2218AB | -22.18 | 18.414 | 1584 | - | - | - | - |
| 10 | 86463(Well) | 2218BA | -22.249 | 18.5422 | 1524 | - | - | 15 | 21 |
| 11 | 86476 | 2218BA | -22.177 | 18.6829 | 1539 | 1962 | 3 | | 61 |
| 12 | 86477 | 2218BA | -22.155 | 18.6607 | 1545 | 1961 | - | - | 61 |
| 13 | 85669 | 2218BA | -22.106 | 18.5161 | 1572 | - | - | - | - |
| 14 | 85670 | 2218BA | -22.135 | 18.5034 | 1563 | - | - | - | - |
| 15 | 85671 | 2218BA | -22.135 | 18.5017 | 1564 | - | - | - | - |
| 16 | 85673 | 2218BA | -22.137 | 18.5577 | 1551 | 1958 | 2.6 | 24 | 34 |
| 17 | 85679 | 2218BA | -22.169 | 18.6478 | 1543 | 1970 | 1.4 | 43 | 85 |
| 18 | 85682 | 2218BA | -22.213 | 18.6738 | 1538 | - | 5.5 | 46 | 61 |
| 19 | 85683 | 2218BA | -22.212 | 18.674 | 1538 | - | 2.3 | 46 | 48.8 |
| 20 | 85685 | 2218BA | -22.209 | 18.6477 | 1526 | 1963 | 3 | - | 61 |
| 21 | 85686 | 2218BA | -22.239 | 18.65068 | 1525 | 1969 | 5 | - | 40 |
| 22 | 85687 | 2218BA | -22.228 | 18.6087 | 1529 | 1964 | 2 | - | 61 |
| 23 | 85689 | 2218BA | -22.168 | 18.5479 | 1539 | 1969 | 1.9 | 60 | 70 |
| 24 | 85690 | 2218BA | -22.19 | 18.5383 | 1534 | 1931 | 4 | 53 | 73 |
| 25 | 85691 | 2218BA | -22.19 | 18.5367 | 1534 | 1962 | 6 | 45 | 73 |
| 26 | WW4937 | 2218BA | -22.191 | 18.5346 | 1534 | 1955 | 10 | 40 | 69 |
| 27 | WW5454 | 2218AB | -22.12 | 18.3258 | 1610 | 1957 | 1.2 | 42.7 | 103.6 |
| 28 | WW4905 | 2218AB | -22.197 | 18.4255 | 1575 | 1954 | 1.4 | | 115.8 |
| 29 | WW20592 | 2218BA | -22.193 | 18.5726 | 1549 | 1975 | - | - | 61 |

| No. | Borehole No. | Toposheet No. | Location | | Elevation (mamsl) | Drill year | Yield (m3/h) | RWL (mbgl) | Depth (mbgl) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Lat (dd) | Long (dd) | | | | | |
| 30 | WW20529A | 2218BA | -22.181 | 18.5817 | 1549 | 1975 | 1.1 | 32 | 55.8 |
| 31 | WW14921A | 2218BA | -22.168 | 18.5298 | 1545 | 1974 | 0.2 | - | 47 |
| 32 | WW14921B | 2218BA | -22.173 | 18.5304 | 1542 | 1974 | - | 30 | 69 |
| 33 | 83308 | 2218BA | -22.181 | 18.5001 | 1550 | 1960 | 4 | 37 | 67 |
| 34 | 83309 | 2218BA | -22.154 | 18.5093 | 1559 | 1964 | 1.4 | 37 | 67 |
| 35 | WW5148 | 2218BA | -22.249 | 18.5072 | 1548 | 1956 | 4.5 | 28 | 61 |
| 36 | WW4984 | 2218BA | -22.24 | 18.514 | 1541 | 1956 | 4.1 | 91.4 | 108.2 |
| 37 | 86462 | 2218BA | -22.25 | 18.5433 | 1524 | - | 2 | 15 | 30 |
| 38 | 86491 | 2218BA | -22.106 | 18.5178 | 1572 | - | - | - | - |
| 39 | WW14649 | 2218AB | -22.051 | 18.4458 | 1592 | 1972 | 2.8 | 196.3 | 243 |
| 40 | WW1598 | 2218AB | -22.061 | 18.4179 | 1598 | - | 2.1 | | 110 |
| 41 | 60711 | 2218AB | -22.061 | 18.4103 | 1599 | - | 1.6 | 49 | 91 |
| 42 | 60712 | 2218AB | -22.043 | 18.3594 | 1609 | 1969 | 0.8 | 58 | 103 |
| 43 | WW22313 | 2218AB | -22.096 | 18.3254 | 1604 | 1977 | 1.3 | 32 | 85.3 |
| 44 | WW28449 | 2218BA | -22.127 | 18.5194 | 1547 | - | 0 | | 94 |
| 45 | 63944 | 2218AB | -22.146 | 18.4389 | 1580 | - | 0.4 | 60 | 102 |
| 46 | 63945 | 2218AB | -22.124 | 18.4243 | 1588 | 1953 | 0.9 | 55 | 102 |
| 47 | 63946 | 2218AB | -22.089 | 18.4161 | 1609 | 1958 | 0.4 | 61 | 102 |
| 48 | 63947 | 2218AB | -22.062 | 18.4702 | 1599 | 1966 | 3 | | 95 |
| 49 | WW5491 | 2218AB | -22.07 | 18.4455 | 1599 | 1957 | 10.9 | 61 | 88.4 |
| 50 | 63948 | 2218AB | -22.123 | 18.4639 | 1589 | - | 1 | | 82 |
| 51 | 63949 | 2218AB | -22.135 | 18.4843 | 1572 | 1950 | 2.5 | | 93 |
| 52 | 63950 | 2218AB | -22.068 | 18.4463 | 1599 | - | - | - | - |
| 53 | 63951 | 2218AB | -22.081 | 18.4537 | 1600 | - | - | - | - |
| 54 | 63952 | 2218AB | -22.079 | 18.4811 | 1593 | - | - | - | - |
| 55 | 63953 | 2218AB | -22.097 | 18.4834 | 1587 | - | - | - | - |
| 56 | 63954 | 2218AB | -22.127 | 18.4685 | 1589 | - | - | - | - |
| 57 | WW2513 | 2218AB | -22.079 | 18.3464 | 1600 | 1931 | 0.5 | | 118.6 |
| 58 | WW9768 | 2218AB | -22.078 | 18.3339 | 1603 | 1968 | 0.1 | | 131.7 |
| 59 | WW10280 | 2218AB | -22.063 | 18.3473 | 1605 | 1969 | | | 115.5 |

