ECC

ENVIRONMENTAL
COMPLIANCE CONSULTANCY






ECC-84-346-REP-08-D

ENVIRONMENTAL SCOPING REPORT PLUS IMPACT ASSESSMENT

EXPLORATION ACTIVITIES ON EPL 5445 FOR BASE, RARE AND PRECIOUS METALS IN THE ERONGO AND KUNENE REGIONS, NAMIBIA

PREPARED FOR

AFRITIN MINING NAMIBIA (PTY) LTD

AFRITIN
MINING

May 2021

TITLE AND APPROVAL PAGE

Project Name:	Exploration activities on EPL 5445 for base, rare and precious metals in the Erongo and Kunene regions, Namibia
Client Name:	Afritin Mining Namibia (Pty) Ltd
Ministry Reference:	APP-002477
Authors:	Diaan Hoffman, Laina Wilhelm and Jessica Bezuidenhout
Status of Report:	Final for Government submission
Date of issue:	May 2021
Review Period	NA

ENVIRONMENTAL COMPLIANCE CONSULTANCY CONTACT DETAILS:
We welcome any enquiries regarding this document and its content. Please contact:

Stephan Bezuidenhout
Environmental Consultant & Practitioner
Tel: +264 81 669 7608
Email: stephan@eccenvironmental.com
www.eccenvironmental.com

Jessica Bezuidenhout (Mooney)
Environmental Consultant & Practitioner
Tel: +264 81 669 7608
Email: jessica@eccenvironmental.com
www.eccenvironmental.com

CONFIDENTIALITY
Environmental Compliance Consultancy Notice: This document is confidential. If you are not the intended recipient, you must not disclose or use the information contained in it. If you have received this document in error, please notify us immediately and delete the document and any attachments. Any personal views or opinions expressed by the writer may not necessarily reflect the views or opinions of Environmental Compliance Consultancy or its client.

Please note at ECC we care about lessening our footprint on the environment; therefore, all documents are printed double sided.

EXECUTIVE SUMMARY

Afritin Mining Namibia (Pty) Ltd (herein referred to as the proponent or Afritin), intends to undertake exploration activities on Exclusive Prospecting Licence (EPL) 5445 for base and rare metals, and precious metals in the Erongo and Kunene regions of Namibia.

The proposed project triggers listed activities in terms of the Environmental Management Act, No. 7 of 2007, therefore an environmental clearance certificate is required. As part of the environmental clearance certificate application, an Environmental and Social Impact Assessment (ESIA) has been undertaken to satisfy the requirements of the Environmental Management Act, No. 7 of 2007. This environmental assessment report and Environmental Management Plan (EMP) is herewith submitted to the competent authority as part of the application for the environmental clearance certificate.

The proposed exploration activities on EPL 5445 may include drilling, aerial or remote sensing, ground or airborne geophysical surveys, and mineral sampling among other standardised exploration techniques. If mineralisation is identified, further exploration methods shall be applied; if not identified, then EPL 5445 shall be rehabilitated and returned to the government.

Activities are expected to be conducted over a 3-year period, which is the duration of the exploration licence. However, the period of each phase of the exploration programme may vary and will be refined as geological information becomes available. If exploration is successful, and a commercially viable mineral resource is defined, exploration operations can potentially transcend into mining operations. This phase will involve an application for a Mining Licence and will be assessed in a separate and detailed environmental impact assessment at the appropriate stage.

The main potential impacts for this EPL that was identified are the potential impacts associated with the generation of noise, air pollution (i.e., dust generation), increased movement of vehicles and people, effects on biodiversity, water resources and heritage sites. The area within and surrounding the EPL represents an area that has moderate species diversity and overall high biodiversity endemism, with various protected and flagship species that play an essential role within the local ecosystems. This area is home to critically endangered black rhinos which freely roam the area within and surrounding the EPL. Furthermore, desert-adapted elephants and lions are also found in these areas, and both have continuous declining populations. These species contribute to the revenue generated by the tourism industry and are a unique and iconic part of Namibia's biodiversity.

The EPL overlaps two communal conservancies, Tsiseb and Doro! Nawas. A communal conservancy represents a conservation area that is managed by a local community that aims

to manage the natural resources within their conservancy in a sustainable way to generate returns and other benefits. Community members are mainly employed by lodges, camps, farms, or the local's farm with livestock in the area. Tourism and consumptive wildlife use are the main benefit contributor to these local communities, in addition, income generated from plant products and local crafts.

An archaeological field site visit and reconnaissance survey was conducted by Dr John Kinahan, in selected focus areas on the EPLs 5445 and 5670 refer to Appendix D for the full archaeological assessment report, issued on the 10 May 2021. The EPLs 5445 and 5670 are located in the western parts of Namibia close to the Dâures massif, or Brandberg, a feature of outstanding archaeological importance. Both EPLs sites present a focus of mining activities in the past and there is a considerable legacy of damage to the archaeological landscape. However, the greater part of the two EPLs is undisturbed and contains a significant concentration of archaeological sites that would require mitigation during the proposed exploration activities.

A total of five archaeological sites were discovered within EPL 5445 that either has a high significance or high vulnerability value according to Dr John Kinahan. The small number of sites that indeed have significance values of 4 are multi-component sites forming an essential part of an archaeological landscape pattern according to Dr Kinahan. The proponent also agreed to set up buffer zones around the various archaeological sites as suggested by Dr. Kinahan**.**

The proposed exploration activities on the Afritin Mining EPLs 5445 and 5670 will be adopted in such a way that they avoid areas of heritage value and an application will be submitted to the National Heritage Council for heritage consent and on-site chance find procedures will be followed.

Exploration activities will be managed in accordance with the Environmental Management Plan and regular monitoring will be conducted to ensure compliance with the relevant legislation and the EMP.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
AEM	Airborne Electromagnetic
AIDS	Acquired Immune Deficiency Syndrome
AMT	Audio Magneto Telluric
CBNRM	Community-Based Natural Resource Management
COVID19	Corona Virus Disease 2019
DEA	Directorate of Environmental Affairs
ECC	Environmental Compliance Consultancy
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
EPL	Exclusive Prospecting Licence
ESIA	Environmental and Social Impact Assessment
GSN	Geological Survey of Namibia
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Parties
IFC	International Finance Corporation
MAWLR	Ministry of Agriculture and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
MME	Ministry of Mines and Energy
MPMRC	Minerals (Prospecting and Mining Rights) Committee
NBRI	National Botanical Research Institute
NDP5	National Development Plan Five
NSA	National Statistics Agency
RAB	Rotary Air Blast
RC	Reverse Circulation
SOP	Standard Operating Procedure
TB	Tuberculosis

LIST OF TERMENOLOGIES

TERM	DESCRIPTION
REMOTE SENSING	Techniques in mineral exploration enable explorers to evaluate large areas of the earth remotely without having to undertake ground-based exploration operations. Remote sensing may be used to map the geology and structure that potentially localise the ore deposits, or may be used to identify rocks, which have been hydrothermally altered. Remote sensing involves the use of aircraft and satellite-based equipment to obtain data to record spectral data from the surface of the earth. Remote sensing includes several tools and techniques including geographical information systems, radar and sonar. Typically, satellites or high-flying aircraft are used in the data collection process. It is a useful tool when searching for minerals and can indicate where deposits could be located. Remote sensing aids in narrowing down the field survey area and helps to identify target areas that may be considered for more.
AIRBORNE GEOPHYSICAL SURVEYS	Using radiometric techniques, are a key aspect in mineral exploration, enabling explorers to probe underground, mapping geology and structure, including potentially direct identification of mineral deposits. Modern surveys are flown at a low level in a grid pattern, adhering fully to the safety margins prescribed by the Civil Aviation Authority (CAA) of Namibia.
GEOLOGICAL MAPPING	Of outcrops is used to describe the primary lithology and morphology of rock bodies as well as age relationships between rock units. Mapping is a crucial part of refining subsurface targets, as it provides structural information and can be used to predict subsurface geology. This will be conducted concurrently with the geochemical sampling process.
GEOCHEMICAL SAMPLING	Soil and rock sampling is a non-invasive technique to determine the existence and extent of mineralization and a potential resource. Geochemical data are used to focus on areas of higher mineral potential as the project advances and help to define drill targets. They assist the company to drill more selectively and thereby increase the chances of intersecting mineralised zones during exploration and reduce the overall footprint of exploration and environmental impact in the area. Geochemical surveys will be the first ground exploration method to be undertaken by the proponent in the licence area. ○ **SAMPLING** - Selecting a fractional but representative part of the soil or rock for analysis.

GROUND GEOPHYSICAL SURVEYS	Including Magnetic or Induced Polarization (IP) techniques, may be undertaken, as appropriate, to collect data that indicate essential rock properties, particularly at depth. They are also used to map geological structures. IP surveys involve sending electrical currents into the ground, measured via electrodes along linear cut-lines up to 3 km long to provide access to electrical cables. Small holes in the ground (0.2m x 0.2m x 0.3m) will be required for IP electrodes every 25 or 50m along a survey line. The majority of EM techniques are completely non-invasive and operate by sending electromagnetically induced currents into the ground. EM surveys are conducted along the same linear traverse lines. A variation is the Audio-Magneto Telluric (AMT) technique, in which surveys utilize the same lines and small holes in the ground, but without the application of high voltage electrical currents.
RAB DRILLING	(Rotary Air Blast drilling) is an open-hole technique that injects compressed air down the drill pipe and recovers the drill chip fragments, on the outside of the drill stem.
DIAMOND DRILLING	Entails the use of a diamond-studded drill bit to obtain core samples of two cm or more in diameter. Bio-degradable drill additives will be used during diamond core drilling. Soil, rock and drill core samples will be temporarily stored at the site office. Exploration activities are usually undertaken in phases, with periods of no field activity between them, whilst awaiting analytical results, and the integration and interpretation of data to decide on the next phase of exploration.

1 INTRODUCTION

1.1 PROJECT OVERVIEW

Environmental Compliance Consultancy (ECC) has been engaged by the proponent (Afritin Mining Namibia (Pty) Ltd) to undertake an Environmental and Social Impact Assessment (ESIA) and an Environmental Management Plan (EMP) in terms of the Environmental Management Act, 2007 and its regulations. An environmental clearance application will be submitted to the relevant competent authorities, the Ministry of Mines and Energy (MME) and the Ministry of Environment, Forestry and Tourism (MEFT).

Afritin Mining is a mining company with a portfolio of tin assets in Namibia and South Africa. The Namibian registered company propose to undertake exploration activities on EPL 5445 in the Erongo and Kunene regions. Should exploration activities lead to the possibility of mining, a separate application will be made for specific Mining Licences (ML), and environmental norms and obligations will be assessed and implemented.

Afritin Mining intends to pursue exploration opportunities in Namibia to contribute to mining prospects. Namibia is rich in natural resources and the minerals sector is a key contributor to the nations GDP in Namibia. Exploration could lead to mining activities, which would contribute to the national and local economy.

1.2 BACKGROUND

AfriTin Mining Company (Pty) Ltd is currently operating a conventional opencast tin mine with three mining licence areas (ML 134, ML 129, and ML 133) located near the Uis settlement in the Erongo Region, Namibia. AfriTin is seeking to further explore for base, rare, precious metals and minerals and propose to undertake exploration activities on EPL 5445 in the Erongo Region. EPL 5445 extends slightly into the Kunene Region, approximately 90km from Uis along the C35 main road and D2342 district road (Figure 1).

The surface area of the EPL is approximately 35090 Ha. This EPL borders and slightly overlaps both the Dorob National Park and the Skeleton Coast Park and falls over two communal conservancies, Doro !nawas and Tsiseb, of which the largest area of the EPL falls within the latter (see figure 3). The Save the Rhino Trust camp also falls within the borders of the EPL and has been identified as a sensitive receptor due to critically endangered Black Rhinos (*Diceros bicornis*) roaming within this area (Emslie 2020). Due to the sensitive location all exploration work on the EPL will be operated and strictly controlled by AfriTin.

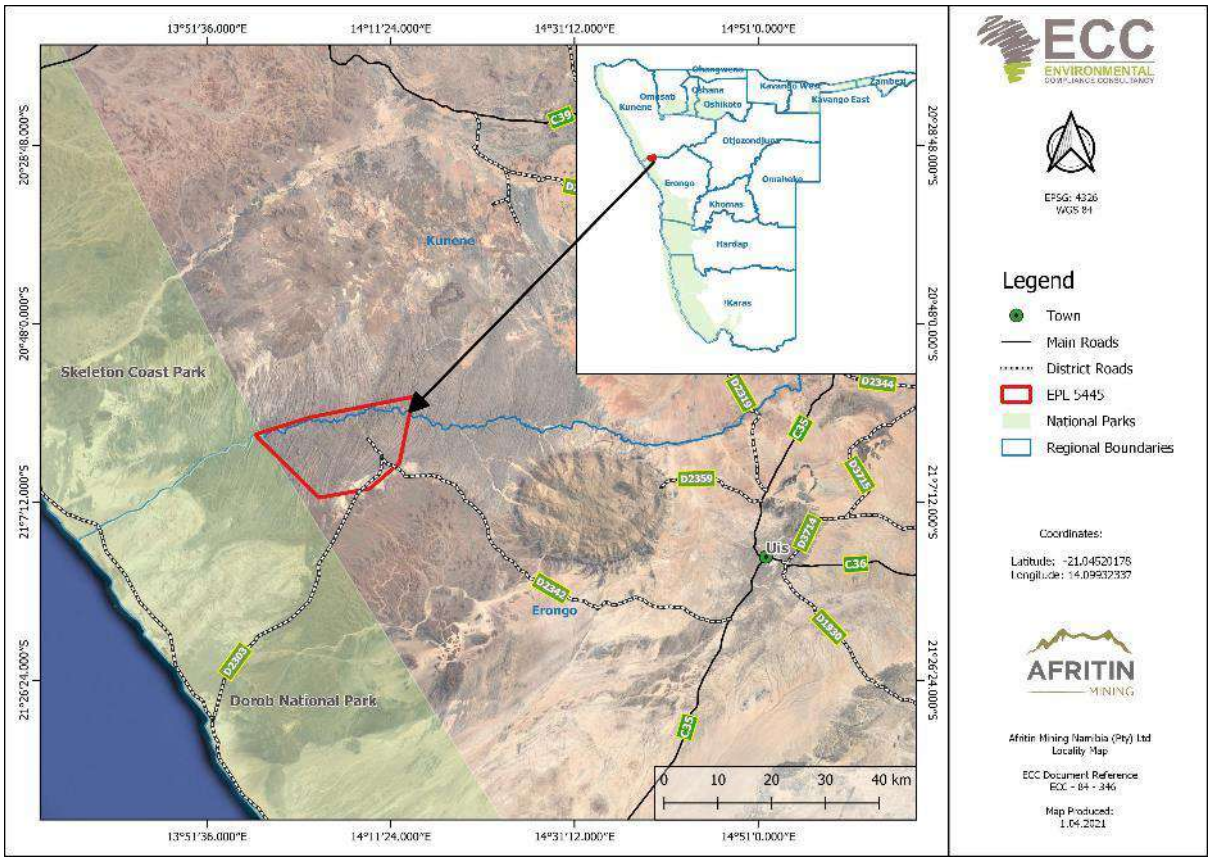


FIGURE 1 - LOCATION OF AFRITIN EPL 5445

1.3 SCOPE OF WORK

The purpose of this report is to present the findings of the assessment for the proposed project. This report has been outlined in terms of the requirements of the Environmental Management Act, No. 7 of 2007 and its regulations, promulgated in 2012 (referred to herein as the EIA Regulations).

ECC's terms of reference for the assessment is strictly to address potential effects, whether positive or negative and their relative significance, explore alternatives for technical recommendations and identify appropriate mitigation measures.
This report provides information to the public and stakeholders to aid in the decision-making process for the proposed project. The objectives are to:

- Provide a description of the proposed activity and the site on which the activity is to be undertaken, and the location of the activity on the site;
- Provide a description of the environment that may be affected by the activity;
- Identify the laws and guidelines that have been considered in the assessment and preparation of this report;

- Provide details of the public consultation process;
- Describe the need and desirability of the activity;
- Provide a high level of environmental and social impact assessment on feasible alternatives that were considered; and
- Report the assessment findings, identifying the significance of effects.

In addition to the environmental assessment, an EMP (Appendix A) is also required in terms of the Environmental Management Act, No. 7 of 2007. The attached EMP has been developed to provide a management framework for the planning and implementation of exploration activities. The EMP provides exploration standards and arrangements to ensure that the potential environmental and social impacts are mitigated, prevented or minimised as far as reasonably practicable and that statutory requirements and other legal obligations are fulfilled.

1.4 THE PROPONENT OF THE PROPOSED PROJECT

The details of the proponent are set out in Table 1 below.

TABLE 1 - PROPONENTS DETAILS

CONTACT	POSTAL ADDRESS	EMAIL ADDRESS	TELEPHONE
Uis Afritin Mining Namibia (Pty) Ltd Anthony Viljoen (Chief Executive Officer)	P O Box 90757 Windhoek Namibia	anthony.viljoen@afritinmining.com	+27 11 268 6555

1.5 ENVIRONMENTAL COMPLIANCE CONSULTANCY

ECC, a Namibian consultancy (registration number Close Corporation 2013/11401), has prepared this scoping report, impact assessment and EMP on behalf of the proponent. ECC operates exclusively in the environmental, social, health and safety fields for clients across Southern Africa, in both the public and private sectors. ECC is independent of the proponent and has no vested or financial interest in the proposed project, except for fair remuneration for professional services rendered.

All compliance and regulatory requirements regarding this EIA report should be forwarded by email or posted to the following address:

Environmental Compliance Consultancy
PO BOX 91193 Klein Windhoek, Namibia
Tel: +264 81 669 7608
Email: info@eccenvironmental.com

1.6 ENVIRONMENTAL LEGAL REQUIREMENTS

The Environmental Management Act, No.7 of 2007 stipulates that an environmental clearance certificate is required to undertake listed activities in terms of the Act and its regulations. Listed activities triggered by the proposed project in terms of the Environmental Management Act, No. 7 of 2007 and its regulations are as follows:

TABLE 2 - LISTED ACTIVITIES TRIGGERED BY THE PROJECT

LISTED ACTIVITY	EIA SCREENING FINDING
MINING AND QUARRYING ACTIVITIES 3.1 The construction of facilities for any process or activities which requires a licence, right or other forms of authorisation, and the renewal of a licence, right or other forms of authorisation, in terms of the Minerals (Prospecting and Mining Act), No. 33 of 1992. 3.2 Other forms of mining or extraction of any natural resources whether regulated by law or not 3.3 Resource extraction, manipulation, conservation, and related activities	○ The proposed project requires an environmental clearance from DEA/MEFT for the search for base and rare metals, precious metals. ○ Minerals (e.g., soil and sand) will be sampled within selected target areas of the project area.
WATER RESOURCE DEVELOPMENT 8.1 The abstraction of ground or surface water for industrial or commercial purposes	○ Due to the drilling of exploration boreholes, the abstraction of groundwater may be possible, although it is intended that water will be obtained from existing boreholes in the proposed project area. Any additional borehole drilled for the intention of abstracting water for use on-site should be permitted by the authorities in the form of an abstraction permit
FOREST ACTIVITIES 4. The clearance of forest areas, deforestation, timber harvesting or any other related activity that required authorisation in terms of the Forest Act, 2001 (Act No. 12 of 2001) or any other law.	○ Limited vegetation clearing may be required for tracks and survey access creation, and possibly for the set up of survey and drilling teams' field camps. ○ Specially protected plant species will not be cleared without approval from the competent authority
HAZARDOUS SUBSTANCE TREATMENT, HANDLING AND STORAGE 9.1 The manufacturing, storage, handling or	○ The possible storage and handling of hydrocarbons (diesel fuel) on-site may trigger pollution events if done incorrectly. ○ Possible quarrying activities will emit dust

LISTED ACTIVITY	EIA SCREENING FINDING
processing of a hazardous substance defined in the Hazardous Substance Ordinance, 1974. 9.2 Any process or activity which requires a permit, licence or another form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste.	into the atmosphere.

2 APPROACH TO THE IMPACT ASSESSMENT

2.1 PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The EIA process in Namibia is governed and controlled by the Environmental Management Act, No. 7 of 2007 and its regulations, No. 30 of 2012, which is administered by the Office of the Environmental Commissioner through the DEA of the MEFT.

This preliminary assessment aims to identify, predict, evaluate and mitigate the potential impacts of the proposed project on the natural and human receiving environment, scope the available data and identify the gaps that need to be filled. The assessment process helps to determine the spatial and temporal scope and identify the assessment methodology which is most applicable for use. In addition, the assessment process and subsequent reports are to apply the principles of environmental management to the proposed activities; reduce the negative and increase the positive impacts arising from the project; provide an opportunity for the public to consider the environmental impacts of the proposed project through meaningful consultation, and to provide a vehicle to present the findings of the assessment process to competent authorities for decision making.

2.2 THE ASSESSMENT PROCESS

The ESIA methodology applied to this assessment has been developed using the International Finance Corporation (IFC) standards and models, in particular, Performance Standard 1, 'Assessment and management of environmental and social risks and impacts' (International Finance Corporation, 2017) (International Finance Corporation, 2012), which establishes the importance of:

- Integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects;
- Effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and
- The client's management of environmental and social performance throughout the life of the project

Furthermore, the Namibian Draft Procedures and Guidance for ESIA and EMP (the Republic of Namibia, 2008) as well as the international and national best practice; and over 25 years of combined EIA experience, we're also drawn upon in the assessment process.

This impact assessment is a formal process in which the potential effects of the project on the biophysical, social and economic environments are identified, assessed and reported so that the significance of potential impacts can be taken into account when considering whether to grant approval, consent or support for the proposed project.

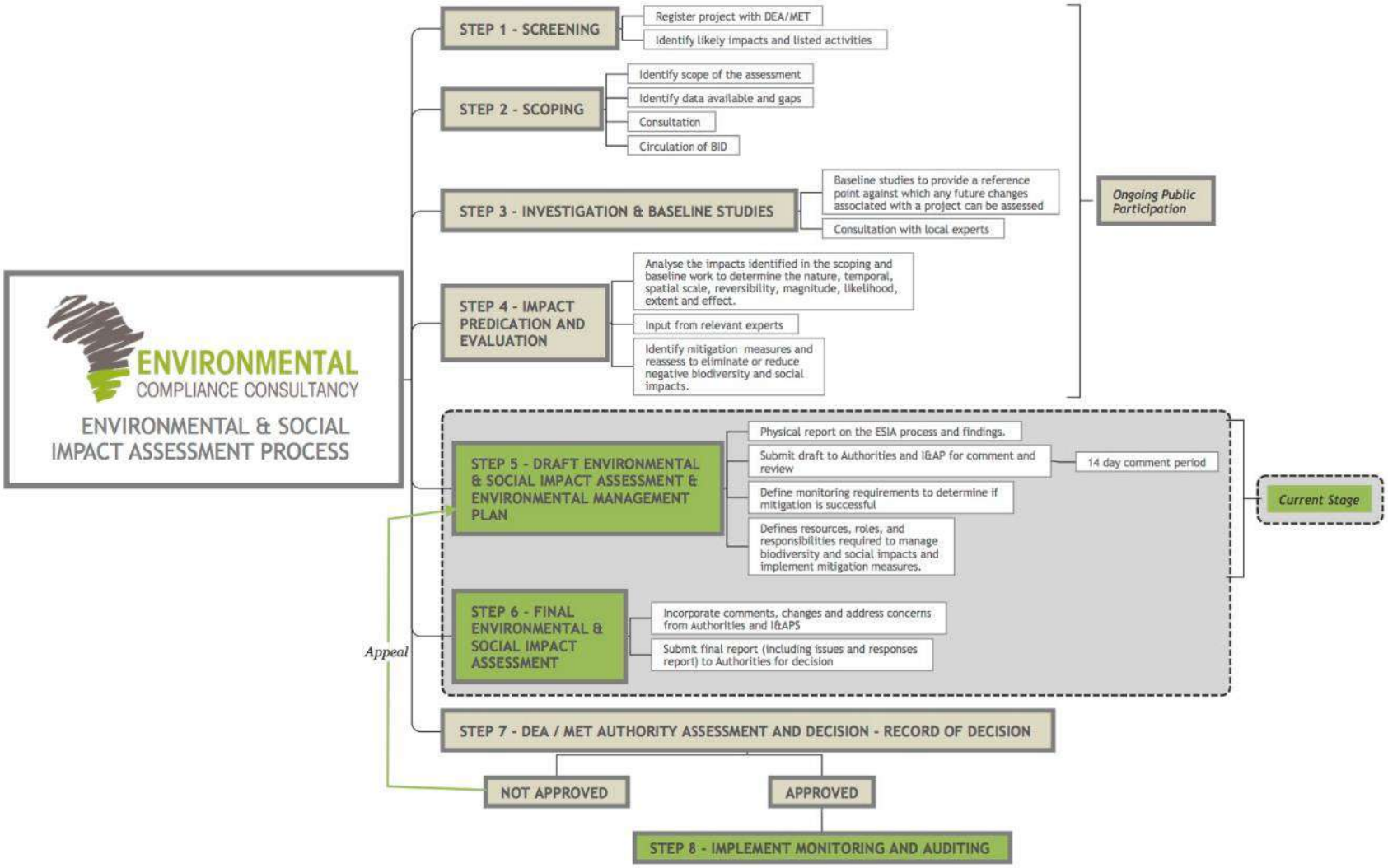


FIGURE 2 - ECC ESIA METHOD

2.3 SCREENING OF THE PROJECT

The first stages in the EIA process are to register the project with the DEA / MEFT (completed) and undertake a screening exercise to determine whether it is considered as a listed activity under the Environmental Management Act, No. 7 of 2007 and associated regulations and if significant impacts may arise from the project. The location, scale and duration of project activities will be considered against the receiving environment.

It was concluded that an ESIA (e.g. scoping report and EMP) is required, as the proposed project is considered as a listed activity and there may be potential for significant impacts to occur.

2.4 SCOPING OF THE ENVIRONMENTAL ASSESSMENT

Where an ESIA is required, the second stage is to scope the assessment. The main aims of this stage are to determine which impacts are likely to be significant (the main focus of the assessment); scope the available data and any gaps which need to be filled; determine the spatial and temporal scope, and identify the assessment methodology.

The screening phase of the project is a preliminary analysis to determine ways in which the project may interact with the biophysical, social and economic environment. Impacts that are identified as potentially significant during the screening and scoping phases are taken forward for further assessment in the ESIA process. The details and outcomes of the screening process are discussed further in sections 6 and 7.

Subsequently, scoping of the ESIA was undertaken by the EIA team. The scope of the assessment was determined through undertaking a preliminary assessment of the proposed project against the receiving environment obtained through a high-level desktop review. Feedback from consultation with the client and stakeholders also informed this process.

The following environmental and social topics and subtopics were scoped into the assessment, as there was potential for significant impacts to occur:

SOCIO-ECONOMIC ENVIRONMENT

- Potential to unearth, damage or destroy undiscovered heritage remains;
- Minor disruption to the residents of the save the Rhino camp within the EPL, including some increase in noise levels and dust arising from drilling and vehicle use;
- Some jobs will be created because of the project; and

- There will be economic benefits due to increased investment and investor confidence in the Namibian minerals sector.

BIOPHYSICAL ENVIRONMENT

- Dust emissions
- Soil and geology
- Terrestrial ecology
- Terrestrial biodiversity (including fauna and flora)
- Groundwater (potential indirect impact). Water management suggestions are contained in the EMP (Appendix A).
- Minor risk of spillage of hydrocarbon, chemical or drill fluids from exploration activities may potentially lead to localised ground contamination; this aspect will be controlled at all times.

HERITAGE

An archaeological assessment was carried out on the proposed project site-specific area by an experienced and qualified Archaeologist - Dr John Kinahan. The archaeological study, issued on 10 May 2021, reviewed that the average significance of heritage value was found (refer to Appendix F for the detailed assessment report). In the unlikely event of a possible archaeological find, a Standard Operating Procedure (SOP) called a "chance-find" procedure outlined in the EMP should be utilised.

2.5 BASELINE STUDIES

Baseline studies are undertaken as part of the scoping stage, which involves collecting all pertinent information from the current status of the receiving environment. This provides a baseline against which changes that occur as a result of the proposed project can be measured.

For the proposed project, baseline information was obtained through a desktop study, focussing on environmental receptors that could be affected by the proposed project, verified through site-specific information. The baseline information is covered in Section 5.

A robust baseline is required to provide a reference point against which any future changes associated with a project can be assessed, and it allows for suitable mitigation and monitoring actions to be identified.

The existing environment and social baseline for the proposed project were collected through various methods:

- Desktop studies;
- Specialist studies;

- Consultation with stakeholders; and
- Engagement with Interested and Affected Parties (I&APs). See Appendix C.

2.6 ESIA CONSULTATION

Public participation and consultation are requirements stipulated in Section 21 of the Environmental Management Act, No. 7 of 2007 and associated regulations for a project that needs an environmental clearance certificate. Consultation is a compulsory and critical component in the ESIA process in achieving transparent decision-making and can provide many benefits.

The objectives of the stakeholder engagement process are to:

- Provide information on the project to I&APs: introduce the overall concept and plan;
- Clarify responsibility and regulating authorities;
- Listen to and understand community issues, concerns and questions;
- Explain the process of the ESIA and timeframes involved; and
- Establish a platform for ongoing consultation.

2.6.1 INTERESTED AND AFFECTED PARTIES

EPL 5445 overlaps the communal conservancies Tsiseb and Doro!nawas. It also falls over two other sensitive receptors namely the Save the Rhino Camp Site and the Brandberg West Mine at the north-easterly side of the EPL (Figure 3). Other I&APs will include national, regional and local authorities. The main access routes to the EPL are the D2303 which intersects the EPL, and the D2342 which joins the C35 main road from Uis (Figure 4).

Onduli Ridge is a (N$ 20 million Namibian dollar investment) newly constructed lodge, which is situated approximately 42 km away from EPL 5445. This is a big investment and due to these areas (i.e. Brandberg, Messum Crater, Twyfelfontein and Organ Pipes) being a tourism hotspot, a large number of tourists are attracted to these parts of Namibia (MET/NACSO, 2018). This newly constructed lodge, as well as various other lodges and camps in proximity to these sites of tourist attraction and landmarks, such as the Brandberg area are considered as sensitive receptors in this assesment. These sites are known for their aesthetic value and any major impacts (i.e. noise, dust, increased movement) might potentially have an effect on the tourism operation, job security for local communities, the Community-based natural resource management (CBNRM) programme in general and the stability of the biodiversity and surrounding environment. The proponent shall ensure that movements for the proposed exploration activities are minimised to the EPL area, designated routes to the site should be maintained. It is also important that constant communication between stakeholders and the proponent shall be maintained.

Overall, all sensitive receptors which the EPL 5445 overlaps were identified as I&APs, as well as the relevant authoritative bodies. Other I&APs were identified through invitations such as newspaper advertisements and site notices.