| No. | Borehole No. | Toposheet No. | Location | | Elevation (mamsl) | Drill year | Yield (m3/h) | RWL (mbgl) | Depth (mbgl) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Lat (dd) | Long (dd) | | | | | |
| 60 | 63936 | 2218AB | -22.132 | 18.3652 | 1604 | 1939 | 4.1 | 53 | 84 |
| 61 | 63937 | 2218AB | -22.132 | 18.3621 | 1600 | 1958 | 0.4 | 43 | 76 |
| 62 | 63938 | 2218AB | -22.123 | 18.3761 | 1604 | 1959 | 4.1 | 53 | 121 |
| 63 | 63939 | 2218AB | -22.135 | 18.3737 | 1598 | - | 22.7 | | 106.7 |
| 64 | 63940 | 2218AB | -22.064 | 18.4096 | 1598 | - | 0.8 | 53 | 91 |
| 65 | 63941 | 2218AB | -22.067 | 18.4054 | 1599 | - | 1.4 | | 77.2 |
| 66 | 63942 | 2218AB | -22.064 | 18.4034 | 1598 | - | 0.9 | | 65.8 |
| 67 | WW21056 | 2218AB | -22.067 | 18.4081 | 1600 | 1977 | 2.3 | | 112.5 |
| 68 | 63943 | 2218AB | -22.077 | 18.419 | 1612 | - | - | - | - |
| 69 | WW5448 | 2218AB | -22.157 | 18.4336 | 1580 | 1955 | 1.4 | 27 | 103 |

### 3.3.8. Groundwater Recharge and Flow Direction

The project area is not located only on the subduction zone of the ancient Kalahari Craton where the basement geology has been affected by the tectonic, reverse movements, but also in the transition zone from the Dama Orogen to the thornbush savannas of the Southern (Nama) Foreland. The geomorphology in the area is defined by fracture patterns which are generally striking Northeast-Southwest within the north-eastern parts of the White Nossob catchment area.

The groundwater recharge in the area is by means of direct rainfall infiltration through the thin cover of the Kalahari sediments into the fractures, joints, and faults, as well as other secondary structures within the metamorphic and metasedimentary bedrock. There is also deep inflow of groundwater, which is seasonally recharged by stream flow of the Back Nossob to the northeast of the area.

The water table is gently sloping in the south-westerly direction where the groundwater is flowing through the fracture pathways towards the White Nossob. The groundwater flow patterns are related to the surface drainage system, which contributes to the recharge zones of the Stampriet Artesian Basin to the Southeast.

### 3.3.9. Contamination Pathways

The risk of groundwater contamination from potential sources of pollution depends on the protective soil cover, depth to groundwater, geological structures, predominant flow and recharge. Considering these variables, contamination pathways in this area consist of stream network draining to the White Nossob, minor surface water ponds, and tectonic structures in the bedrock, boreholes, and the thick cover of Kalahari sediments.

### 3.3.10. Groundwater Use and Quality in the Area

The area is merely covered by agricultural lands mainly for livestock farming. As the area is of moderate groundwater potential, there are no large groundwater-abstraction activities such as large-scale

irrigated agriculture. Groundwater is rather abstracted for domestic water supply and livestock watering as well as small scale irrigation activities of one (1) hectare at most.

Groundwater in the area is classified as fresh based, on salinity ranges, and known to be of quality ranging from Class B (good quality water) to Class C (low risk water) according to the drinking water standards in Namibia. Water quality of Class C was reported in a few boreholes due to high concentrations of Nitrate, which originated from animal wastes.

### 3.3.11. Aquifer Vulnerability

This section assesses the aquifer vulnerability not only to pollution but also to the depletion of groundwater storage. As explained in the preceding sections, the project area is underlain by fractured aquifers in Tsumis, Hakos, Nossib, Khomas, Witvlei, and Nama sequences with higher fracture density in the central to southwestern parts of EPL 7072. The non-porous nature of the bedrock has restricted groundwater storage to the to the fracture zones.

Furthermore, the bedrock is overlain by a thin layer of less permeable (hence protective) sediments of the Kalahari Group, results in high net infiltration rates and hence reducing the residence time in the unsaturated zone.

It is, therefore, against this background the project area is moderately vulnerable due to unhindered migration of potential contaminants through the unsaturated zones to the groundwater table. The more sensitive are the areas covered by EPL 7072 with higher fracture density, especially in the SW of the EPL.

Unlike surface water, which is highly vulnerable to depletion by direct evaporation, the groundwater storage is stable in the area, affected only by evapotranspiration and abstraction from boreholes. However, despite this stability, the groundwater storage in this area is very limited due limited rainfall and very high evaporation rates. This implies that most of the rainwater is lost to the atmosphere by evaporation and evapotranspiration before it percolates to the water table. Therefore, and as indicated by low borehole yield of 2.92$m^3$/h on average, (Tjelos (2021). The groundwater storage is vulnerable to excessive abstraction rates, which can result in draining of fractures and hence a decline in water table. This will lower the yields of or drain the shallower boreholes in the surrounding.

### 3.3.12. Mineral Occurrence

Regional: Contributing to the geological character is the Kalahari Copper Belt which stretches discontinuously from western Namibia to northern Botswana for about 1000 km and hosts significant stratabound copper-silver deposits such as Klein Aub, Oamites, Dordabis, Witvlei in Namibia (Anhaeusser and Button, 1973; Borg, 1987) and the ones along the Ghazi-Chobe belt in Botswana (Borg, 1987; Borg and Maiden, 1989, Figure 12).

The mineral deposits are hosted in Meso- to Neoproterozoic metasedimentary rocks that have been deformed and metamorphosed to greenschist facies during the Pan-African Damara Orogeny (Borg, 1987; Borg and Maiden 1989; Modie, 1996; Hitzman et al., 2005). All deposits along the Kalahari Copperbelt have been proven to have similar lithological features with respect to age, geotectonic position and depositional environment (Borg, 1987; Borg and Maiden, 1987) and they are thought to share similarities with the Kupferschiefer of Poland and Germany, and with the central African

Copperbelt of Zambia and Democratic Republic of Congo (Borg, 1987; Modie, 2000; Hall, 2012; Hitzman et al., 2005).

EPLs 7122 & 7072: The mineral deposits being targeted are located in the 'Witvlei area' (a segment of the Kalahari Copper Belt. The Witvlei area comprise of multiple areas namely Gemsbokvlei, Christiadore, Okasewa NW, Witvlei pos, Malachite and Daheim. Based on reports of past airborne magnetic surveys and exploration drilling derived from the Geological Survey of Namibia (MME), the Witvlei area is known to have a high mineral occurrence , predominantly copper. Past drilling results and radiometric data show large copper reserves associated with farm Okasandu in zone 1 (Fig 14 & 15) with an estimated copper ore deposit of 15 840 000 (NHIG, 2021; Henry & Wilson: 2006).

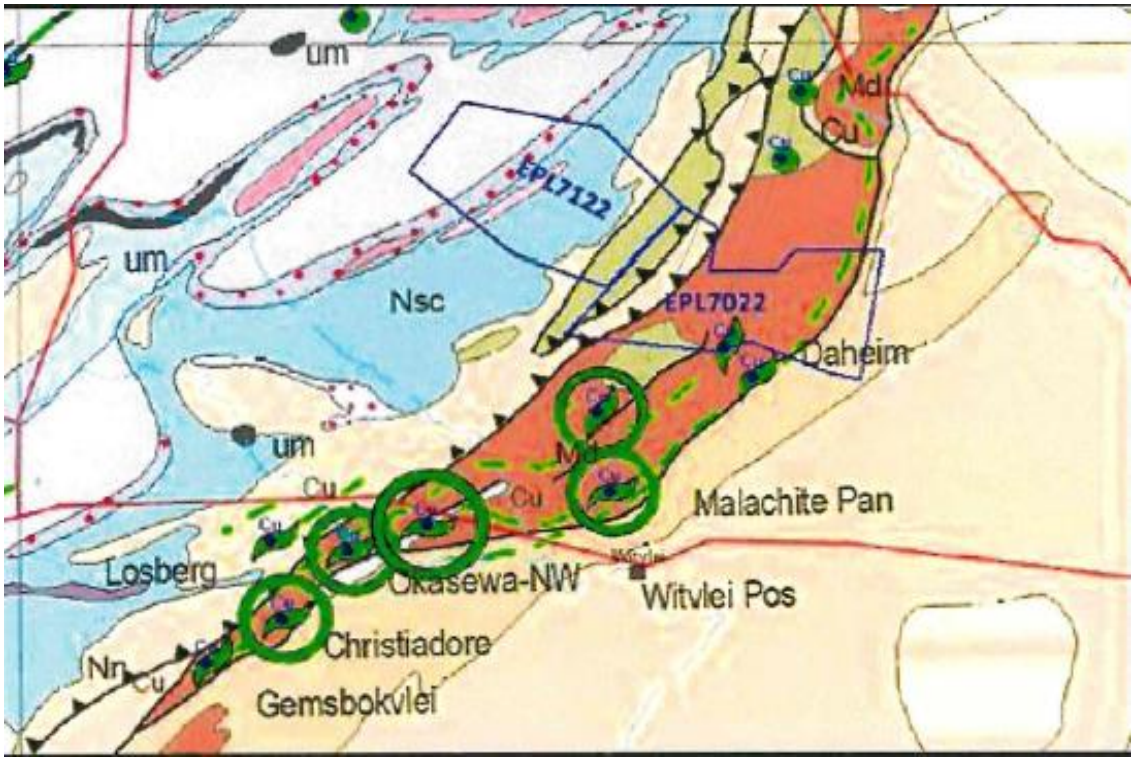


**Figure 11:Copper mineralization of the Witvlei Area**

## 3.4. Biodiversity

## 3.5. Habitat

The EPLs are located in the camelthorn savannah vegetation biome (Fig 13). Dominant vegetation forms are woody tree species, dense thickets of shrubs and grasses. Riverine thickets are common as defined by a network of shallow drainage channels with some connected to. Small pans are dominated by open to dense shrub lands.

The broader landscape is gently undulating with many flat areas that allow for infiltration of water. The water-holding capacity is low to moderate (Strohbach, 2012), and the area has medium to high average vegetation biomass production that supports livestock farming.

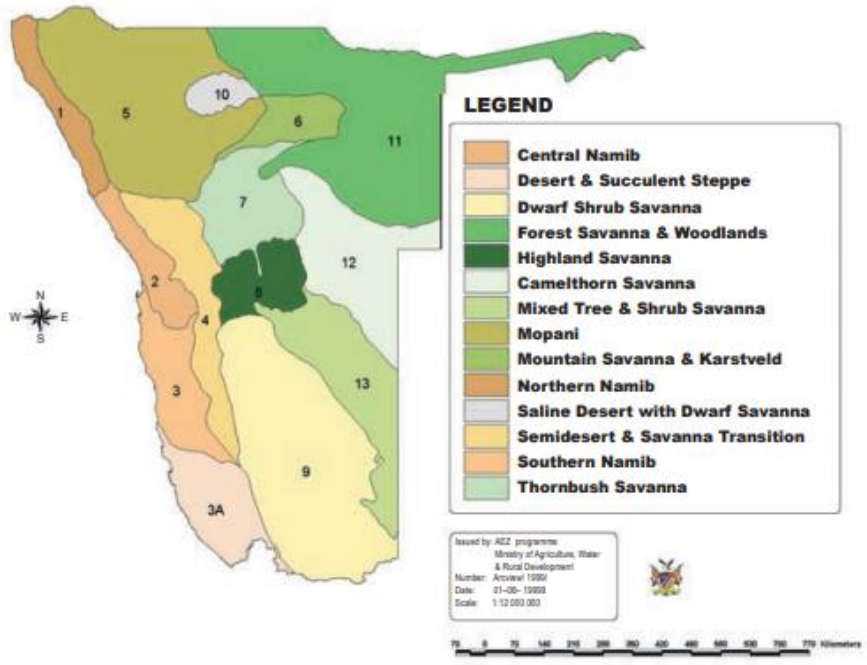


**Figure 12:Biomes and broad vegetation types (Adapted from Giess, 1971, MAWLR)**

Based on the Normalised Difference Vegetation Index (NDVI) derived from Sentinel 2A satellite imagery (16 May 2021) and using high resolution (10 m,) NDVI values ranged between 0.09 to 0.6. The latter is an indication of a low to medium amount of green vegetation biomass present in the areas. Higher values of NDVI represent areas with a higher density of green vegetation while lower values represent areas with a low density of green vegetation.