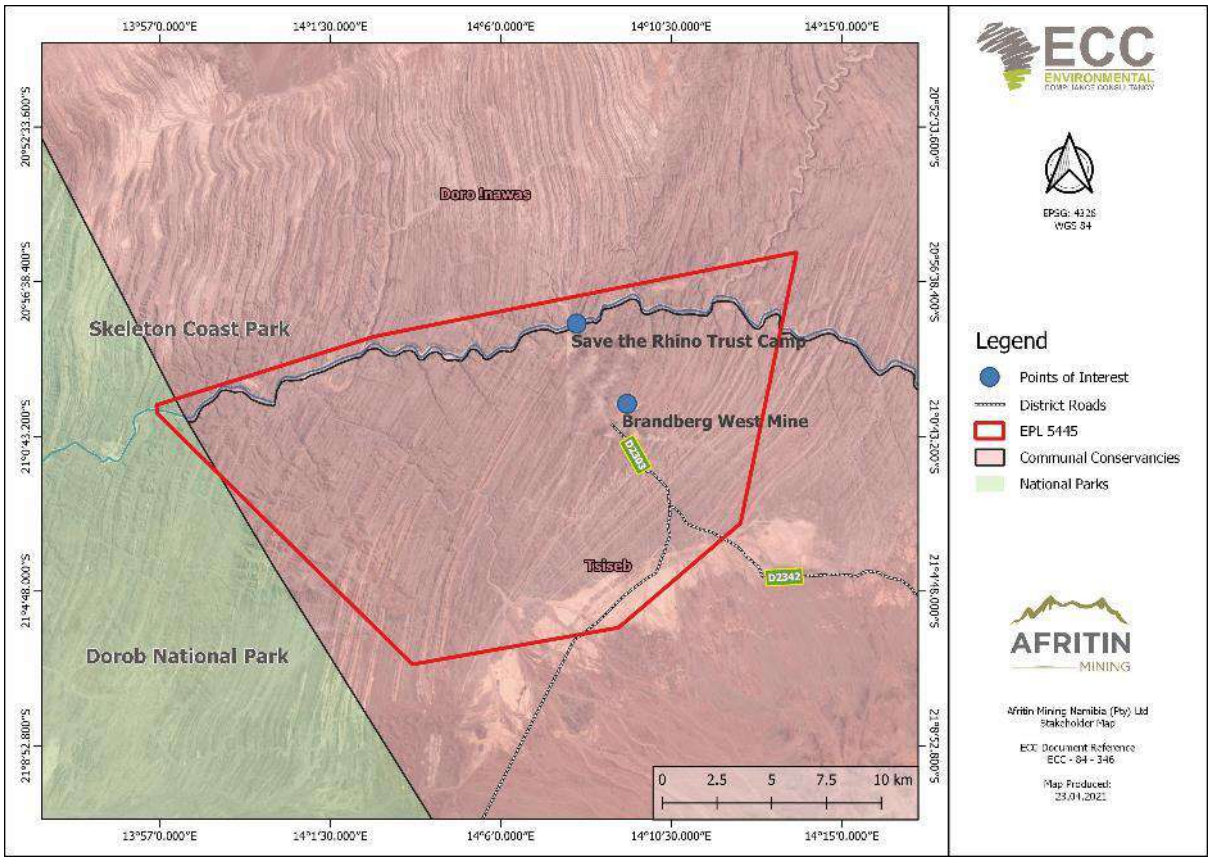


FIGURE 3 - EPL 5445 OVERLAPPING SEVERAL SENSITIVE RECEPTORS

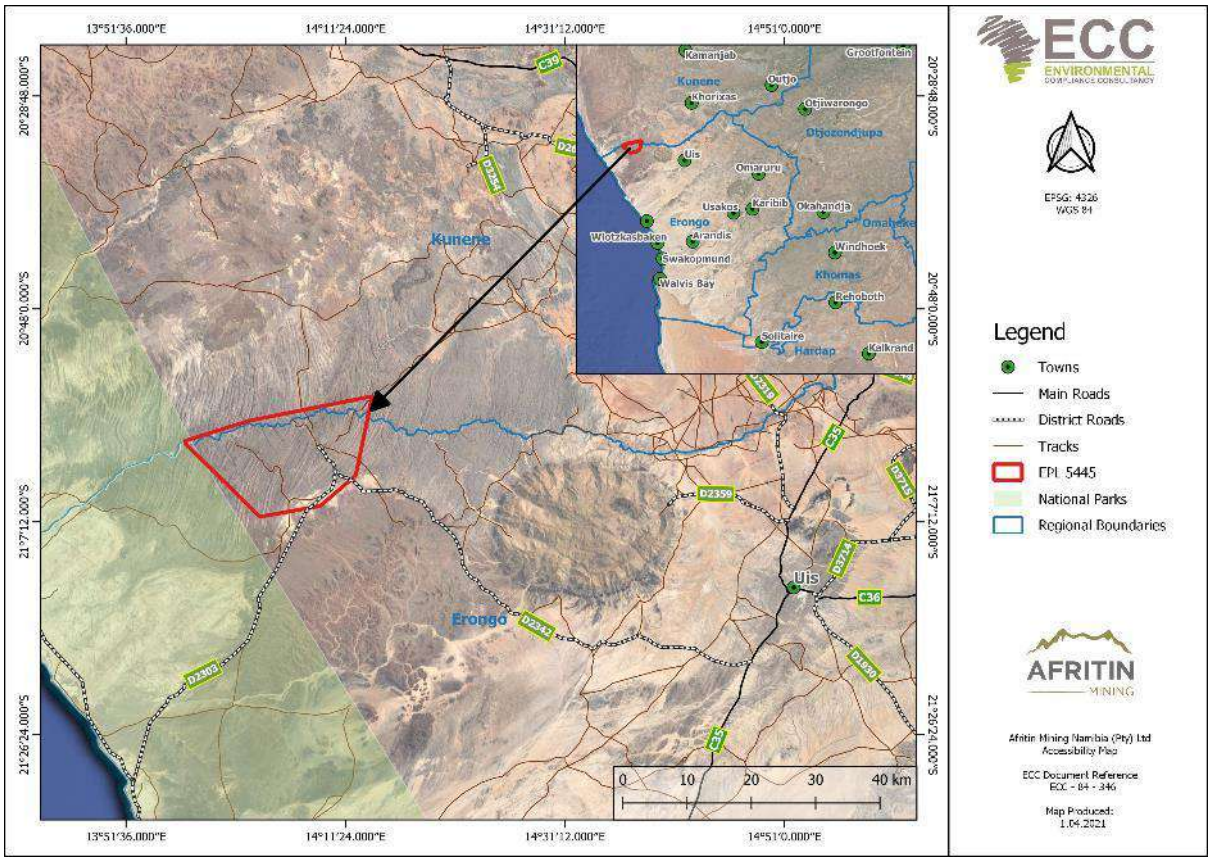


FIGURE 4 - EPL 5445 ACCESSIBILITY MAP

2.6.2 NON-TECHNICAL SUMMARY

The Non-Technical Summary (NTS) presents a high-level description of the proposed project; sets out the ESIA process and when and how consultation is undertaken and provides contact details for further project-specific inquiries to all registered I&APs. The NTS was distributed to all registered I&APs and the NTS can be found in Appendix B.

2.6.3 NEWSPAPER ADVERTISEMENTS

Notices regarding the proposed project and associated activities were circulated in three newspapers namely the 'Republikein', Allgemeine Zeitung' and the Namibian 'Sun" on the 7th and the 14th of April 2021. The purpose of this was to commence the consultation process and enable I&APs to register an interest in the project. The adverts can be found in Appendix C.1.

2.6.4 SITE NOTICES

A site notice ensures neighbouring properties and stakeholders are made aware of a proposed project. A site notice was set up at the entrance of the Save the Rhino trust camp. Evidence of the site notice placement is illustrated in Appendix C.

2.7 SUMMARY OF ISSUES RAISED

The initial public participation phase involved the notifications of the project through media such as the newspaper adverts, direct mail sent to identified I&APs and the display of site notices delivered very few interactive communications from the public.

The main issues that were raised for EPL 5445 and 5670 include the mention of protected species within the proposed exploration project area and suggested that a full botanical/biodiversity study should be conducted, as well as, the communal conservancies within the area and the recently built N$ 20 million worth in value camps in the Doro !nawas conservancy. The local black Rhino population within the EPL is also a major concern. All the comments have been recorded in Appendix C.

2.8 DRAFT ESIA AND EMP

This report and EMP for the project's environmental clearance application includes an assessment of the biophysical and social environment, which satisfies the requirements of Step 5 (Figure 2).

The ESIA report documents the findings of the assessment process provides stakeholders with the opportunity to comment as part of continued consultation and forms part of the environmental clearance application. The EMP provides measures to manage the environmental and social impacts of the proposed project and outlines specific roles and responsibilities to fulfil the plan.

This ESIA report focuses on the significant impacts that may arise from the proposed project as described in Step 4 (Figure 2). These impacts are discussed in Chapter 6.

This ESIA draft report is open to stakeholders and I&APs for consultation for a 7 days review period (23/07/21 to 01/08/21), meeting the mandatory requirements set out in the Environmental Management Act, No. & of 2007 and its regulations, including the Environmental Impact Assessment Regulations, No. 30 of 2012. This stage aims to ensure all stakeholders and I&APs have the opportunity to provide final comments on the assessment process and findings and register their concerns.

2.9 FINAL ESIA AND EMP

The final ESIA report and associated appendices are available to all stakeholders on the ECC website www.eccenvironmental.com and MEFT portal. All I&APs will be informed via email.

The ESIA report and appendices are formally submitted to the Office of the Environmental Commissioner, DEA as part of the application for an environmental clearance certificate.

2.10 AUTHORITY ASSESSMENT AND DECISION MAKING

The Environmental Commissioner in consultation with other relevant authorities will assess if the findings of the ESIA presented in the ESIA report is acceptable. If deemed acceptable, the Environmental Commissioner will revert to the proponent with a record of decision and any recommendations.

2.11 MONITORING AND AUDITING

In addition to the EMP being implemented by the proponent, a monitoring strategy and audit procedure will be determined by the proponent and competent authority. This will ensure key environmental receptors are monitored over time to establish any significant changes from the baseline environmental conditions caused by project activities.

3 REGULATORY FRAMEWORK

This chapter outlines the regulatory framework applicable to the proposed project. Table 3 provides a list of applicable legislation and its relevance to the project. Environmental clearance is required for any activity listed as per Government Notice No 29 of 2012 of the EMA.

3.1 NATIONAL LEGISLATION

TABLE 3 - LEGAL FRAMEWORK

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Constitution of the Republic of Namibia of 1990	The Constitution of the Republic of Namibia, 1990 clearly defines the country's position concerning sustainable development and environmental management. The constitution refers that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at the following: *"Maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present, and future; in particular, the government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian territory."*	The proponent is committed to engaging the local community for the proposed project by providing local jobs as well as, exploring ways of finding rich recourses that could contribute to the mining sector in Namibia.
Minerals (Prospecting and Mining) Act, No. 33 of 1992	Provides for the reconnaissance, prospecting and mining for, and disposal of, and the exercise of control, minerals in Namibia. Section 50 (i) requires *"an environmental impact assessment indicating the extent of any pollution of the environment before any prospecting operations or mining operations are being carried out and an estimate of any pollution, if any, likely to be caused by such prospecting operations or mining operations"* Section 50 sets out that in addition to any term and condition contained in a mineral agreement and any term and condition contained in any	The proposed activity is prospecting for minerals; hence it requires an ESIA to be carried out as it triggers listed activities in the Environmental Management Act and its regulations. This report presents the findings of the EIA. Works shall not commence until all conditions in the Act are met, which includes an agreement with the landowners and conditions of

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
	mineral licence, it shall be a term and condition of any mineral licence that the holder of such mineral licence shall: Exercise any right granted to him or her in terms of the provisions of this Act reasonably and in such manner that the rights and interests of the owner of any land to which such licence relates are not adversely affected, except to the extent to which such owner is compensated. Section 52 sets out that the holder of a mineral licence shall not exercise any rights conferred upon such holder by this Act or under any terms and conditions of such mineral licence (a) In, on or under any private land until such time as such holder. (i) Has agreed in writing with the owner of such land containing terms and conditions relating to the payment of compensation, or the owner of such land has in writing waived any right to such compensation and has submitted a copy of such agreement or waiver to the Commissioner.	compensation has been agreed. The project shall be compliant with Section 76. With regards to records, maps, plans and financial statements, information, reports, and returns submitted. As the proponent will need to access privately owned land the proponent will ensure Sections 50 and 52 are complied with.
Environmental Management Act, (No. 7 of 2007) and its regulations, including the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2012)	The Act aims to promote sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment. It sets the principles of environmental management as well as the functions and powers of the minister. The Act requires certain activities to obtain an environmental clearance certificate before project development. The Act states an EIA may be undertaken and submitted as part of the environmental clearance certificate application. The MEFT is responsible for the protection and management of Namibia's natural environment. The Department of Environmental Affairs under the MEFT is responsible for the administration of	This environmental scoping report (and EMP) documents the findings of the environmental assessment undertaken for the proposed project, which will form part of the environmental clearance application. The assessment and report have been undertaken in line with the requirements under the Act and associated regulations.

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
	the EIA process.	
Water Act, No. 54 of 1956	Although the Water Resources Management Act, no 11 of 2013 has been billed, not promulgated, it cannot be enacted as the regulations have not been passed – so the Water Act 54 of 1956 is still in effect. This act provides for *"the control, conservation and use of water for domestic, agricultural, urban and industrial purposes; to make provision for the control, in a certain respect and for the control of certain activities on or in water in certain areas".* The Department of Water Affairs within the Ministry of Agriculture Water and Land Reform (MAWLR) is responsible for the administration of the act. The Minister may issue a permit in terms of regulations 5 and 9 of the government notice R1278 of 23 July 1971 as promulgated under section 30 (2) of the Water Act no. 54 of 1956, as amended.	The Act stipulates obligations to prevent pollution of water. Should wastewater be discharged, a permit is required. The EMP sets out measures to avoid polluting the water environment. Measures to minimise potential groundwater and surface water pollution are contained in the EMP. Abstraction of water from boreholes requires an abstraction permit. Abstraction rates need to be measured and reported to the authorities in accordance with the requirements of this legislation. In addition, annual reporting on the environmental impacts of water abstraction is recommendable. Should the project require drilling and abstraction of water from underground sources, an application should be submitted to the authorities.
Soil Conservation Act, No. 76 of 1969) and the Soil Conservation Amendment Act, No. 38 of 1971)	Makes provision for the prevention and control of soil erosion and the protection, improvement and the conservation, improvement and manner of use of the soil and vegetation.	This will be taken into consideration during the intention of the works to be undertaken within EPL 5445 site. Measures in the EMP set out methods to avoid soil erosion.
The Forestry Act, No. 12 of 2001 as amended by the Forest Amendment Act, No. 13 of	Section 22 requires a permit for the cutting, destruction or removal of vegetation that are classified under rare and or protected species; clearing the vegetation on more than 15 hectares on any piece of land or several pieces of land situated in the same locality which has	The planned project activities will include minimal vegetation clearing to support exploration activities. The necessary permit should be obtained from the MEFT, where the application

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
2005	predominantly woody vegetation, or cut or remove more than 500 cubic metres of forest produce from any piece of land in a period of one year.	should satisfy that the cutting and removal of vegetation will not interfere with the conservation of soil, water or forest resources.
National Heritage Act, No. 27 of 2004.	The Act provides provision of the protection and conservation of places and objects with heritage significance. Section 55 stipulates that exploration companies must report any archaeological findings to the National Heritage Council after which a heritage permit needs to be issued	There might be potential for heritage objects to be found on-site, therefore the stipulations in the Act have been taken into consideration and are incorporated into the EMP. Section 55 compels exploration companies to report any archaeological findings to the National Heritage Council after which a permit needs to be issued before the find can be disturbed. In cases where heritage sites are discovered the 'chance find procedure' will be used
The Traditional Authorities Act, No. 25 of 2000 and its Regulations of 2001	The Act makes provision for the establishment of traditional authorities over communal land in Namibia. The Act also sets out the structure of the traditional authorities with different levels of authority and the appointment of office bearers to the various positions. The Ministry of Regional & Local Government & Housing (MRLGH) pays allowances for the chief, 12 councillors and the secretary, and also provides funds for stationery and communications.	EPL 7508 falls within communal land administered by a traditional authority. All communication of environmental matters and beyond should be directed to the relevant traditional authority who administers the land. All communication with the Board of Trustees of the traditional authority should be directed via the secretary of the Board.
Communal Land Reform Act No. 5 of 2002	To provide for the allocation of rights in respect of communal land; to establish Communal Land Boards; to provide for the powers of Chiefs and Traditional Authorities and boards in relation to communal land; and to make provision for incidental matters.	EPL 7508 falls within communal land. All communication of environmental matters and beyond should be directed to the relevant Communal Land Board. All communication with the Board of Trustees of the traditional

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
	Section 43 (1) stipulates that no person may occupy or use for any purpose any communal land other than under a right acquired in accordance with the provisions of this Act, including a right referred to in section 28(1) or 35(1). (2) A Chief or a Traditional Authority or the board concerned may institute legal action for the eviction of any person who occupies any communal land in contravention of subsection (1).	authority should be directed via the secretary of the Board.

3.2 NATIONAL REGULATORY REGIME

TABLE 4 - NATIONAL POLICIES

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Vision 2030	Vision 2030 sets out the nation's development programmes and strategies to achieve its national objectives. It sets out eight themes to realise the country's long-term vision. Vision 2030 states that the overall goal is to improve the quality of life of the Namibian people to a level in line with the developed world.	The planned project shall meet the objectives of Vision 2030 and shall contribute to the overall development of the country through continued employment opportunities.
The Fifth National Development Plan (NDP5)	NDP5 is the fifth in the series of seven five-year national development plans that outline the objectives and aspiration of Namibia's long-term vision as expressed in Vision 2030. NDP5 is structured on the pillars of economic progression, social transformation, environmental sustainability and good governance. Under the social transformation pillar is the goal of improved education.	The planned project supports meeting the objectives of NDP5 by creating opportunities for employment for the nearby community and the Namibian nation.
Minerals Policy	The Minerals Policy was adopted in 2002 and sets guiding principles and direction for the development of the Namibian mining sector while communicating the values of the Namibian people. It sets out to achieve several objectives in line with the sustainable development of	The objectives of the Minerals Policy are in line with the objectives of the NDP5, i.e., reduction of poverty, employment creation, and economic empowerment in

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
	Namibia's natural resources. The policy strives to create an enabling environment for local and foreign investments in the mining sector and seeks to maximise the benefits for the Namibian people from the mining sector while encouraging local participation, amongst others. The objectives of the Minerals Policy are in line with the objectives of the Fifth National Development Plan that include reduction of poverty, employment creation and economic empowerment in Namibia.	Namibia. The proposed project conforms to the policy, which has been considered through the ESIA process and the production of this report.
Labour Act, No. 11 of 2007	The Labour Act, No. 11 of 2007 (Regulations relating to the Occupational Health & Safety provisions of Employees at Work promulgated in terms of Section 101 of the Labour Act, No. 6 of 1992 - GN156, GG 1617 of 1 August 1997)	The proposed project will comply with stringent health and safety policies, including the compulsory use of specific PPE in designated areas to ensure adequate protection against health and safety risks. Proper storage and labelling of hazardous substances are required. The project will ensure employees in charge of and working with hazardous substances need to be aware of the specific hazardous substances in order not to compromise worker and environmental safety.