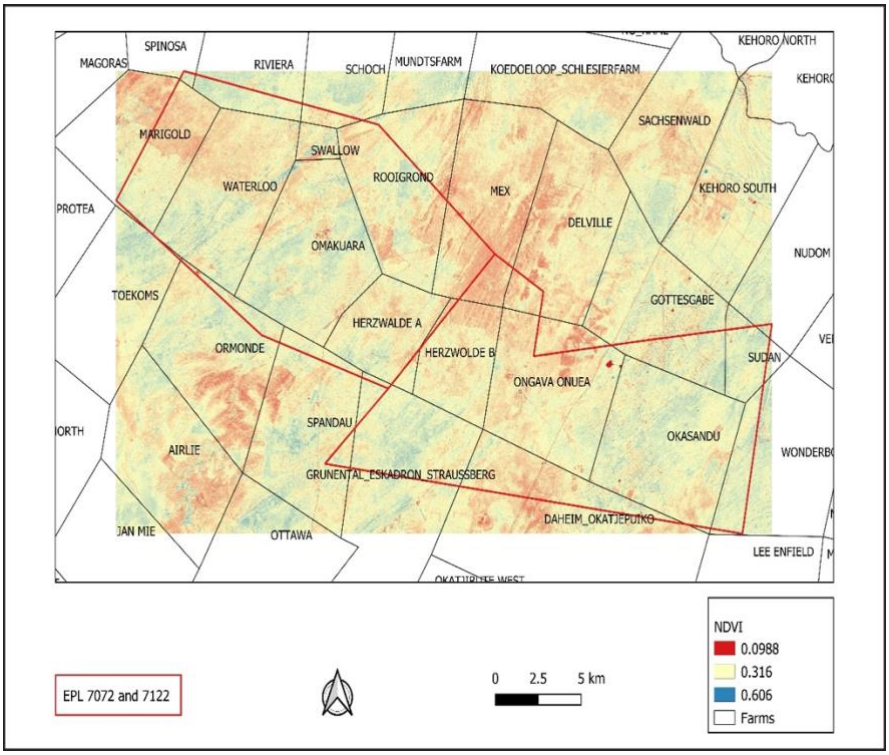


**Figure 13:A map of the NDVI for the EPLs.**

## 3.6. Fauna

The wildlife found in the proposed project area comprise of birds, reptiles, and amphibians with a limited number of mammals. Due to human encroachment; **Reduced vegetation around the project site and surrounding environs has resulted in habitat loss** for most mammals that used to habit the area. Much of the wildlife that used to occur in Witvlei has now disappeared because so much of the natural vegetation has been cleared (Mendelsohn 2009). As a result, most remaining wildlife is now concentrated in the surrounding private farms. The project site does not have any unique fauna habitats of critical ecosystem importance, and there were no animals observed on the project site.

There are no known species of rare or endemic status in the proposed exploration site. Some fauna species that occur in the area such as Wildebeest (*Connochaetes taurinus albojubatus*), Springbok (*Antidorcas marsupialis*), Duiker (*Sylvicapra grimmia*), Black-backed jackal (*Lupulella mesomelas*), Eland (*Taurotragus oryx*), Hartebeest (*Alcelaphus buselaphus*), Black faced impala (*Aepyceros melampus*), Warthog (*Phacochoerus africanus*), Zebra (*Equus quagga*), and Steenbuck (*Raphicerus campestris*) (Environmental Compliance Consultancy, 2020). Birds' species that are found there include the **black backed vulture spp**, *Agapornis roseicollis* (rosy-faced lovebird) which is known to be endemic to the area, *Falco chicquero* (red necked falcon), *Apus coffer* (little swift), *Oena Namaqua* (Namaqua dove), *Falco rupicolis* (Rock kestrel) and *Vidua regio* (Shaft-tailed whydah). The area is also associated a high number of reptiles such as *Pseudaspis cono* (Mole snake), **black mamba** *Python notalensis* **(Southern african python), *Heliobolus lugubris* (Bushveld lizard), *Pedioplanis nomaquensis* (Namaqua sand lizard) and *Bitis orietons (*Puff adder) (Environmental Compliance Consultancy, 2020).**

## 3.7. Amphibians & Reptiles

About 263 reptiles occur in Namibia (Cunningham,2018)**.**Large scale clearing as envisaged in the worst case scenario would have major impacts on arboreal reptiles, (M. Griffin, pers comm In: Cunningham,2018.).

## 3.8. Avifauna- Birds

Approximately 174 birds species are likely to occur in the general area. Twenty one (23) species were sighted during the field excursion. Species observed include Helmeted Guineafowl, White-Backed vulture, Ring-necked Dove, Namaqua Dove, Gray Go-away-bird, Crowned Lapwing, Pale Chanting-Goshawk, Red-crested Bustard, Great Rufous Sparrow, Common Scimitarbill, Crimson-breasted Gonolek, Mariqua Sunbird, Red-billed Francolin, Blacksmith Lapwing, Crimson-breasted Gonolek, Blacksmith Lapwing, Red-faced Mousebird, Southern Pied-Babbler, Rufous-eared Warbler, Laughing Dove, Red-crested Bustard, Pale Chanting-Goshawk, Violet-eared Waxbill. One species listed under the IUCN Red-List Category and commonly occurring in the project area is the *Gyps africanus* (White backed vulture) that remain critically endangered (CE). The latter's survival is threatened by verson poisoning meant for combating predation on commercial farms.

Species that also carry IUCN threatened status but with a rare sighting in the project area includes, Ruppels Korhaan (Eupodotis rueppellii, NT), Black Eagle(Aquila verreauxii;EN) ,the Ludwig's Bastard

(Neotis ludwigii, EN) ,Martial eagle (Polemaetus bellicosus NT) and the Lapp faced vulture ( Aegypius tracheliotus;CR)

## 3.9. Flora

Plant diversity in the area is estimated to be 400 - 499 species (Mendelsohn et al, 2002. Acacias, shrubs and grasses are dominant. Most common Acacias include *Acacia erioloba* (Camelthorn), the Black thorn (*Acacia mellifera*), Red umbrella thorn (*Acacia reficiens*) and Umbrela thorn (*Acacia tortilis)*. The latter three (3) are classified as encroacher bushes. The dominant grasses observed include *stipagrostis uniplumis, Microchloa caffra(Mendelson et al.2009) and Eragrostis rigidior*. Terminalia sericea is the second most common tree species in the area. Common bushes observed during the study include *Grewia flava, Grewia flavensis*. Plants primarily associated with pens are *Ziziphus mucronata*, *Catapractes alexandrii*, and Acacias (Lindholmes, 2006). A species inventory (checklist) of species likely to occur in the project area is attached as (Appendix A of main report).

**Table 4: Common plant species occurring on the project area**

| SPECIES | COMMON NAME | STATUS |
|---|---|---|
| *Acacia mellifera* | Black thorn | Not threatened |
| Acacia fleckii | Sand-veld acacia | Not threatened |
| *Acacia karroo* | Sweet thorn | Not threatened |
| *Acacia tortolis* | Umbrella thorn | Not threatened |
| *Brachiaria serrata* | Rag bush | Not threatened |
| *Acacia erioloba* | Camelthorn | Protected |
| Rhigozum brevispinosum | Simple-leaved rhigozum | |
| Terminalia sericea | Silver cluster-leaf | Protected |

**Figure 14:Camelthorn – Acacia erioloba**

**Figure 15:Aloe spp in the background : Location (Farm Waterloo).**

# 4. CHAPTER FOUR: PROJECT ALTERNATIVES

## 4.1. Technology

**Hydro excavation (Hydro Vac):** Hydrovac excavation uses the power of pressurised water to breakdown overburden. The power of vacuum is used to extract the generated slurry and to deposit the waste material in special containers or holding tanks. After the work is complete, slurry is released from the holding tank back onto the ground to cover once again the exposed subsurface. Given the low ground water potential in the proposed project area, this method of trenching will not be appropriate as it is water intensive.

**Blasting and Drilling**: Blasting includes the use of explosives (dynamite). Blasting operations cause several adverse environmental effects: ground vibrations, air blast, fly rock, generation of fines, fumes and dust. The noise generated can stress livestock. Unexploded explosives or by-products can be hazardous to the natural environment. Exploration drilling may make the aquifers more vulnerable to degradation and contamination by potentially allowing seepage (surface run-off to enter the aquifers).

**'No Go' Alternative:** The no go alternative may negatively affect regional economic development , consequently leading to a stagnant economy with lower levels of living standards especially for low income groups. As such, reducing the high un-employment rate, ensuring greater social cohesion and reduction in poverty will remain a chronic challenge.

# 5. CHAPTER SIX: PUBLIC CONSULTATION

## 5.1. Overview

Public and Stakeholder involvement is a key component of the EA process. The public consultation process, as set out in Section 21 of Regulation No 30 of EMA (Act no 7 of 2007, has been followed during this assessment and the details thereof documented below.

## 5.2. Printed Media

**Background Information Document**

A Background Information Document (BID) was drafted at the onset of the EA process to act as a useful information handout about the proposed project. In addition, the BID provided details on the public consultation process with contact details for further information. This document was advertised for availability through various means of newspaper articles, public meeting, and electronic mail; see Appendices section of this document.

**Newspaper Advertisements & Articles**

Newspaper notices about the proposed project and related EA processes was circulated in two newspapers for two weeks. These notices appeared in the "Confidante" and "New Era" newspapers.

**Table 5:Newspaper & Site Notices**

| Newspaper | Area of Distribution | Language | Date placed |
|---|---|---|---|
| The New Era | Country Wide | English | 01-03-2021<br>08-03-2021 |
| Windhoek Observer | Country Wide | English | 26-02-2021<br>05-03-2021 |
| Site notice | | English | 25-02-2021 |
| Preliminary Meeting with Village Head | Hoadadi Community Hall in Witvlei. | English/Afrikaans | 17-03-2021 |

**Site Notices**

Site notices placed at the project site and at Witvlei Village Council office. These provided information about the project and related EA while providing contact details of the project team.

**Building a Stakeholder Database**

A stakeholder database for the project was developed. During the advertisement of the project (though public notices in local newspapers and site-notices) the list was augmented as Interested & Affected Parties (I&AP) registered and contact information of stakeholders updated.

**Stakeholder Meetings & Key Conversations**

A public meeting was conducted on the 17$^{h}$ March 2021 at Hoadadi Community Hall. The meeting was attended by representatives from the Witvlei Village Council, Omaheke Regional council, Residents, Government and Quasi-Government departments and Land owners.

Attendance registers, comments and proof of stakeholder's engagement are attached in Appendix A of this ESR. An additional meeting specifically targeting the affected farmers was held (minutes attached: Appendix A). Pertinent issues relating to the projects were discussed and recorded. Below are pictures that relate to public meetings.

**Figure 16:Consultation with land owners – (17 March 2021, Hoadadi Community Hall, Witvlei)**

**Figure 17:Public Meeting Proceedings (17 March 2021 Hoadadi Community Hall, Witvlei)**

**Comments and review period**

From the onset of the public consultation process and the initial information sharing through the BID, newspaper and site notices, various stakeholders have registered and provided comments.

The public commenting period from the first Newspaper advert spanned for thirty (30) days and the Scoping Report and Environmental Management Plan was made available to the public and stakeholders for comment and review.

**Table 6:Key Issues raised during the consultative meeting.**

| THEME | COMMENT |
|---|---|
| ECONOMIC | Employment of general labour: NHIG must consider employing local people particularly the youth.<br>Improve the life being of the residents.<br>The project should benefit all the community members citing lack of inclusivity when projects kick-off. |
| AMBIENT ENVIRONMENTAL QUALITY | Dust emissions, suppression and monitoring measures were inquired |
| ENVIRONMENTAL | Potential for water pollution from exploration was raised, citing groundwater vulnerability.<br><br>Concerns regarding the rehabilitation of target exploration areas were also raised.<br><br>Resources such as air and water should not be polluted during operations because communities, wild animals and livestock rely on these resources.<br><br>Waste management was emphasized as crucial to the project as the community does not have a functional and approved solid waste disposal site. |

# 6. CHAPTER SIX: ASSESSMENT OF POTENTIAL IMPACTS

## 6.1. Overview

Explorations are associated with a wide array of potential environmental impacts, both positive and negative. The primary aim of an environmental assessment is to assess the potential impacts of proposed exploration activities. This is done to ensure that the negative impacts that the project activities may have on the biophysical and social environments are adequately addressed, are brought under control while maximizing the positive impacts. The potential positive and negative impacts that have been identified from the proposed Plant activities are as follows:

## 6.2. Impact Identification (Positive and Negative) and Description

The potential beneficial and adverse impacts stemming from the proposed development onto the bio-physical and socio-economic environment during various phases of project are listed below and assessed. NHIG has committed to sustainability and environmental compliance by coming up with a corrective action for all anticipated environmental impacts associated with the project. This is also in line with the Namibian Environmental Management legislation and International best practices. As proponent, NHIG will implement an Environmental Management Plan (EMP) to prevent, minimise and mitigate negative impacts. The environmental management plan developed address all the identified expected impacts, the plan will be monitored and updated on a continuous basis with aim for continuous improvement to addressing impacts. The main conclusion of the overall assessment was that the proposed project would result in environmental and social impacts, however management and monitoring measures will be put in place to minimise these impacts to insignificant levels. Summaries of the key findings of the specialist studies are provided below.

<u>Positive impacts</u>

- Improvement the country's GDP because of mineral beneficiation
- Socio-economic advancement: The proposed development will create several employment opportunities for individuals and their families in the surrounding areas.

<u>Negative impacts</u>

- Aesthetics /Visual Degradation (operational and decommissioning phases)
- Biodiversity Loss/Wildlife disturbance (all phases
- Decrease in ambient air quality (operation and decommissioning phases)
- Over abstraction of water and contamination (operation and decommissioning phases)
- Soil degradation (operational phase)
- Damage to Private Property (all phases)
- Noise nuisance from vehicle activities (all phases)
- Public and environmental Health impacts (operation and decommissioning phases)
- Social nuisance: Influx of people into the area, economic losses due to poaching (operational phases).
- Vehicular traffic impacts (operation and decommissioning phases)
- Waste generation and management (all phases)

### 6.2.1. Biodiversity loss / disturbance

Vegetation clearing may result in biodiversity loss. Clearing may lead to the manifestation and proliferation of alien invasive on barren patches. Wild animals likely to be affected significantly include burrowing mammals and reptiles. Haulage trucks can trample reptiles and animals traversing vehicle routes. Natural migratory routes and passages can be disrupted by exploration activities affecting wildlife movement patterns. The abrasiveness cause by heavy contact onto the ground (rock) and during dumping of waste rock by haul trucks could produce sparks and potential cause veldfire leading to vegetation and animal loss. Burrowing animals rely on bush cover for safety (predation aversion) and food. Also shrubs prevent burrows from being trampled by cattle and large game. Reptiles dependent on microclimatic conditions and litter beneath trees and shrubs will be negatively affected by bush clearing activities.