3.3 PERMITS AND LICENCES

3.3.1 EXCLUSIVE PROSPECTING LICENCES

The EPL 5445 was granted on the 01st of November 2013. In terms of the Minerals (Prospecting and Mining) Act, No. 33 of 1992, an EPL may be renewed, however, it may only be extended twice for two-year periods if demonstrable progress is shown. Renewals beyond seven years require special approvals from the Minister (MME, 2018).

Such renewals are subject to a reduction in the size of the EPL. When a company applies for renewal of an EPL, the application must be lodged 90 days before the expiry date of the EPL or, with good reason, no later than the expiry date (MET & MME, 2018).

If renewal is applied for, the MME must review the renewal application and make any comments or recommendations for consideration by the Minerals (Prospecting and Mining Rights) Committee (MPMRC). Amendments and revisions may be required for the ESIA and EMP. Due consideration must be given when renewing the licence to ascertain whether there is justification to renew the licence. Once an EPL expires and a new EPL is issued, even if it is to the previous holder, the full screening process must be followed with a full EIA process, before operations may commence (MET & MME, 2018).

The permits and licences that may be relevant to the proposed projects are outlined in Table 5.

TABLE 5 – RELEVANT PERMITS AND LICENCES

PERMIT AND LICENCES	RELEVANT AUTHORITY	VALIDITY/DURATION
WATER ABSTRACTION PERMITS	Ministry of Agriculture, Water and Land Reform	Permit dependent
EXCLUSIVE PROSPECTING LICENCE	Ministry of Mines and Energy - Windhoek	3 years
NOTICE OF INTENTION TO DRILL	Ministry of Mines and Energy - Windhoek	To be submitted before drilling
EFFLUENT DISCHARGE PERMIT	Ministry of Agriculture, Water and Land Reform	5 years

4 PROJECT DESCRIPTION

4.1 NEED FOR THE PROJECT

Namibia is relatively rich in a variety of minerals, and mining has always been a critical sector of the Namibian economy. The sector contributes significantly to the country's Gross Domestic Product (GDP), through taxation, royalties, fees and equities as well as export revenues. For this reason, exploration activities are encouraged in Namibia and the vision of the Minerals Policy being to "further attract investment and enable the private sector to take the lead in exploration, mining, mineral beneficiation and marketing" supports the development.

The proposed project is in line with the development goals and has the potential to create short term and limited employment in local communities such as Uis, Khorixas and the local settlement of Anixab to contribute to the national, regional and local income. If exploration activities are successful, and a resource with commercially viable mineral concentrations can be defined, the exploration operations can potentially transcend into mining operations which can result in multiple socio-economic benefits to the region and the country at large.

In Namibia, mining exploration is mainly done by the private sector focusing on base and rare metals (copper, lead, zinc, etc.). According to the Mineral Yearbook of 2016, Mining and quarrying accounted for 7.9% of the country's real GDP, of which about 59% was from diamond mining; 19%, from the mining of metal ores; and about 15%, from uranium mining. Namibia's economy heavily relies on its mining industry and its mineral resources include diamond, silver, tungsten, lead, zinc, tin, uranium, and copper. Nearly 25% of the country's income is contributed by this sector.

4.2 EXPLORATION

It is the process of sampling/collecting fragments of the earth's layers for testing of each sample's mineral composition, grade, and spatial dispersion to acquire an informed perspective of the target area's ore potential. Deeper probing is achieved through geophysical surveys.

4.3 EXPLORATION METHODOLOGY

Exploration work will be entirely conducted by contracted geological, geophysical consultants and in phase three and four onwards drilling consultants and companies. The below schedule of activities (Table 6) is presented for the project.

TABLE 6 - LIST OF ACTIVITIES PLANNED PER PHASE

PHASE	DATE	ACTIVITY DESCRIPTION
Phase 1: 2021	Field inspection commencement date unknown, desktop work commenced 2021:	Non-invasive Ground Penetrating Radar (GPR) will be done in the first three months. Desktop studies and Remote Sensing will take place
Phase 2: 2022	Actual commencement date unknown: Early 2022.	RC drilling will then commence soon after for another three months. Further planning will take place after the results of drilling has been obtained. If results are favourable subsequent exploration will continue. However, if not, the sites will be rehabilitated and vacated.

4.4 ALTERNATIVES CONSIDERED

The proposed project has been subject to a process of design evolution, informed by both consultation and an iterative environmental assessment. In terms of the Environmental Management Act, No. 7 of 2007 and its regulations, alternatives considered should be analysed and presented in the scoping assessment and EIA report. This requirement ensures that during the design evolution and decision-making process, potential environmental impacts, costs, and technical feasibility have been considered, which leads to the best option(s) being identified.

Exploration activities range from extremely low impact exploration such as coarse line sampling and geophysical surveying to more invasive activities such as trenching or extensive close spaced drilling. The initial exploration results will define the need, if at all, for the more invasive activities.

The Environmental assessment has therefore taken a worst-case scenario, which includes a review of all likely exploration activities, thus no other technological alternatives are available for consideration at this stage.
Once the exploration programme is further defined, the best available option for methods shall be identified to ensure the impacts on the environment and society are minimised. The following activities are ongoing or proposed:

- Interpretation of Govt aeromagnetic and radiometric data (planned);
- Satellite image interpretation;
- Acquisition of low-level airborne electromagnetic data (coarse line spacing yet to be determined, planned);

- Initial field visits to exposed geology both in isolated outcrop and in streams (planned);
- Stream sediment and rock-chip sampling for geochemistry (planned); and
- Detailed geochemical sampling and ground geophysical follow-up of specific interpreted target localities (planned).

Once the exploration programme is further defined with new information generated from the initial geophysical surveying and data analysis activities, the following more invasive techniques will be employed at strategic locations informed by new data.

- RAB or RC drilling as the next stage of the programme, followed by
- Diamond core drilling.

The most suitable options and methods shall be identified to ensure the impacts on the environment and society from these activities are minimised.

4.5 NO-GO ALTERNATIVE

Should exploration activities within EPL 5445 not take place, the anticipated environmental impacts from exploration activities would not occur, however, the social and economic benefits associated with the project would also not be materialized.

There would not be an opportunity to define resources within the project area, this would be a missed opportunity for geological mapping and data collection that would add to regional knowledge of Namibia's mineral wealth and, if found to be viable for mining, could benefit the Namibian economy.

4.6 EQUIPMENT REQUIREMENTS

In the early exploration phase (1st and possible 2nd year) contractor vehicles and equipment will comprise:

- 4x4 vehicles for personnel and field equipment;
- Field equipment including tents, mobile toilets and ablution facilities, spades, axes, soil sampling equipment such as sieves, sample bags, surveying apparatus;
- Portable or semi-portable vehicle-mounted geophysical equipment such as magnetometers or Induced Polarization apparatus (all passive and non-invasive).
- In the ensuing phases, drilling is envisioned. The equipment requirements would therefore be a RAB/ Aircore Drill rig initially then followed by diamond core drilling. This is anticipated to be a specific provision within the tender documentation.

4.7 POWER SUPPLY

The individual contractors will be responsible to supply their own energy needs throughout their stay within the field camps. The proponent prefers the use of solar panels and small-scale generators.

4.8 WATER SUPPLY

Water will be required for various uses including human consumption and exploration activities. Water demand per day for the exploration project is broken down into two usage categories.

SOURCE 1: Potable water will be brought to the site. During drilling operations, water shall be used, recirculated and stored in lined collections ponds. If deemed clean and suitable will be discharged to the environment for evaporation or if not suitable for discharge will be transported to Walvis Bay for disposal at a suitable waste facility.

SOURCE 2: Supplied directly from already existing boreholes within the area (if any), with the relevant permission.

4.9 WORKERS ACCOMMODATION

The workers will be deployed at various stages of exploration including soil sampling, geological mapping, geophysical surveys and drilling operations.

It is envisioned that for most of the exploration programme workers will reside in a dedicated campsite within the EPL. The proponent will provide transport. However, during the latter part of the prospecting (drilling) workers may be required to stay in field camps away from any buildings or camps within the EPL. It is anticipated that the contractor will be completely self-sufficient concerning the power supply and waste management.

The proponent shall provide suitable living facilities during this period. Furthermore, the camping equipment shall include tents and a portable kitchen.

4.10 SOLID WASTE MANAGEMENT

Solid waste will be generated throughout the project, and will mainly consist of packaging materials and food waste. Contractors and employees will properly collect the waste, transport it and disposed of it at the appropriate disposal sites of a larger town (i.e., Uis) once a vehicle leaves the exploration site.

4.11 WASTEWATER EFFLUENT

Wastewater will be diverted into a lined sump to evaporate. The remaining solid residue will be buried in the soil if not toxic. Hazardous waste (hydrocarbon contaminated soil, etc.) will be disposed of at the Walvis bay municipal landfill site.

Effluent waste will be generated by the project, whilst exploration work throughout the phases are ongoing. Waste produced on-site will include sewerage. Wastewater (e.g. water with drill additives) used during drilling will be recycled where possible. In case of the provision of mobile toilets to be used on-site, sewerage generated shall be managed by the toilet contractor. The proponent shall ensure waste transport certificates are provided by the toilet contractor for sewerage waste removed from the site. No toxic waste will be discharged into the environment. Otherwise, existing long drop or toilet facilities will be used, if any exist within the area.

4.12 REHABILITATION

Once exploration activities are completed the areas shall be rehabilitated to a condition as close to the original state as far as possible. Rehabilitation shall be determined during the exploration programme and shall be agreed upon with the landowners and authorities as implied by legislation (discussed in Section 3). Before and after photographs will be used to monitor rehabilitation success. The proponent has committed to restoring any historic exploration disturbance on the site if identified.

5 BASELINE / CURRENT BIOPHYSICAL ENVIRONMENT

This section provides an overview of the existing biophysical environment through the analysis of the baseline data regarding the existing natural and socio-economic environment. Desktop studies on the national database are undertaken to get information on the current status of the receiving environment. This provides a baseline where changes that occur because of the proposed project can be measured.

5.1 CLIMATE

The area where this EPL is located has a climate that is characterised by mild summers and cool winters with the mean temperatures ranging between 17˚C and 19˚C. The minimum temperatures are between 6˚C to 10˚C and the maximum temperatures between 18˚C to 22 ˚C. The hottest month of the year is known to be February and the coolest is August. This area is not known to get frost in the winter months. The fog in this area is expected to be between 25 and 50 days per year (Bubenzer, 2002 & meteoblue, 2021).

Most fog is prevalent during mornings and evenings and dissipates as the day heats up. This is an important determining factor for outdoor activities during daytime hours within this area. The solar radiation in this area is also known to be between 5.6 to 6 kWh/m^2/day. EPL 5445 is located in a part of Namibia, within the Namib Desert climatic zone (Bubenzer, 2002).

With regards to the relative humidity, the most humid month of the year is February at approximately 80% RH, and the driest month is June with approximately 30-40% RH. The average rainfall in this area during the year is between 50 to 110mm and rainfall events are limited to the summer months, mainly between December and March. Potential evaporation is between 2800 and 3200 mm per year, meaning an average water deficit of between 1,901 and 2,300 mm per year (Bubenzer, 2002).

The closest town to this EPL with climatic data is Uis, which is known to have average wind speeds between 12 and 19 km/h. The months of October to January are known to have the strongest winds. Wind can occur any time of the day and the most predominant wind directions for this area are ENE, SW and SSW (Figure 4).

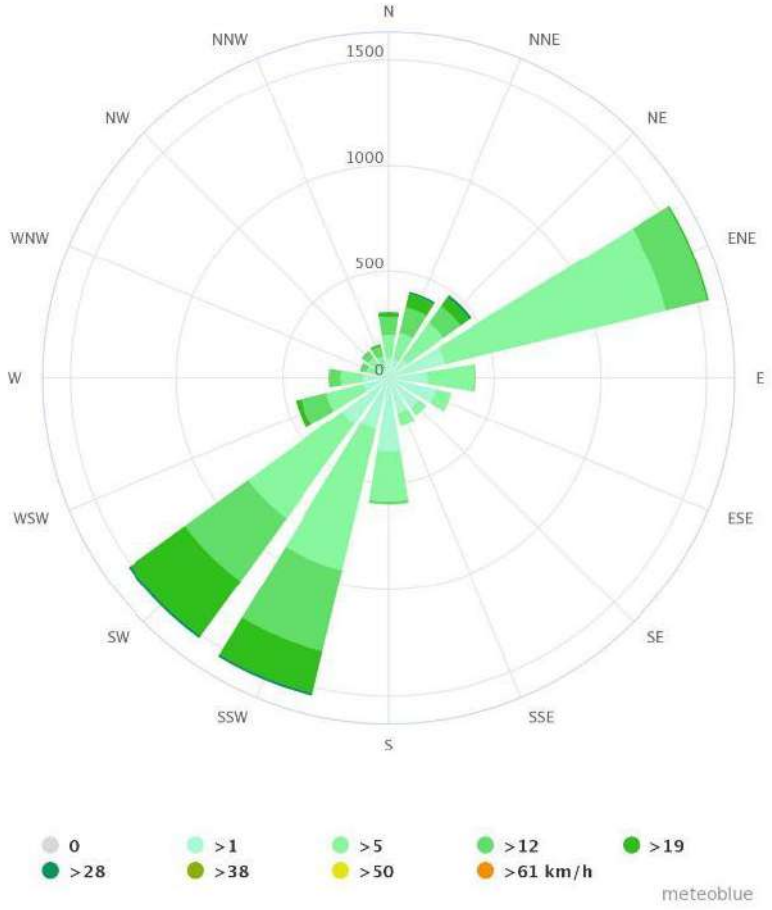


FIGURE 4 - WIND DIRECTION AND SPEED FROM THE UIS WEATHER STATION, ERONGO REGION (METEOBLUE, 2021).

5.2 GEOLOGY

Namibia can be divided into two broad geological provinces, one covering the western parts and the other in the east. The western parts consist of a variety of geological formations of different ages and compositions and formed under very diverse environmental conditions – some were formed in the depths of primaeval oceans, others as a result of the movement of the earth's crust or because of collisions or volcanic eruptions. Most of these formations are exposed in the west as rugged landscapes of mountains, hills, valleys and plains with sparse vegetation, providing an interesting insight into Namibia's geological past. In eastern Namibia, the formations are covered with deposits of a much more recent past (Mendelsohn et al., 2002). The deposits are loose, aeolian of origin, sandy and unconsolidated. On the surface the east of Namibia appears monotonous and uniform, covered with dense vegetation in the north and decreasing to the south. Most of the knowledge about these sediments has been derived from water abstraction boreholes, and

rare outcrops and underlying formations exposed along drainage lines and around isolated pans.

Apart from diamonds, most of Namibia's valuable mineral resources have been found in the western part of Namibia where the oldest rocks are exposed to the surface, i.e., the metamorphic complexes and the Damara Supergroup which is where the EPL is situated (Mendelsohn et al., 2002).

The regional geology of this EPL area consists of the Swakop Group, Damara Granites and Huab Basin. The main rock types of this area are Schists, Dolomites and Granite. The Swakop Group is part of the Damara Supergroup and Gariep Complex (Bubenzer, 2002). The southern corner of the EPL falls within the Damara Granite intrusions. The different geological group formations associated with the EPL are illustrated in Figure 5.

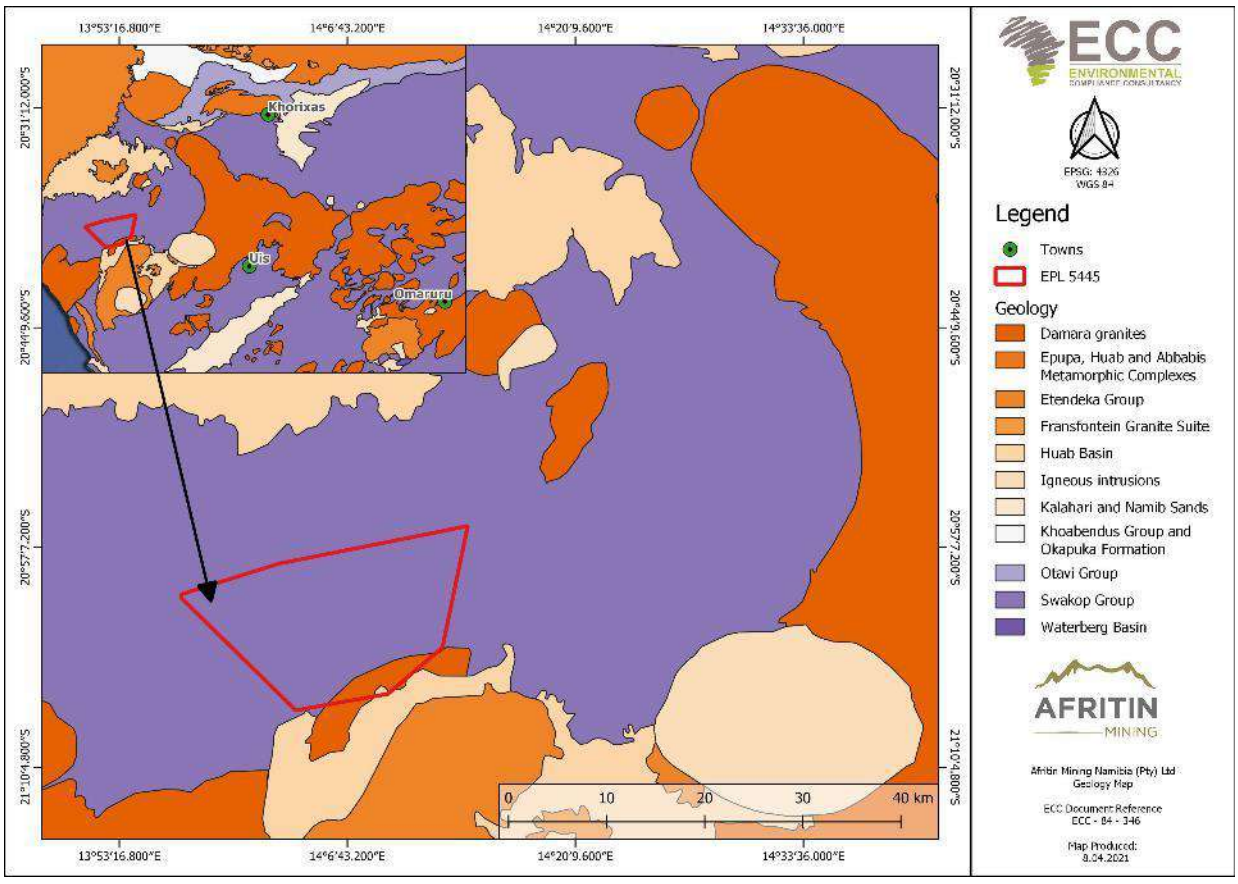


FIGURE 5 - REGIONAL GEOLOGICAL SETTING OF EPL 5445

5.3 TOPOGRAPHY AND SOILS

The topography of the EPL is flat, varying between 493 and just below 200m above mean sea level. The surface geology appears to be rugged, and the entire landscape has a gentle gradient dipping from east to west (Figure 6). This EPL is situated close to the Brandberg which is highly elevated at about 2475m above mean sea level.

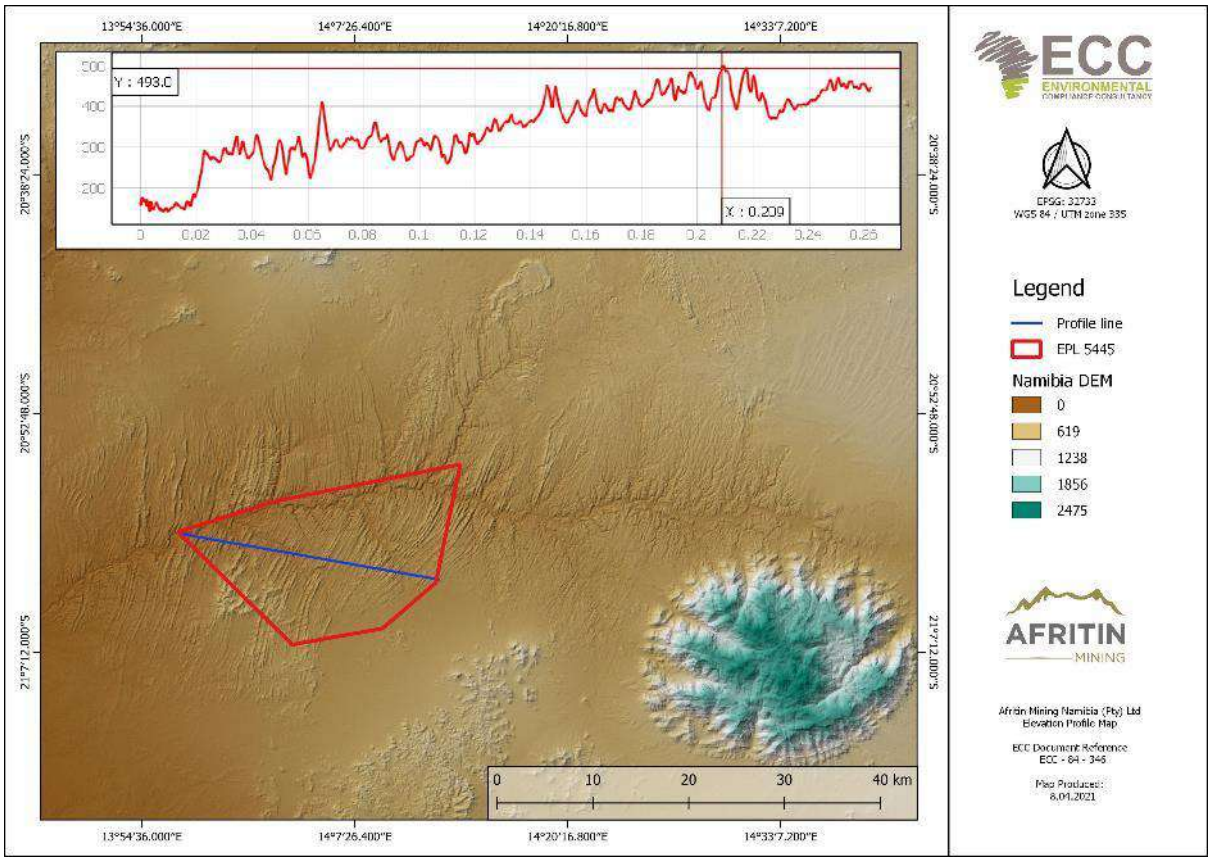


FIGURE 6 - ELEVATION PROFILE FOR EPL 5445

EPL 5445 is largely covered by lithic Leptosols soil and a small part of the EPL in the Southern corner is of eutric Regosols soil (Figure 7) (Bubenzer, 2002). Namibian soils vary a great deal, variations occur on a broad scale but there is even a great deal of variability at a local level.

The first part of the soil name provides information on the properties of the soil, namely: Lithic soil is characterised as very thin or shallow soils whereas eutric soils are fertile with high base saturation. The second name reflects the conditions and processes which have led to the formation of the soils (Mendelsohn et al., 2002).

Leptosols are typically formed in areas that are actively eroding, especially in hilly or undulating areas which cover a large part of the southern and north-western parts of

Namibia, where the EPL is located. This type of soil is coarse-textured and offers limited depth due to the presence of hard-rock, highly calcareous or cemented layer within 30cm of the surface. Leptols are the shallowest soils in Namibia and often contain gravel, this soil has a low water-holding capacity. Water run-off and water erosion can be very high in these areas if heavy rainfall occurs (Mendelsohn et al., 2002).

Regols are medium to fine-textured soils of actively eroding landscapes. These soils are not as shallow as Leptosols but these soils never reach depths of more than 50cm. This type of soil cannot provide vegetation with sufficient minerals or water (Mendelsohn et al., 2002).

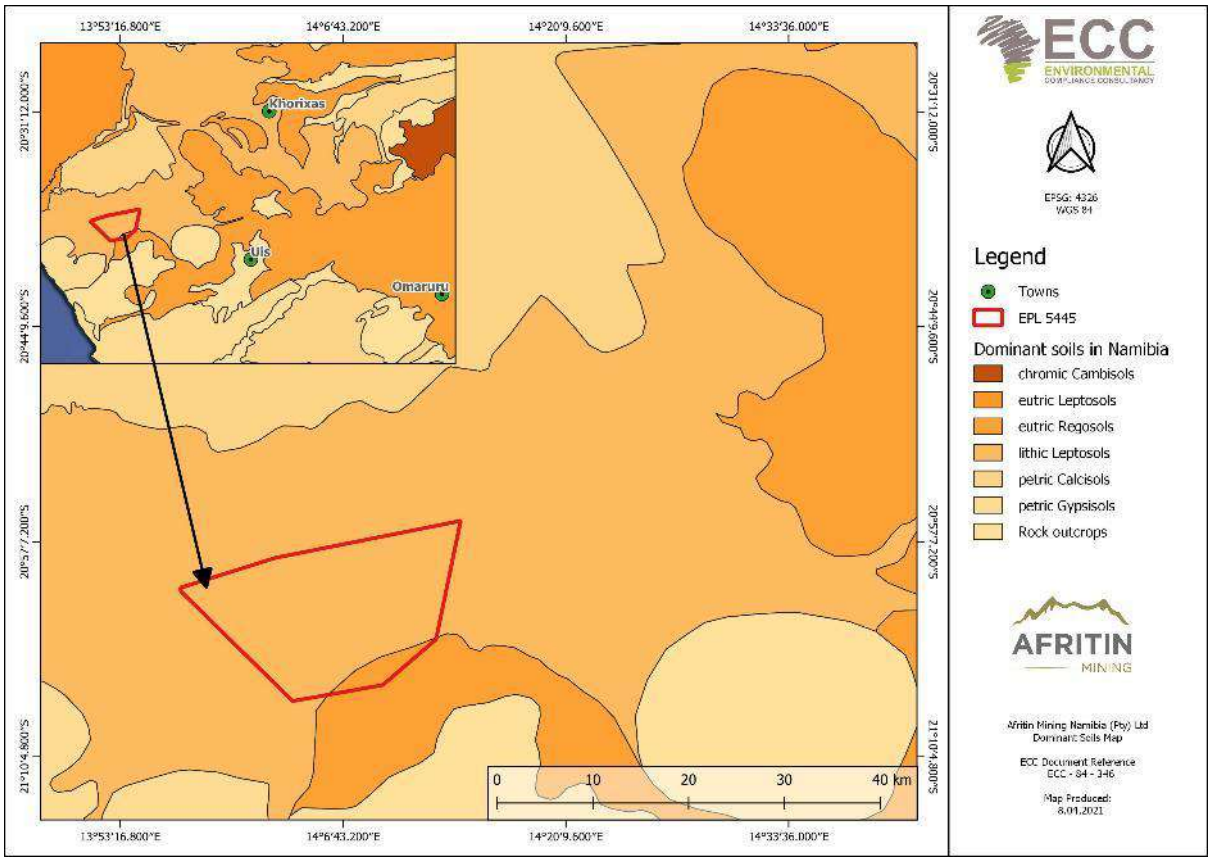


FIGURE 7 - REGIONAL SOIL MAP OF EPL 5445

5.4 HYDROLOGY

EPL 5445 falls within the Kunene south groundwater basin (figure 8)., in general, this region has little groundwater. This EPL falls within the Ugab catchment area The groundwater potential of fractured aquifers in the Swakop Group of the Damara Sequence is generally low (Christelis, 2011).

There are no farms located within or nearby EPL 5445, thus no borehole abstraction is used by the surrounding area for water supply. There is no indication of any boreholes in the nearby area, or surrounding the EPL, as per Namibian GIS data. The current and planned mining-related activities in the Kunene south Basin and other areas in the Erongo Region of Namibia may have impacts on the availability and quality of water resources.

The Erongo region in the central-western part of Namibia receives between 350 to less than 50 mm of rainfall per year, most of the EPL area is located in the arid part with rainfall of less than 150 mm per year (Bubenzer, 2002).

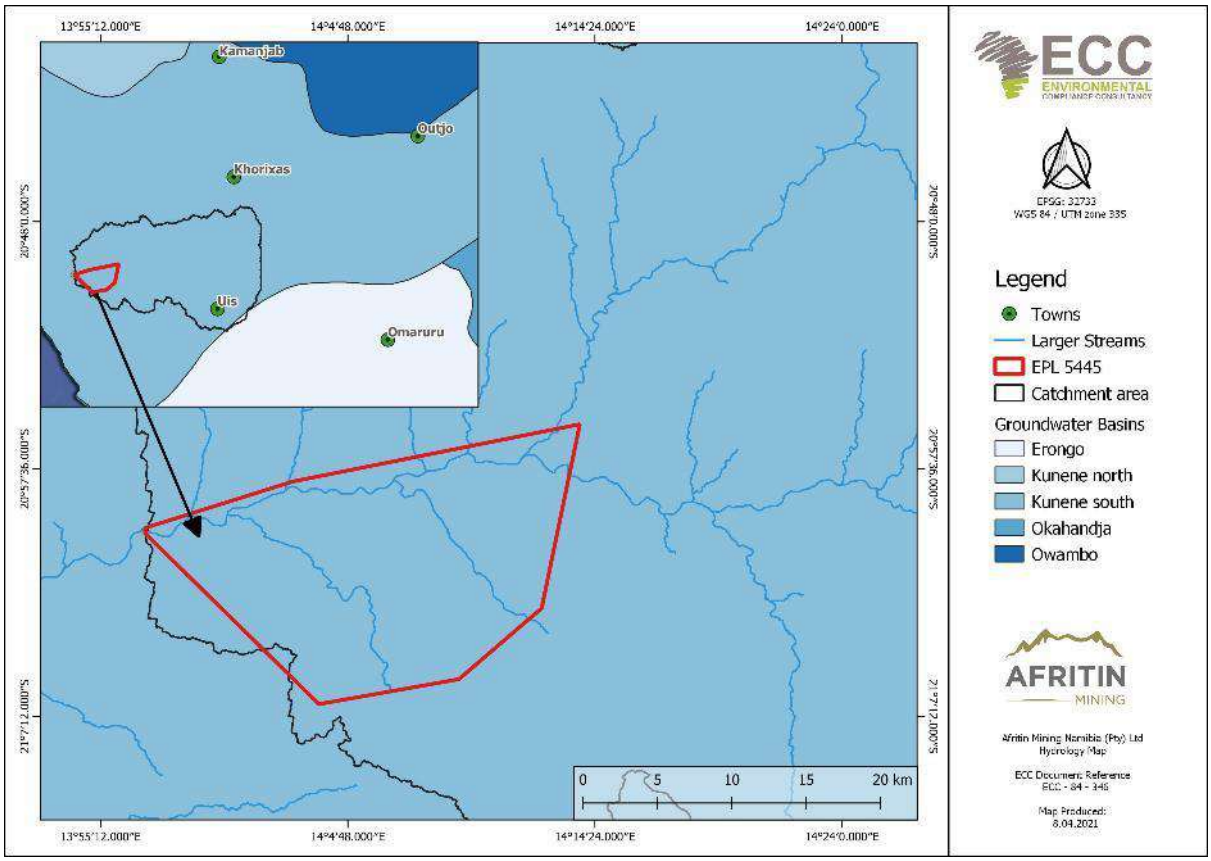


FIGURE 8 - REGIONAL HYDROLOGY MAP OF EPL 5445

5.5 VEGETATION

EPL 5445 falls within the central desert vegetation cover. The vegetation in Namibia is strongly influenced by rainfall. The plant diversity and tallest trees are most lush in the north-eastern parts of the country and contrast sparser and shorter to the west and south of the country. This gradient is not simple as other factors such as soil types and landscape may also influence the vegetation. The dominant vegetation structure of EPL 5445 is spare shrubs and grasses and the dominant landscape is mainly central-western plains (Bubenzer, 2002 & Mendelsohn et al., 2002).

The area has unique vegetation and wildlife species including reptiles and avifauna, many of which are endemic to the Namib Desert. EPL 5445 lies within the Desert Biome and Central Desert vegetation type, which tends to have grassland occupying the gravel plains. The grass cover is very sparse but dominates the little vegetation that grows on the gravel plains. The plant diversity of the areas is low (between 50 to 100 species) (Bubenzer, 2002 & Mendelsohn et al., 2002).