### 6.2.2. Degradation of Air Quality

Activities that could affect ambient air quality includes off-road driving (haulage trucks) and use of diesel-powered excavation machinery. An increase in particulate matter particulate matter (dust) is due to excavations and operation of diesel power equipment (volatise organic carbons). Additional fugitive particulate emissions occur from materials handling (crushing of mined out ores) including the dumping or stockpiling of waste rock.

No ambient air quality or emission standards exist for Namibia. Also, no occupational exposure limits exist for dust emissions in Namibian environmental legislation. Although dust mitigation measures will be adopted, dust emissions proximate to sensitive receptors will be strictly monitored. Iit is necessary to regularly monitor ambient air quality around working areas.

### 6.2.3. Health Risks /Public Safety

Employees may be severely exposed to health and safety risks, when not properly inducted or trained on how to use certain machinery or equipment. Trenching can result employee injuries due to collapse (unstable walls) of trenches. Occurrence of predators (e.g leopards) and venomous snakes(e.g cobras, puff adders and black mamba) in the study area may present a considerable threat to workers safety. To comply with legislation, an occupational health and safety plan (OHSP) and emergency preparedness plan should be implemented. Abandoned trenches (ponding effect) can provide the perfect environment for mosquito breeding especially during the rainy season which can cause the spread of Malaria Disease. It is imperative that trenches be backfilled as soon as the ore material is removed. The risk of transmission of communicable diseases (HIV, hepatitis, measles, Covid 19 cannot be underscored. Most common forms of spread may include fecal-oral (lack of sanitation, open defecation) and sexual intercourse (unprotected sex). As of the latter, the influx of people into the immediate (proximate to project site) may lead to sexual relations between employees and locals, consequently leading to the spread of sexual transmitted diseases (i.e., HIV/AIDS) and pregnancies when engaging in unprotected sex. Namibia has a high generalized mature HIV epidemic with a HIV prevalence of 14%, high antiretroviral coverage of 90% and teenage pregnancies (18%).

### 6.2.4. Influx & Social Annoyance

The news of the proposed project may cause the immigration and increase of people into the project area. Given the current unemployment rate in Namibia and Omaheke in particular, the project may attract many out of area people to come look for jobs. This influx of out-of-area people during construction and operational phase may lead to social annoyance to the local farming community. Inbound persons from

diverse backgrounds and culture may exhibit t behavioural traits (social norms, culture, and values), potentially antagonizing locals. This may lead into social clashes between the locals and "outsiders".

### 6.2.5. Contamination& Over abstraction of subterranean water

Over abstraction of subterranean water sources can negatively impact water security. A significant drop in ground water levels due to over-abstraction can limit the ability of farmers to provide water sufficient for domestic use, livestock and wildlife. Water contamination may result from the dumping of debris or excess soil from land leveling, access road construction, runoff from on-site vehicle and equipment maintenance (oil change, refueling, washing) and lack of sanitation facilities for exploration teams.

### 6.2.6. Noise/ Vibrations

Noise and vibration sensitive receptors includes households residing in project area, wildlife, and livestock. The vibrations and movement of exploration equipment can increase ambient noise. Noise levels can also be aggravated due to removal of vegetation. Generally, vegetation cover and wind speed influence ambient noise levels.

### 6.2.7. Property damage and loss

Haulage trucks may damage fences due to driver recklessness or poor visibility. Livestock may be hit by moving construction vehicles and haulage trucks. Livestock loss due to theft may increase as criminals become opportunistic due to increased presence of people in the area. Property also likely to be affected are farm houses, wildlife (game) , farm implements or any other properties of value to farm owners and their workers.

### 6.2.8. Soil Degradation

The removal of vegetation may result in soil erosion as the topsoil becomes exposed. Heavy equipment can compact the soil affecting topsoil (texture) and hence soil degradation. Top soil loss can increase with increased surface run-off. Soil loss can trigger the establishment of dongas and gullies. Run-off from vehicle tracks can create also degrade landscape. Trenching when conducted during the rainy season can create a ponding effect as rain water percolates in the dugout area.

### 6.2.9. Visual Degradation /Aesthetics

Mine out areas can be aesthetically unpleasant affecting the visual characteristic the natural landscape.

### 6.2.10. Waste Generation

Exploration activities will result in the stockpile of waste rock material and pilling of debris (cleared vegetation matter). Sanitary waste and domestic household waste is expected to build-up especially around staging areas/field camps.

### 6.2.11. Assessment of Impacts

This section sets out the overall approach that was adopted to assess the potential environmental and social impacts associated with the project. To fully understand the significance of each of the potential impacts

each impact must be evaluated and assessed. The definitions and explanations for each criterion are set in Table 8 below.

**Table 7:Assessment Criteria**

| | |
|---|---|
| Duration – What is the length of the negative impact? | |
| None | No Effect |
| Short | Less than one year |
| Moderate | One to ten years |
| Permanent | Irreversible |
| Magnitude – What is the effect on the resource within the study area? | |
| None | No Effect |
| Small | Affecting less than 1% of the resource |
| Moderate | Affecting 1-10% of the resource |
| Great | Affecting greater than 10% of the resource |
| Spatial Extent – what is the scale of the impact in terms of area, considering cumulative impacts and international importance? | |
| Local | In the immediate area of the impact |
| Regional / National | Having large scale impacts |
| International | Having international importance |
| Type – What is the impact | |
| Direct | Caused by the project and occur simultaneously with project activities |
| Indirect | Associated with the project and may occur later or wider area |
| Cumulative | Combined effects of the project with other existing / planned activities |
| Probability | |
| Low | <25% |
| Medium | 25-75% |
| High | >75% |

**Table 8:Impact Significance**

| Class | Significance | Descriptions |
|---|---|---|
| 1 | Major Impact | Impacts are expected to be permanent and non- reversible on a national scale and/or have international significance or result in a legislative non- compliance. |
| 2 | Moderate Impact | Impacts are long term, but reversible and/or have regional significance. |
| 3 | Minor | Impacts are considered short term, reversible and/or localized in extent. |
| 4 | Insignificant | No impact is expected. |
| 5 | Unknown | There are insufficient data on which to assess significance. |
| 6 | Positive | Impacts are beneficial |