A list of plant species (mostly trees and shrubs) that might potentially be found within this EPL has been composed and can be seen in Appendix E. This list was created through a desktop study; thus, it is not certain that those species will be present within EPL 5445, but the EPL does fall within their possible distribution range. The sources used to compile this list can be seen in Appendix E. Additionally, a list of species was requested from the National Botanical Research Institute (NBRI) for this assessment.

According to the desktop study, a total of 22 tree and shrub species with some sort of legal protection might potentially occur within EPL 5445; the legal requirements that were used include, The Nature Conservation Ordinance 4 of 1975 (NCO), The Forest Act 12 of 2001 (FA), The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species (Appendix E). Additionally, from an I&AP the following plants were also identified that might potentially occur on-site, *Hoodia currorii subsp. Currorii*, *Aloe asperifolia*, *Moringa ovalifolia* and *Welwitschia mirabilis*.

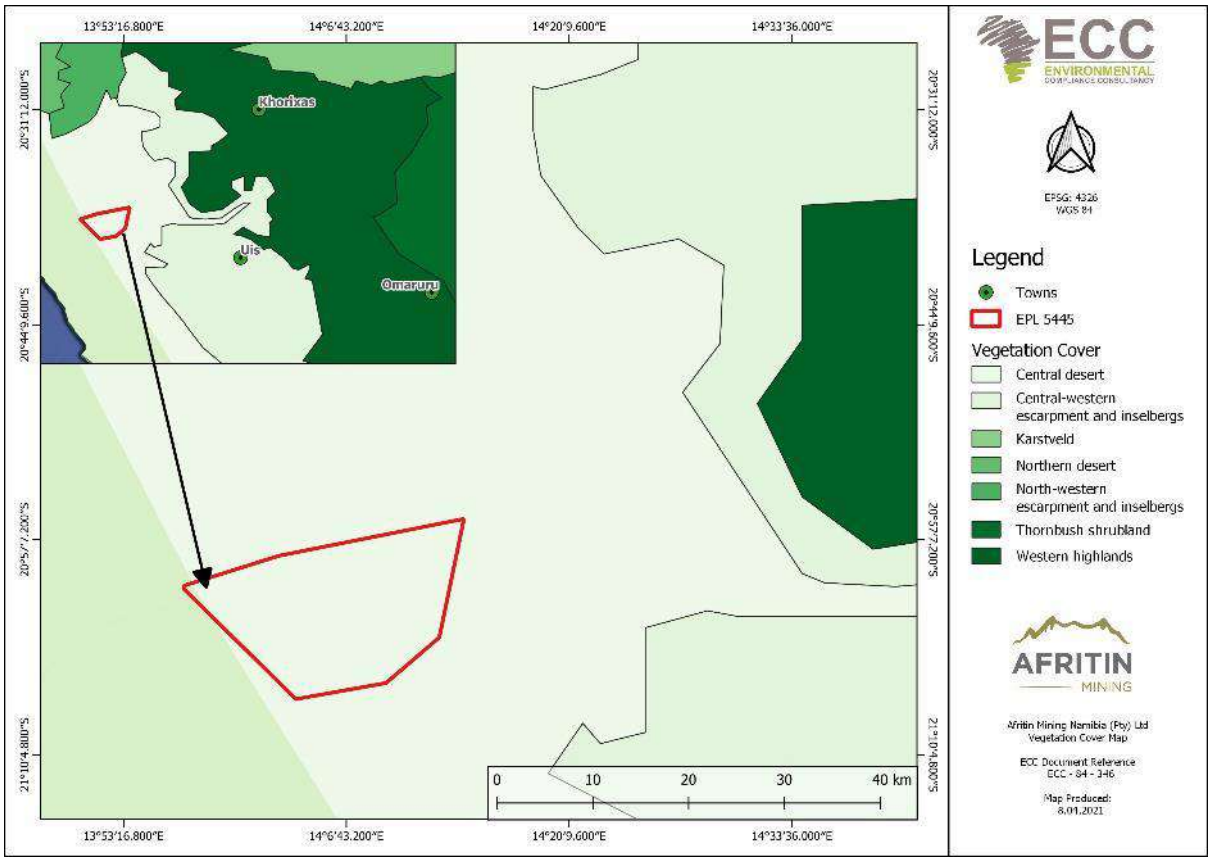


FIGURE 9 - REGIONAL VEGETATION MAP OF EPL 5445

5.6 FAUNA SPECIES

The area within and surrounding the EPL has between 111 – 140 bird species, which is of medium diversity in comparison to the rest of Namibia, which has a total of 658 recorded bird species. The number of observed lizard species for this area is between 28 to 35 different species and the mammal diversity of this area has been recorded to be between 31 to 75 species. The carnivore diversity is approximately 5 species for this area, thus the overall terrestrial diversity for this area is low in comparison with the rest of the country (Bubenzer, 2002 & Mendelsohn et al., 2002).

Furthermore, the rodent diversity is between 12 to 19 species as recorded for this area and the different snakes recorded are between 10 to 19 different species (Bubenzer, 2002 & Mendelsohn et al., 2002).

The diversity of mammals and reptiles in the area is generally low and low respectively when compared to the rest of Namibia, but this area represents an area that has various important species that need to be protected of which some are critically endangered (Bubenzer, 2002, IUCN, 2021 & Mendelsohn et al., 2002). Although this area does not have the highest diversity of species in Namibia it surely has a unique and sensitive ecosystem

with high endemism and some High Conservation Value (HCVs) Species (Bubenzer, 2002, IUCN, 2021 & Mendelsohn et al., 2002).

This part of the Erongo and Kunene Regions are relatively untouched, as most people that live within the area are confined to settlements, lodges or camps or larger towns like Uis. This area also has no farms directly surrounding the EPL, thus human-wildlife conflict between the farmers and animals will be relatively low (human-wildlife conflict will be mostly confined to settlements or any nomadic lifestyle in the area); on the contrary conservation within this area is of very high priority, due to the Save the Rhino Trust camp that falls within the EPL and is responsible for the conservation of critically endangered Black Rhinos (*Diceros bicornis).*

In the last 60 years (since the 1960's) the black rhino (*Diceros bicornis)* population declined from approximately 100,000 individuals to only 3,142 mature individuals (total of 5,495). From these 5,495 black rhinos, there are only approximately 1,334 mature individuals (total 2,188) of the South-western black rhino (*Diceros bicornis ssp. bicornis)* (sub-species present across Namibia) left in the wild (Emslie 2020 & Save the Rhino Trust Namibia. n.d). These populations decreased drastically, due to poaching, combined with inadequate field protection and habitat loss. A total of 260 Black Rhinos have been poached in Namibia between 2010 and 2018, of which the majority were poached between 2015 and 2018 (226 individuals poached) (IUCN 2021); furthermore, during 2019 52 rhinos (black and white rhinos) were poached and in 2020, 31 rhinos have been poached (Rhino Recovery Fund 2021).

According to Save the Rhino Trust (n.d.), the "critically endangered black rhinos' last stand may be in north-western Namibia". This is the last population of free-roaming black rhinos left in the world (Save the Rhino Trust Namibia. n.d). This "desert-specific" black rhino (*Diceros bicornis bicornis*) population is unique and the only population of its kind in the world and is has been rated by the African Rhino Specialist Group (AfRSG) as a Key 1 Population. Throughout Africa, there are only seven Key 1 populations, which shows the national and global importance of the Save the Rhino Trusts black rhino conservation work (Save the Rhino Trust Namibia. n.d.). Thus, any area hosting these majestic animals should be considered as an extremely sensitive ecosystem. From a study conducted by Hearn, Loutit and Uri-Khob (2000), the size of the black rhino's range (approximately 25 000 km^2) in North-western Namibia.

A list of species that might potentially be found within this EPL has been composed and can be seen in Appendix E. This list was created through a desktop study; thus, it is not certain that those species will be present within EPL 5445, but the EPL does fall within their possible distribution range. Due to the desert climate of the area, some species might only be

encountered on the EPL during certain seasons of the year, for example during the rainy season when the Ugab River, small streams or rock pools have water within the EPL, it might attract certain species to the area.

This list shows mammal and bird species that have some sort of legal protection, either under the Nature Conservation Ordinance 4 of 1975 (NCO), The Forest Act 12 of 2001 (FA), the Marine Resources Act 27 of 2000 (MRA), The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species. In the tables, in Appendix E an IUCN or a Namibia Biodiversity link can be found to view the relevant species that could potentially be found within the EPL. The list only includes birds with at least two legal/regulatory requirements, because almost all bird species in Namibia fall under Schedule 4: Protected Game within the NCO.

In the area of EPL 5445, there are 53 bird species mentioned in Appendix E, that might potentially be found or encountered on the EPL during the year (depending on the season and migratory patterns); of these species five are Near-threatened, three are Vulnerable, five are endangered and one Critically Endangered (White-backed Vulture) according to the IUCN red list of threatened species (IUCN 2021).

In the area of the EPL 5445 there are approximately 18 protected mammal species of which five are classified as vulnerable, as well as one endangered and one Critically endangered (Black Rhino) according to the IUCN red list of threatened species (link to these species can be found in the tables in Appendix E) may be found within the surrounding area. Although Lions (*Panthera Leo*) are classified as vulnerable by the IUCN red list of threatened species, the unique desert lions of Namibia that are found within these North-western regions of Namibia should rather be seen as endangered due to their small population size, and the continuous threats associated human-wildlife conflict and trophy hunting within these north-western parts of Namibia (IUCN, 2021 & the Guardian, 2018). This small population of lions have a unique adaptation to their environment and can survive in harsh desert conditions and nowhere else in the world can free-ranging lions be seen on the beach or among sand dunes. Due to this "the iconic Desert lion has become a prominent feature in Namibia and is highly valued, both aesthetically and financially, by conservationists and the growing tourism industry alike". These lions need to be conserved and managed wisely and should be seen as a national asset to Namibia (www.desertlion.info. 2021). In figure 10 some useful lion distribution data can be seen, this figure also shows how drastically the lion distribution range shrank over the last 100 years and how small the current conservation areas (national parks and communal conservancies) is for lions in Namibia (Panthera.org., 2019).

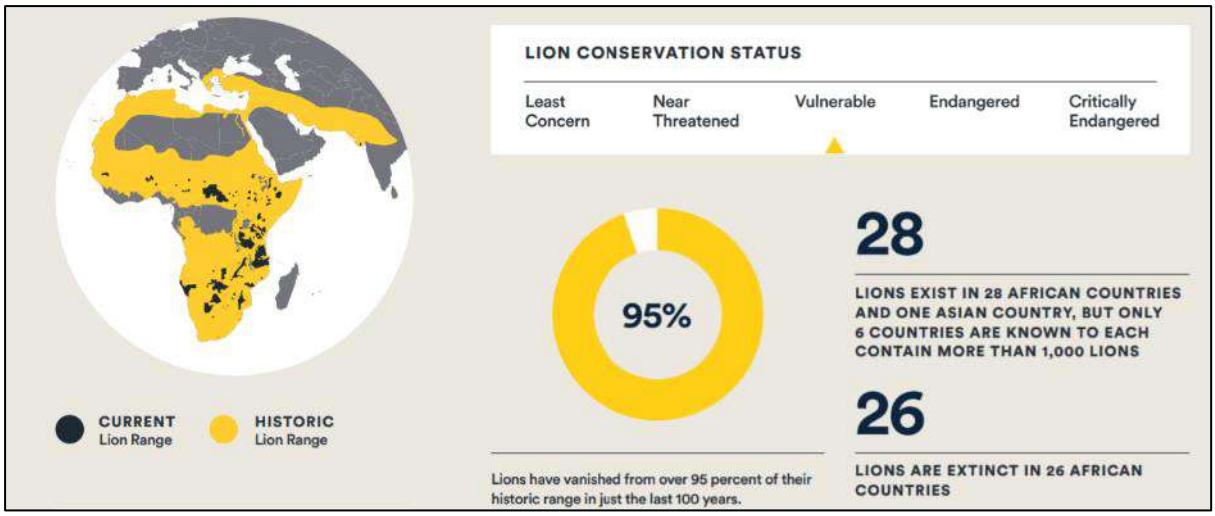


FIGURE 10 - IMPORTANT INFORMATION ON LIONS (PANTHERA.ORG., 2019).

Additionally, within this area, there are also desert-adapted Elephants, which is not a distinct species, they are African bush elephants (*Loxodonta africana)*, that are also specifically adapted to these harsh desert environments. There are only approximately 62 deserts adapted elephants left within the southern Kunene and northern Erongo regions; they mainly move within the ephemeral rivers, where they get water, food, and shelter from larger trees. A 32% decrease has been seen since 2016 among the desert-adapted elephants' residents to the Ugab River, which was partly due to human-caused and natural reasons (major drought) (Elephant-Human Relations Aid. 2020). In the Ugab and Huab rivers between 2014 and 2018, 9 out of 14 newborn elephant calves died, the exact causes were unknown, but human-caused stress factors and harsh environmental conditions contributed to this. These elephants are keystone species that play an essential role within these local desert ecosystems as they usually dig for water, making these resources available to other animals, as they break off large branches from trees, that assists smaller animals to also get access to green fodder in the drier seasons. Their deep tracks in the mud during the short rainy season also provide an ideal environment for seedlings, which is essential for vegetation growth. Thus, these Desert-adapted ecosystem engineers form an essential part to balance the desert ecosystem and they also contribute to the annual revenue of Namibia through tourism. The African Bush Elephant is an Endangered species (Elephant-Human Relations Aid. 2020).

There are also various reptile, amphibian, and insect species in, and surrounding the EPL. Marais' Lace-winged Katydid (*Pseudosaga maraisi)* is a critically endangered insect species that are found in the Brandberg Mountain area which is relatively close to the proposed site (22 km) (Bazelet & Naskrecki 2014).

5.7 SOCIO-ECONOMIC ENVIRONMENT

Namibia's GDP is recorded at 14 billion US Dollars as of 2019 (Plecher, 2020). The development of the services sector, which directly includes tourism-related products and services have created a significant positive impact on domestic and national economic growth levels; employment; and local and regional development. Examples of this are the continued development of small and medium-sized tourism-based accommodation developments throughout the country as well as large-scale tourism developments and eco-tourism with a strong focus on wildlife marketing.

EPL 5445 is located within the Erongo Region. It is named after Mount Erongo, a well-known landmark in Namibia and this area. Erongo contains the municipalities of Walvis Bay, Swakopmund, Henties Bay and Omaruru, as well as the towns Arandis, Karibib and Usakos. All the main centres within this region are connected by paved roads, the capital is Swakopmund. The area surrounding the town Uis and ELP 5445 is less developed than some of the larger towns in the Erongo Region, as mentioned above.

The EPL overlaps two communal conservancies, Tsiseb and Doro! Nawas (figure 3). A communal conservancy represents a conservation area that is managed by a local community that aims to manage the natural resources within their conservancy in a sustainable way to generate returns and other benefits (MET/NACSO, 2018). The locals of these communities are mainly employed by lodges, camps, farms, or the locals farm with livestock in the area. Tourism and consumptive wildlife use are the main benefit contributor to these local communities, in addition, income generated from plant products and local crafts (MET/NACSO,2018).

According to MET/NACSO (2018), "Wildlife is central in generating returns for conservancies", thus it is essential to ensure that the ecosystem and biodiversity is healthy within these communal conservancies to ensure a bright future for both wildlife and Namibia's local communities. Any major environmental or ecological impacts within these areas could compromise the success and future of the Community Based Natural Resource Management (CBNRM) programme, which mainly depends on healthy wildlife populations for tourism and consumptive wildlife use.

5.7.1 DEMOGRAPHY

Namibia is one of the least densely populated countries in the world, with a population of 2.5 million. Life expectancy is 65 years and expected years at schooling is 11.7 (National Planning Commission, 2017). Namibia's population is expected to increase from an estimated 2.11 million in 2011 to 3.44 million by 2041 (63%). It is predicted that

urbanisation will continue, with an increase from 43% population in urban areas in 2011 to 67% in 2041. The populations of Khomas and Erongo are projected to increase the most with over a third of Namibia's population living in these two regions (Namibia Statistics Agency, 2011). In the Erongo region, Swakopmund and Walvis Bay are the main towns expected to have an increase in urbanisation, mostly due to economic activities resulting from mining, tourism and the fishing industry.

In the 2011 Census, the population of the Erongo Region was 150 809, with a growth rate of 28.6% since 2001. The population of Namibia has been growing steadily; the population growth rate between 2001 and 2011 (the two census) was 1.4%, with urban areas growing quicker than rural areas. The highest growth rate in Namibia was recorded in the Erongo region (3.4%). This was mainly influenced by in-migration; more than 40% of residents in these regions were born elsewhere. Situated in the central Namib Desert, Swakopmund is the fourth-largest populated town in Namibia and the capital of the Erongo region administrative district with 44 725 inhabitants (Namibia Statistics Agency, 2011).

5.7.2 GOVERNANCE

Namibia has achieved the level of 'medium human development and ranks 125th on the Human Development Index out of 188 countries (National Planning Commission, 2017). Namibia is divided into 14 regions, subdivided by 121 constituencies. Each region has a regional council, elected during regional elections per constituency. Towns are governed through local authorities, in the form of municipalities.

The Namibian constitution provides for the establishment of Local authorities by-laws under the Municipal Ordinance, 1963 (Ordinance 13 of 1963) and the Local Authorities Act, No. 23 of 1992. As such the Local Authorities have the power to pass by-laws for the effective administration of their Municipalities and Communities.

In this case, the Namibia Inter-censal Demographic Survey reported that for the Erongo Region with a growth rate of 3.8, there was a noticeable movement of people from rural to urban areas where the population in urban areas increased from 43 percent in 2011 to 48 percent in 2016.

5.7.3 EMPLOYMENT

The rate of unemployment is estimated at 33.4% for Namibia, using the broad definition of unemployment. More than 60% of the population is over 15 years of age and about one-third of the total population can be regarded as part of the labour force. The unemployment rate in rural and urban areas is almost the same – 33.4% in urban areas and 33.5% in rural areas. The highest unemployment rates are found amongst persons with education levels

lower than junior secondary. The unemployment rate of persons with no formal education is 28.6%, with primary education 34.6% and with junior secondary education 32.7% (NSA, 2019).

5.7.4 ECONOMY

Unemployment rates in Namibia, particularly among the youth, are high with approximately 44.79 % of all people unemployed in 2018. In terms of employment by occupation, it is demonstrated that skilled agricultural or fishery workers made up the largest occupational group in Namibia with 46.5%, followed by the category 'elementary occupation' (18.7%) and then service workers (12.5%).

Since 2016, Namibia has recorded slow economic growth, registering an estimated growth of only 1.1% in 2016. The primary and secondary industries contracted by 2.0 and 7.8% respectively. During 2017 the economy contracted by 1.7, 0.7 and 1.9% in the first, second and third quarters respectively (NSA, 2019). Despite the more positive expectations, the economy retracted to average growth of not more than 1% annually since 2017.

5.7.5 HEALTH

Since independence in 1990, the health status of Namibia has increased steadily with a remarkable improvement in access to primary health facilities and medical infrastructure. In 2015 the World Health Organization (WHO) recommended strategic priorities of the health system in Namibia which entail improved governance and improved health information system, emergency preparedness, risk reduction and response, preventative health care and the combating of HIV/AIDS and TB (WHO, 2016).

According to the MoHSS health facility census (MoHSS, 2009), the Erongo Region has a record of approximately 150 facilities which include individual private health care practices, group private health care practices, primary health care clinics and workplace clinics. Erongo was recorded to have a high life expectancy, in Namibia. As of 2011, life expectancy, in Erongo was 63 years.

As of the beginning of 2020 the coronavirus disease (COVID-19), caused illness in humans at a pandemic scale and has resulted in an increasing number of deaths worldwide. The viral outbreak is adversely affecting various socio-economic activities globally, and with reports of the increasing number of people testing positive, it is anticipated that this may have significant impacts on the operations of various economic sectors in Namibia too. The disease caused many countries to enter a state of emergency and lockdown mode, with dire economic consequences. In addition, these measures have a detrimental effect on various sectors – and Namibia is in both cases no exception.

5.7.6 HERITAGE

In Namibia, several mountains are closely coupled to heritage values. The Namib Desert has rich archaeological and heritage value and presents valuable information about the occupation of the area dating back 700,000 years. The archaeological finds reflect a combination of isolated finds and minor archaeological sites. For EPL 5445, there were only sites discovered with a significance value of isolated minor find and probable threat.

An archaeological field site visit and reconnaissance survey were conducted by Dr John Kinahan, in selected focus areas on the EPLs 5445 and 5670 refer to Appendix D for the full archaeological assessment report, issued on 10 May 2021. The EPLs 5445 and 5670 are located in the western parts of Namibia close to the Dâures massif, or Brandberg, a feature of outstanding archaeological importance. Both EPLs sites present a focus of mining activities in the past and there is a considerable legacy of damage to the archaeological landscape. However, the greater part of the two EPLs is undisturbed and contains a significant concentration of archaeological sites that would require mitigation during the proposed exploration activities.

The field survey of EPLs 5445 and 5670 reported evidence of late pre-colonial settlement. The evidence from the two EPLs shows a relationship between indigenous communities and mining operations, specifically tin, during the colonial era. The recent archaeological sites from the vicinity of the now-abandoned Brandberg West and Goantagab mines reflects indigenous artisanal mining and ore processing.

On EPL 5445 there are approximately 13 sites of heritage find, which were grouped as A, B and C as indicated on the site distribution (Figure 12). The group labelled “A” includes sites, all clustered around several small granite outcrops. The sites comprise approximately ten stone shelters of windbreak features as well as a number of storage cairns and other features. The group labelled “B” includes sites comprising three groups of substantial stone hut features built on the lower slopes of the hillside overlooking the Ugab. The sites are associated with the same pottery as found in the “A” group, suggesting that the sites on the river which represent permanent homesteads were contemporaneous with the temporary seed gathering camps. Included among the “B” group of sites is a well preserved grave or burial. The importance of these “A” and B” groups of sites is that they represent the two main components of the late pre-colonial settlement pattern in this area. The group labelled “C” includes sites comprising a small livestock post and two groups of huts.

The sites outside the EPL 5670 area represent the activity of grass seed gathering as observed among the sites on EPL 5445. Although they lie outside the EPL area, these sites may be the path of the likely routes of access to the proposed exploration area. The sites

within the surrounding area represent small groups of huts associated with evidence of artisanal tine ore dressing. It is generally known in this area that artisanal miners processed ore from minor deposits and sold it to the tin mine at Uis.

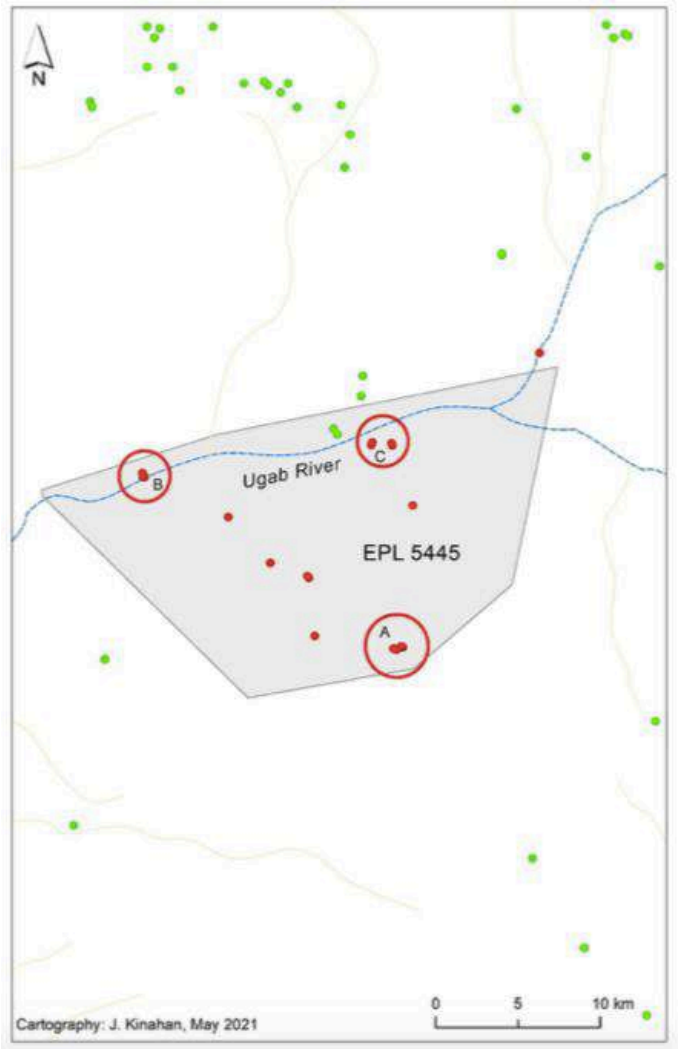


FIGURE 11 - ARCHAEOLOGICAL SITES DISTRIBUTION ON EPL 5445 (RED DOTS) (J. KINAHAN, MAY 2021)

The proposed exploration activities on the Afritin Mining EPLs 5445 and 5670 will be adopted in such a way that they avoid areas of heritage value. It is therefore recommended that additional investigation on the EPLs should be carried out by the proponent as the project proceeds. An application will be submitted to the National Heritage Council for heritage consent and on site procedures requirements to follow.

It is recommended that the proponent should adopt the Chance Finds Procedure as part of the project, the EMP will adopt the chance-find procedure devised for mining related projects. Furthermore, If any other historically important or heritage value sites on or

around the project area are encountered during exploration activities and beyond the target areas, the same will be reported to the Monument's Council in Windhoek, and the site will be left untouched.

Archaeological remains in Namibia are protected under the National Heritage Act (27 of 2004) and National Heritage Regulations (Government Notice 106 of 2005). The archaeological assessment forms the basis of recommended management actions to avoid or reduce negative impacts, as part of the environmental assessment. The heritage study is intended to satisfy the requirements of the relevant legislation and regulations, in which the process of review and clearance may require further, or different mitigation measures to be adopted.

6 IDENTIFICATION AND EVALUATION OF IMPACTS

The key stage of the ESIA process is the impact prediction and evaluation stage. This stage is the process of bringing together project characteristics with the baseline environmental characteristics and ensuring all potentially significant environmental and social impacts are identified and assessed. Impact prediction and evaluation involve predicting the possible changes to the environment because of the proposed project. The recognised methodology was applied to determine the magnitude of impact and whether or not the impact was considered significant and thus warrant further investigation. The assessment considers all stages of the project's life cycle that is scoped into the assessment and is presented in this report. It is an iterative process that commences at project inception and runs through to the project implementation. The impact prediction and evaluation stages were undertaken in April and May 2021 and the findings of the assessment are presented in this document.

6.1 INTRODUCTION

Chapter 2 provides an overview of the approach used in this EIA process and details each of the steps undertaken to date. Predication and evaluation of impacts is a key step in the EIA process. This chapter outlines the methods followed to identify and evaluate the impacts arising from the proposed project. The findings of the assessment are presented in this chapter.

This chapter provides the following:

- Details on the assessment guidance used to assess impacts;
- Lists the limitations, uncertainties and assumptions with regards to the assessment methodology;
- Details how impacts were identified and evaluated, and how the level of significance was derived; and
- Details how mitigation was applied in the assessment and how additional mitigation was identified.

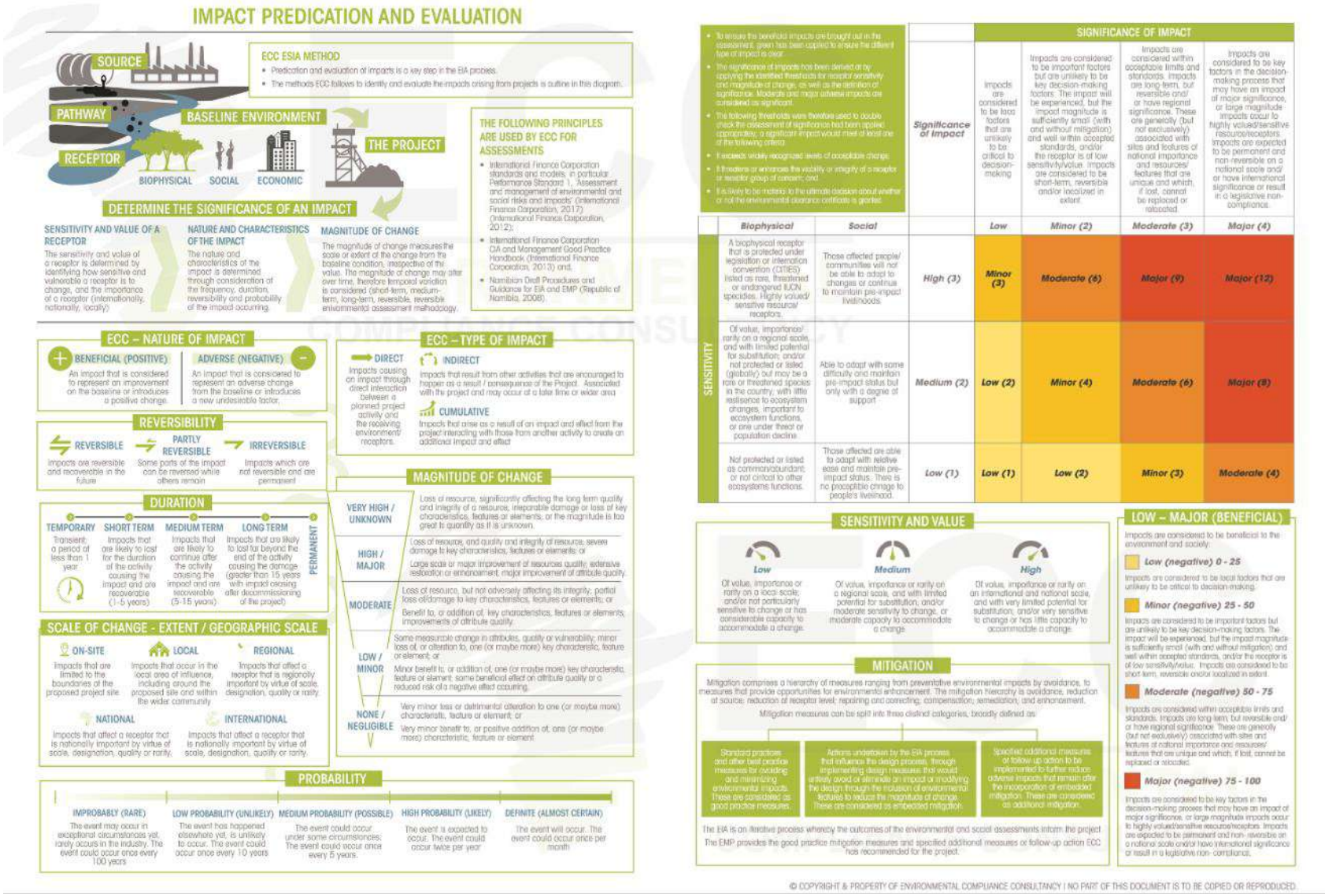


FIGURE 12 - ECCS IMPACT PREDICATION AND EVALUATION PROCESS

6.2 LIMITATIONS, UNCERTAINTIES AND ASSUMPTIONS

Several limitations and uncertainties were acknowledged during the EIA process. In line with EIA best practice, assumptions have been made based on realistic worst-case scenarios, thereby ensuring that the worst-case potential environmental impacts are identified and assessed. Table 7 contains the assumptions and uncertainties identified during the assessment process.

Where uncertainties exist, a cautious approach has been applied, allowing the worst-case scenario for potential impacts to be identified. Where limitations and uncertainties exist, assumptions have been made and applied during the assessment process. These have been clearly described in the baseline section.

TABLE 7 – SUMMARY OF LIMITATIONS, UNCERTAINTIES AND ASSUMPTIONS OF THE EIA PROCESS

LIMITATION / UNCERTAINTY	ASSUMPTION
Program of activities	As per the EPL award, work will take place over an initial three-year period to establish potential resources of interest. A detailed timeline of the activities is not available at this point, activities will be modified depending on work results. If commercially viable concentrations can be defined by preliminary drilling, the next phase of advanced resource drilling operations is possible. It is assumed that exploration activities are limited to these stipulated undertakings.
Number of workers and area they will come from	The numbers of contractors are expected to include the following teams: field sampling and mapping; ground geophysics; possible trenching; and preliminary drilling. Moreover, staff will be sourced from the local authority areas such as Uis and possibly nearby villages.
Water supply	Water will only be required for field camps once the drilling programme commences. Water is anticipated to be obtained from and transported to the site, using a mobile water-bowser, from either a local farm or from a local authority. This is subject to permission granted by relevant farm owners or a permit from the local authority. If new boreholes are to be created for water supply purposes for the advanced exploration phase, the exact placement would need to be confirmed in relation to a drill grid.

LIMITATION / UNCERTAINTY	ASSUMPTION
Structures	No permanent infrastructure development will take place in the greenfield phase of operations which will span the 3-year award period. Depending on results, the proponent will set up temporary field camps required to house field staff for sample collection, ground surveys and drilling. The camps will be such that their locations can be fully rehabilitated post completion of the fieldwork.