**Table 9:Environmental Impacts and Aspects Assessment**

| Environmental Impact | Valued Ecosystem Component | Impact | Project Phase | Duration | Magnitude | Extent | Type | Probability | Significance |
|---|---|---|---|---|---|---|---|---|---|
| **TOPOGRAPHY** | Landscape Scenery | Visual aesthetic impact | Construction and Operation | Moderate | Moderate | Local | Direct | Medium 25 - 75% | Minor |
| | Topography and Landscape | Alternation of existing topography | Construction & operation | Short term | Small | Local | Direct | High>75% | Moderate |
| | Topography and Landscape | Topographic changes and Visual Impact | Construction &Operation | Medium term | Moderate | Local | Direct | High>75% | Moderate |
| **SOIL** | Soil | Contamination to soil from solid and sanitary waste disposal | Construction and Operations | Moderate | Small | Local | Direct | Low <25% | Minor |
| | Soil | Spillages of fuel, oil, and lubricants. | Construction | Short | Small | Local | Direct | Low <25% | Minor |
| | Soil | Erosion | Construction | Moderate | Small | Local | Direct | Low <25% | Minor |
| | Soil | Loss of usable topsoil material | Construction | Long term | Small | Local | Direct | High>75% | Moderate |
| **LAND CAPABILITY** | Terrestrial ecology and aquatic ecosystems | Change in land use | Construction and Operations | Permanent | Great | Local | Direct | Low <25% | Moderate |
| | Terrestrial ecology and biodiversity | Decreased in vegetated land (biodiversity zones) around the project area. | Construction and Operations | Long term | Low | Local | Direct | High>75% | Low |
| **WATER** | Surface and ground water quality | Water pollution from oils and lubricants from vehicles and machinery. | Construction | Moderate | Moderate | Local | Direct | Medium 25 - 75% | Moderate |
| | Surface water quality | Turbidity and high sediment load | Construction | Moderate | Small | Local | Direct | Low <25% | Low |
| | Groundwater quality | Pollution of underground aquifers because of unsafe storage or disposal of hazardous waste | Operations | Long term | Great | Local | Direct | Medium 25 - 75% | Low |
| | Groundwater quality | Groundwater source and soil may be polluted by construction activities | Construction | Short term | Great | Local | Direct | Medium 25 - 75% | Moderate |
| | Ground water quality | Groundwater source potentially contaminated by sewerage waste | Operations | Long term | Moderate | Local | Direct | Medium 25 - 75% | Low |
| | Surface water quality | Increase in surface water run- off from barren areas. | Construction and operations | Short term | Moderate | Local | Direct | Low <25% | Low |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **AIR QUALITY** | | | | | | | | | |
| | Ambient Air Quality | Potentially release the following: emissions.<br>-PM2.5<br>-PM10<br>-Fallout dust | Operations | Short term | Moderate | Local | Direct | Medium 25 - 75% | Moderate |
| **WASTE** | Ground water quality | Hazardous waste from the waste storage site | Operations | Long term (operation) | Small | local | Direct | Medium 25 - 75% | Low |
| | Topography and Landscape | Visual impacts due to infrastructure and unsustainable handling and disposal of waste. | Construction and Operations | Short | Small | Local | Direct | Low <25% | Minor |
| | Groundwater quality | Leaching of hazardous substance or chemicals laden water into the sub-terranian water sources | Construction and Operations | Long term | Small | Local | Direct | Medium 25 - 75% | Low |
| | Topography and Landscape | -Visual impacts due to use of unsustainable disposal methods<br>-Excavations could pose a visual impact and complete change scenery | Construction and Operations | Long term | Small | Local | Direct | Medium 25 - 75% | Moderate |
| **FAUNA** | Terrestrial ecology and biodiversity | -Operational dust fallout, soil disturbance can affect nutrient recycling process effected by soil living organisms | Construction, Operations | Moderate | Small | local | Direct | Low <25% | Minor |
| | | Destruction of vertebrate fauna (e.g., road kills; fence and construction /land clearing mortalities) | Construction and Operations | Long | Moderate | Local | Direct | Low <25% | Minor |
| **FLORA** | Terrestrial ecology and biodiversity | Proliferation of invasive plants | Construction and Operations | Long | Moderate | Local | Direct | High >75% | Moderate |
| | Terrestrial ecology and biodiversity | Loss of unique flora and special habitats in the local environment because of general nuisance and animal migrate. | Construction and operations | None | Moderate | Regional | Direct | Low <25% | Moderate |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Terrestrial ecology and biodiversity | Dust fallout and emissions may contaminate some sensitive animal and plant species and they may experience stunted growths. | Construction and Operations | Long Term | Small | Local | Direct | Medium 25 - 75% | Low |
| | Terrestrial ecology and biodiversity | Clearing of land may lead to destruction of protected vegetation and loss of biodiversity. | Construction | Long Term | Moderate | Local | Direct | High >75% | low |
| | Terrestrial ecology and biodiversity | Uncontrolled/accidental fires | Construction and Operations | Long Term | Great | Local | Direct | Medium 25 – 75% | Moderate |
| **SOCIO-ECONOMIC** | Noise Pollution | Increase in noise levels | Construction, Operation | Moderate | Small | Local | Direct | Low <25% | Minor |
| | Socio Economic Activities | Temporary and permanent employment prospects. | Construction and operations | Long | Moderate | Regional | Direct | Medium 25 – 75% | Positive |
| | Community health and morals | Increased potential of social evils such as prostitution proliferation and abuse of the vulnerable groups (Children and women). Also potential for increased HIV infections; | Construction, Operation | Moderate | Small | Local | Direct | Low <25% | Minor |
| | Contribution to National Economy | Employment, local procurement, duties, and taxes. | Construction and Operations | Short | None | Regional / National | Direct | Low <25% | Positive |
| **HERITAGE/ ARCHAEOLOGY** | Artefacts, archaeological high value components | Destruction or affecting paleontological and archaeological artefacts | Construction and Operation | Moderate | Moderate | Local | Direct | Medium 25 – 75% | Moderate |
| **HEALTH AND SAFETY** | Health Sanitation | Poor sanitation can be detrimental to human health. | Construction and Operation | Moderate | Moderate | Local | Direct | Medium 25 – 75% | Moderate |
| | Employee Health and Safety | Potential accidents when operating exploration equipment as well as transportation of ore and illnesses of the workers. | Operation | Moderate | Moderate | Local | Direct | Medium 25 – 75% | Moderate |
| **CLIMATE** | Greenhouse Gases | Operation of heavy vehicles and equipment result in release of GHGs such as CO2 | Operation | Moderate | Great | Local | Direct | Medium 25 – 75% | Major |
| | Respiratory illnesses | Dust Emissions such as PM10, PM 2.5 and PM 0.1 can be highly dangerous to the respiratory system and as such areas around will be strictly monitored dust fallout. | Operation | Moderate | Moderate | Local | Direct | Medium 25 – 75% | Moderate |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **TRAFFIC IMPACTS** | Vehicular Movement | Increase in vehicular movement can displace local wild animals and cause nuisance to nearby homesteads | Operation | Moderate | Moderate | Local | Direct | Medium 25 – 75% | low |

# 7. CONCLUSION

The proposed exploration activities are desirable and highly recommended because of the pressing need for socio-economic advancement. Distant and proximate environs in relation to predefined exploration targets are less likely to be adversely affected by the project as alluded in the Impact Assessment Matrix. The results of the public consultation process indicated that most Interested and Affected Parties welcome the proposed development. Attention was drawn to ensure that potential adverse impacts are prevented, and mitigation measures are stringently implemented during the project. An Environmental and Social Management Plan has been developed to ensure that it addresses all potential negative impacts anticipated for the project and enhance all positive impacts for a more beneficial impact. An assessment of alternatives suggest that trenching may be more advantageous than other exploration techniques in terms of operational efficiency, productivity and safety. As such, the exploration program should be timely communicated to the directly affected landowners well in advance prior and during exploration.

Based on the findings of the ESR, CPC cc recommends that MEFT (Department of Environmental Affairs) approve the Environmental Clearance Certificate Application on basis of full compliance to the developed Environmental and Social Management Plan. In this respect, the EAP recommends the approval of the ESIA for the proposed mineral exploration activities. If authorised, the developed EMP that takes account of rehabilitation requirements should be strictly adhered together with monthly compliance monitoring and Quarterly reporting, taking into consideration comments and concerns from the surrounding farmers

## BIBLIOGRAPHY

Bee Pee (Pty) Ltd and SRK Consulting (Pty) Ltd. Compilation of the Hydrogeological Map and Atlas for he SADC Region Annexure H.

Christelis, G. Struckmeier, W. (2001). Groundwater in Namibia: An Explanation to the Hydrogeological Map. Strohbach, B. n.d, Mapping the Major Catchments of Namibia

DEAT. (2005). Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning

Jeltsch, F., Blaum, N., Classen, N., Eschenbach, A., Grohmann, C., Gröngröft, A., Joubert, D. F., Horn, A., Lohmann, D., Linsenmair, K. E., Lück-Vogel, M., Medinski, T. V., Meyfarth, S., Mills, A., Petersen, A., Popp, A., Poschlod, P., Reisch, C., Rossmanith, E., Rubilar, H., Schütze, S., Seymour, C., Simmons, R., Smit, G. N., Strohbach, M., Tews, J., Tietjen, B., Wesuls, D., Wichmann, M., Wieczorek,, M., Zimmermann, I. (2010): Impacts of landuse and climate change on the dynamics and biodiversity in the Thornbush Savanna Biome.

Hoffman, M. T., Schmiedel, U., Jürgens, N. [Eds.]: Biodiversity in southern Africa. Volume 3: Implications for landuse and management: pp. 33–74, Klaus Hess Publishers, Göttingen & Windhoek.

Joubert, D.F. & Zimmermann, I. 2002. The potential impacts of wood harvesting of bush thickening species on biodiversity and ecological processes. *Proceedings of the First National Forestry Research Workshop held on 12 and 13 March 2002 in Windhoek, Namibia,* Ministry of Environment and Tourism,Forestry Publication 9:67-78

Klocke-Daffa, Sabine. *Is BIG Enough? Basic Income Grant in Namibia. An Anthropological Inquiry*. Universitätsbibliothek Tübingen, 2012.

Malango, V. (2021), Namibia's Mining Profitability Improved in 2021. New-Era [Dated 16 July 2021].

MAWF (Ministry of Agriculture, Water and Land Reform), (2001). The Hydrogeological Map of Namibia (HYMNAM), porous aquifers coverage. GIS dataset available at the Department of Water/BGR, Windhoek, Namibia.

Mendelsohn, J., el Obeid, S.2003.A digest of information on key aspects of Namibia's geography and sustainable development prospects. Research and Information Services of Namibia

Mendelsohn, J. Jarvis, A. Roberts, C. Robertson, T. 2002. Atlas of Namibia: A Portrait of the Land and its People.

Miller, R. McG. (2008). The Geology of Namibia Volume2. Neoproterozoic to Lower Paleozoic.

Mendelsohn, J. Jarvis, A. Roberts, C. Robertson, T. (2002). Atlas of Namibia: A Portrait of the Land and its People.

Miller, R. McG. (2008). The Geology of Namibia Volume2. Neoproterozoic to Lower Paleozoic

NSA. (2011). 2011 Population and Housing Census Main Report. Namibian Statistics Agency.

NSA. (2015). The Namibia Labour Force Survey 2014 Report. Windhoek: Namibian Statistics Agency.

NSA. (2019). Namibia Labour Force Survey 2018 Report. Namibia Statistics Agency,

NSA. (2012). Namibia Household Income and Expenditure Survey (NHIES) 2009/2010. Namibian Statistics Agency. Retrieved fromhttp://www.nsa.org.na/files/downloads/NHIES%20Main%20Report.pdf

NSA. (2018). Namibia - Namibia Household income and Expenditure Survey, 2015/16. Namibia Statistics Agency. Retrieved from https://nsa.org.na/microdata1/index.php/catalog/28/related_materials

Otaru, A. J., Odigure, J. O., Okafor, J. O., & Abdulkareem, A. S. (2013). Model prediction of particulate dispersion from a cement mill stack: case study of a cement plant in Nigeria. *IOSR Journal of Environmental Science, Toxicology and Food Technology*, *3*(2), 97-110.

Republic of Namibia. 2008, Government Gazzette of the Republic of Namibia. Government notice No.1: Regulations for Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA)-Windhoek

Republic of Namibia.2008, Government Gazette of the Republic of Namibia. Government notice No.1: Regulations for Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA)-Windhoek

Republic of Namibia. (2009). Namibia National Housing Policy. Cabinet Approved July 1991 and Reviewed July 2009. Ministry of Regional and Local Government, Housing, and Rural Development.

Republic of Namibia. (2016). Harambee Prosperity Plan 2016/17-2019/20. Republic of Namibia

Republic of Namibia (2017a) 'Namibia's Fifth National Development Plan (NDP 5)'. Windhoek, Namibia: National Planning Commission. Accessed 10.12.2020.

Smyth, E., & Vanclay, F. (2017). The Social Framework for Projects: a conceptual but practical model to assist in assessing, planning, and managing the social impacts of projects. *Impact Assessment and Project Appraisal*, *35*(1), 65-80.

Strohbach,BJ; Strohbach,M,; Josaphat T. Kutuahuripa ;Heiner D. Mouton.2004.Reconnaissance Survey of the Landscapes, Soils and Vegetation of the Eastern Communal Areas (Otjiozondjupa and Omaheke Regions). Namibia National Botanical Research Institute and Agro-Ecological Survey Programme Directorate Agriculture Research and Training Ministry of Agriculture, Water and Rural Development

UNICEF. (n.d.). Sanitation: A Namibia fit for children. United Nations Children's Emergency Fund. Retrieved from https://www.unicef.org/namibia/Sanitation_fact_sheet_print.pdf

WHO (2005)? WHO Air Quality Guidelines Global Update, World Health Organisation, October 2005, Germany.

Mendelsohn, J. Jarvis, A. Roberts, C. Robertson, T. 2002. Atlas of Namibia: A Portrait of the Land and its People.

Miller, R. McG. 2008. The Geology of Namibia Volume2. Neoproterozoic to Lower Paleozoic

Namwater, 2020, Witvlei Water Supply Scheme, Environmental Management Plan.