7 IMPACT ASSESSMENT FINDINGS AND PROPOSED MITIGATION MANAGEMENT MEASURES

This chapter presents the findings of the EIA for the proposed project as per the ESIA process, scope and methodology set out in Chapter 2 and Chapter 6. A range of potential impacts has been identified that may arise as a result of the proposed project. This ESIA report aims to focus on the significant impacts that may arise as a result of the proposed project. This chapter therefore only considers the significant impacts and or those that may have specific interest to the community and stakeholders. A summary of impacts that are considered significant is discussed in this section.

The following topics were considered during the scoping phase:

- Surface water and groundwater;
- Soils and topography;
- Landscape (visual impacts, sense of place);
- Socioeconomics (employment, demographics, Increased movement and land-use);
- Noise;
- Ecology (fauna and flora);
- Air quality (emissions, pollutants and dust); and
- Cultural heritage.

A summary of impacts that are not considered significant is discussed in Section 6.1.

7.1 IMPACTS NOT CONSIDERED SIGNIFICANT

As a result of an iterative development process, mitigation has been incorporated and embedded into the project, thereby designing out potential environmental and social impacts or reducing the potential impact so that it is not significant. Best practice has also played a role in avoiding or reducing potential impacts. The EMP provides best practice measures, with practical management and monitoring for all impacts.

Impacts that have been assessed as not being significant are summarised in table 8 below and not discussed further.

TABLE 8 - SUMMARY OF NON-SIGNIFICANT POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

ENVIRONMENT OR SOCIAL TOPIC	POTENTIAL IMPACT	SUMMARY OF ASSESSMENT FINDINGS
Waste management	Solid waste may be produced during exploration activities	The proponent will develop a waste management plan to counter the impact of waste generation and dispersal on and surrounding the site.
Increased people/foot traffic in the immediate vicinity.	Increased footfall in the project area and surrounding vicinity.	Potential risk of negative social interactions to occur between the workforce and the public. An internal Health and Safety Management Plan will be developed by the proponent to address this topic and mitigation measures provided.
Fire risks and occurrences	Exploration activities may increase the risk of fire occurrences. Fire risks may result in property damage, possible injury and impacts caused by explosions or uncontrolled fires.	With the mitigation measures such as a fire protection and a prevention plan, with inclusion of an emergency response and firefighting, fire risk can be managed. The occurrence of fire is possible but very rare for the proposed exploration activities. The proponent will take precautions through the development and used of an EMP to avoid the occurrences of this impact. Therefore, this impact has been assessed to be of low to none significance.

7.2 SCOPING ASSESSMENT FINDINGS

Impacts that are considered significant or those of interest to the community and stakeholders are as follows:

- Socio-economic: Employment;
- Social: The need for the project and its potential to impact the tourist attractions and points of heritage value;
- Biophysical environment: Potential disturbance to protected species fauna and flora; and
- Ambient noise as a result of machinery use, and vehicle movement to receptors.

When undertaking the assessment exercise, the activities of the proposed project and best practice measures were considered to ensure the likely significant effects and any required additional mitigation measures were identified. A summary of the potential impacts and mitigation and/or control measures are discussed below.

Table 9 and 10 sets out the findings of the scoping assessment phase. Activities that could be the source of an impact have been listed, followed by receptors that could be affected. The pathway between the source and the receptor has been identified where both are present. Where an activity or receptor has not been identified, an impact is unlikely, thus no further assessment or justification is provided. Where the activity, receptor and pathway

have been identified, a justification has been provided documenting if further assessment is required or not required.

Due to the nature and scale of the exploration activities, and the environmental context of the EPL, the potential environmental effects are likely to be significant for EPL 5445, due to the site having various endangered species (High Conservation Value Species) and represents an area with high endemism. There are various protected plant and animal species in this area, which could be significantly impacted, these include the desert-adapted Lions and Elephants, Black Rhinos, White-backed vultures, Welwitschia, and various other protected species. The receptors are mainly the Communal Conservancies of Tsiseb and Doro!nawas, various lodges, camps and tourist attractions (Within a 50 km radius, i.e. Onduli Ridge, White Lady Lodge, Twyfelfontein, Organ Pipes, Brandberg etc.), as well as the Save the Rhino campsite and the Brandberg West Mine site that falls within the EPL.

TABLE 9 - IDENTIFICATION AND EVALUATION OF IMPACTS AND MITIGATION MEASURES (COMMUNITY)

Receptor	Description of activity	Description of impact	effect/description of magnitude	value of sensitivity	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	– IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
Community	Movement of vehicles, exploration activities	Create conflict with Rhino trust camp owners and neighbours about access, leaving gates open, suspicious movements.	Adverse Indirect Reversible Minor Short term Onsite Likely	Low	Minor	**Low (1)**	– Ensure documented permission to enter restricted areas (nearby save the Rhino Camp); – Residents shall be provided at least two weeks' notice of exploration operations within 1 km of their property; – Existing water points and feeding areas need to be left unaffected; – Use existing roads for access, avoid new tracks, clearances; – Compliance with all applicable laws and agreements; and – Continuous engagement with residents to identify any concerns or issues, and mitigation and management measures	**Low (1)**

Receptor	Description of activity	Description of impact	effect/description of magnitude	value of sensitivity	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	– IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
							agreed upon	
Community	Exploration activities	Triggers job creation, skills development and opportunities for the local economy	Beneficial Direct Reversible Minor Short term Local Possible	Low	Minor	**Low (2)**	– Maximize local employment. – As far as possible promote local procurement. – Enhance the development of local skills where possible.	**Low beneficial**

TABLE 10 - IDENTIFICATION AND EVALUATION OF IMPACTS AND MITIGATION MEASURES (ENVIRONMENT)

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
Groundwater quality	Site operations such as maintenance activities, loss of containment,	Hydrocarbon leaks and spills could enter the aquifer causing contamination	Adverse Direct Partly Reversible Moderate Short term	Medium	Minor	**Minor (4)**	– Good housekeeping; – Training through toolbox talks and induction; – All stationary vehicles and machinery must have drip trays to collect leakages of	**Low (2)**

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
	accidental fuel / hydraulic fluid leaks and spills, or similar sources.	.	Regional Possible				lubricants and oil; – Spill kits and absorption material available during fuel delivery, storage or use; – Accidental spills and leaks (including absorption material) to be cleaned as soon as possible; – Major spills to be reported, also to the authorities; – Maintenance and service schedules on equipment are in place; – Store bulk fuel inadequate containment areas (non-porous surface, bunded to 110% of the volume stored, within a fenced-in area) – Ensure integrity of containment with regular inspections);	

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
							– No damaged containers in use; – Preventative measures will be in place when service and maintenance activities are done (drip trays, non-porous surfaces, funnels, non-damaged containers); – Refuelling is done in areas with adequate preventative measures in place.	
Groundwater quality	Potential spillages of drill fluid, lubrication, etc. or exploration activities that penetrate the groundwater table.	Hydrocarbon leaks and spills could enter the aquifer causing contamination.	Adverse Indirect Partly Reversible Minor Short term Local Possible	Medium	Minor	**Minor (4)**	– Ensure spill kits and preventative measures (e.g. drill pads) are in place at exploration sites; – A drilling system should be dug to direct any accidental spills into sumps; and – Extraction volumes of water shall be minimal during exploration and	**Low (2)**

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
							where possible, water from existing water sources shall be used.	
Water	Discharge and infiltration of non-contained wastewater	Wastewater can contaminate surface and groundwater	Adverse Direct Partly Reversible Minor Short term Regional Unlikely	Medium	Minor	**Minor (4)**	– Wastewater discharges will be contained; – Workers will be made aware of the importance of wastewater management; – Good housekeeping; and – Ensure prompt clean-up of spills.	**Low (2)**
Water	Inadequate management of waste	Waste items and litter can pollute drainage channels	Adverse Cumulative Reversible Minor Temporary Onsite Unlikely	Medium	Minor	**Low (2)**	– Good housekeeping; – Training and awareness through toolbox talks and induction; – Implement a Standard Operational Procedure (SOP) on waste management, from cradle to grave for all kinds of waste possible onsite (e.g. domestic, mineral, hydrocarbons,	**Low (1)**
Soil	Inadequate management	Pollution of	Adverse	Medium	Low	**Minor (4)**		**Low (2)**

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
	of hazardous and hydrocarbon waste	soil	Direct Reversible Minor Short term Onsite Possible				etc.); – Raise awareness about the importance of responsible waste management; – Implement a culture of correct waste collection, waste segregation and waste disposal; – Avoid hazardous waste onsite; and – Wastewater discharges will be contained – no disposal of wastewater or processing or tailings effluent.	
Soil	Vegetation clearing	Increased exposure of soil due to vegetation clearance can cause soil erosion	Adverse Direct Partly Reversible Moderate Medium Term On-site Likely	Medium	Moderate	**Moderate (6)**	– Ensure erosion control and prevention measures are in place when vegetation clearance is required, especially in upslope areas; – Where possible, plan access routes, drill pads	**Minor (4)**

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
							and other activities outside of existing drainage lines; – Where necessary, install diversions to curb possible erosion, and – Restore drainage lines when disturbed.	
Soil	Exploration activities, heavy equipment and vehicles	Loss of soil quality due to the mixing of earth matter, trampling and compaction	Adverse Direct Partly Reversible Moderate Medium-term On-site Likely	Medium	Moderate	**Moderate (6)**	– Limit the possibility of compaction and creating of a hard subsurface; – Limit the possibility of trampling; – Compacted soil areas should be loosed by ripping methods; – Where possible, topsoil should be stockpiled separately, and re-spread during rehabilitation; – During exploration activities with heavy equipment, oil absorbent matting	**Minor (4)**

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
							should be placed under and around the equipment; – Equipment must be in a good condition to ensure that accidental oil spills do not occur and contaminate soil; – In the event of spills and leaks, polluted soils must be collected and disposed of at an approved site, and – Limit the possibility to mix mineral waste with topsoil.	

TABLE 11 - IDENTIFICATION AND EVALUATION OF IMPACTS AND MITIGATION MEASURES (BIODIVERSITY)

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
Terrestrial ecology and biodiversity	Veld fires during high wind periods	Terrestrial biodiversity destruction due to uncontrolled fire outbreaks	Adverse Direct Partly Reversible Moderate Temporary Onsite	High	Moderate	**Moderate (6)**	– No open fires are allowed to be lit by personnel associated with the proponent anywhere on the EPL outside of dedicated campsites; – The proponent to ensure that exploration campsites have proper cooking facilities available to use. Gas stoves are the preferred option; – No cigarette butts are allowed to be discarded into the environment. These should be contained inappropriate domestic containment bins and disposed of at the local landfill site; – No unauthorised movement beyond the exploration areas and campsites is allowed;	**Minor (4)**

RECEPTOR	DESCRIPTION OF ACTIVITY	DESCRIPTION OF IMPACT	EFFECT/DESCRIPTION OF MAGNITUDE	VALUE OF SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT	IMPACT MANAGEMENT/CONTROL MEASURES	RESIDUAL IMPACT AFTER MITIGATION
							and – Proper fire hazard identification signage to be placed in areas that store flammable material (i.e. hydrocarbons and gas bottles).	
Terrestrial ecology and biodiversity	Increased disturbance of areas with natural vegetation	Alien species and weeds can be introduced to the area and displace endemic and protected species	Adverse Direct Reversible Minor Short term Onsite Possible	High	Low	**Minor (3)**	– Monitor areas of activity for weed and alien species; – Eradicate weeds and alien species as soon as they appear, and – Make workers aware of alien species and weeds.	**Minor (3)**

7.3 IMPACTS FOR FURTHER CONSIDERATION

7.3.1 IMPACTS ON THE COMMUNITY

The EPL overlaps two communal conservancies, Tsiseb and Doro! Nawas. A communal conservancy represents a conservation area that is managed by a local community that aims to manage the natural resources within their conservancy in a sustainable way to generate returns and other benefits (MET/NACSO, 2018). The locals of these communities are mainly employed by lodges, camps, farms, or the local's farm with livestock in the area. Tourism and consumptive wildlife use are the main benefit contributor to these local communities, in addition, income generated from plant products and local crafts (MET/NACSO,2018).

According to MET/NACSO (2018), "Wildlife is central in generating returns for conservancies", thus it is essential to ensure that the ecosystem and biodiversity are healthy within these communal conservancies to ensure a bright future for both wildlife and Namibia's local communities. Any major environmental or ecological impacts within these areas could compromise the success and future of the Community Based Natural Resource Management (CBNRM) programme, which mainly depends on healthy wildlife populations for tourism and consumptive wildlife use.

Furthermore, any noise and dust nuisance within the EPL and surrounding areas might negatively impact the tourism potential of this area (i.e. tourists visit these areas for the aesthetic value of nature and noise and air pollution will have an impact on this); which, will directly impact the local communities that depend on the tourism and consumptive wildlife-related industry. The Brandberg (approximately 23 km from EPL 5445) is a UNESCO world heritage site and attracts many tourists during the year and is an important contributor to the economy (MEAC/MEFT, 2020); tourist accommodations within these areas might also be impacted by air pollution (i.e., suspended dust particles might cause murky skies, which can impact a large area and even lodges further away).

TABLE 12 - SUMMARY OF EFFECTS ON THE COMMUNITY

RECEPTOR	ACTIVITY	IMPACT	NATURE OF IMPACT	VALUE & SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT
Community	Exploration activities, including dust, emissions and noise generation	Visual disturbance and temporary reduction in the sense of place for the local community and tourists.	Adverse Direct Reversible Negligible Temporary Local Likely	High	Moderate	Adverse

RECEPTOR	ACTIVITY	IMPACT	NATURE OF IMPACT	VALUE & SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT
		Impacts the aesthetic nature of this area.				

Impact management/control measures may include, but not limited to the follow:

- Limit trenching and bulk sampling as far as possible;
- Position heavy equipment in such a way that it is out of sight from human receptors;
- Apply dust suppression where possible (drilling, loading, hauling, tipping);
- Restrict speed of vehicles (<30km/h);
- Specific activities that may generate dust and impact on residents shall be avoided during high wind events;
- All vehicles and machinery/equipment to be shut down or throttled back between periods of use;
- Barriers or fences shall be used if exploration occurs in locations that may affect people, livestock or wildlife;
- Residents need to be informed at least two weeks in advance that exploration operations are within 1km of their property;
- Maintain good housekeeping; and
- Continuous engagement with residents to identify any concerns or issues, and appropriate mitigation and management measures agreed upon.

7.3.2 IMPACTS ON FAUNA AND FLORA

The north-western areas of Namibia, where the EPL is situated represents an area with moderate species diversity and High overall endemism of terrestrial fauna and Flora as seen in figure 12. The EPL also lies close to and might overlap a plant endemism hotspot, as seen in figure 12, of which there are only 18 of these hotspot areas in Namibia (MET/NACSO, 2018). These north-western parts of Namibia are home to the only population of free-roaming critically endangered black rhinos, desert-adapted elephants, and lions, as well as home to various other endangered and protected biodiversity. Biodiversity within these areas also plays an essential role in community-based conservation (communal conservancies), which depend largely on the presence of a healthy ecosystem, to benefit from either tourism or consumptive wildlife use (Trophy hunting) (MET/NACSO, 2018). Any

major negative impacts on biodiversity within this area can have major consequences on the future livelihoods of local communities, as biodiversity form an essential part of these communal conservancies in the form of job security, income, donations, food etc.

These two communal conservancies represent an area with moderate species richness, containing about 71 – 80% of species that historically occurred within these areas; But this area holds unhealthy population sizes of less than 25% of the historic percentages (MET/NACSO, 2018). Thus, this means that this ecosystem is vulnerable, and any major environmental impacts might push biodiversity numbers over the tipping point, where population recovery will be almost impossible without major conservation efforts. According to MET/NACSO (2018), a healthy population is one that is large enough that it could sustain itself, but currently the large wildlife species within these areas have a very unhealthy population size. Wildlife in this area already faces major threats such as human-wildlife conflict, poaching, climate change and other anthropogenic impacts (Elephant-Human Relations Aid. 2020 & MET/NACSO, 2018).

Poaching within these areas is also a major concern, which could potentially increase as a result of increased movement within these untouched parts of Namibia. Due to the illicit ivory trade, poaching will be a major threat to this area and previous reports showed that poaching in Namibia has been on the increase since 2015 (Herbig & Minnaar, 2019 and IUCN 2021). Poaching does not only take out targeted species but could also potentially be associated with deliberate mass vulture poisonings, due to poachers not wanting to alert authorities (Murn & Botha, 2018). If such an event occurs here it can have major consequences on vultures (i.e., the critically endangered white-backed vulture) and other scavengers or carnivores.

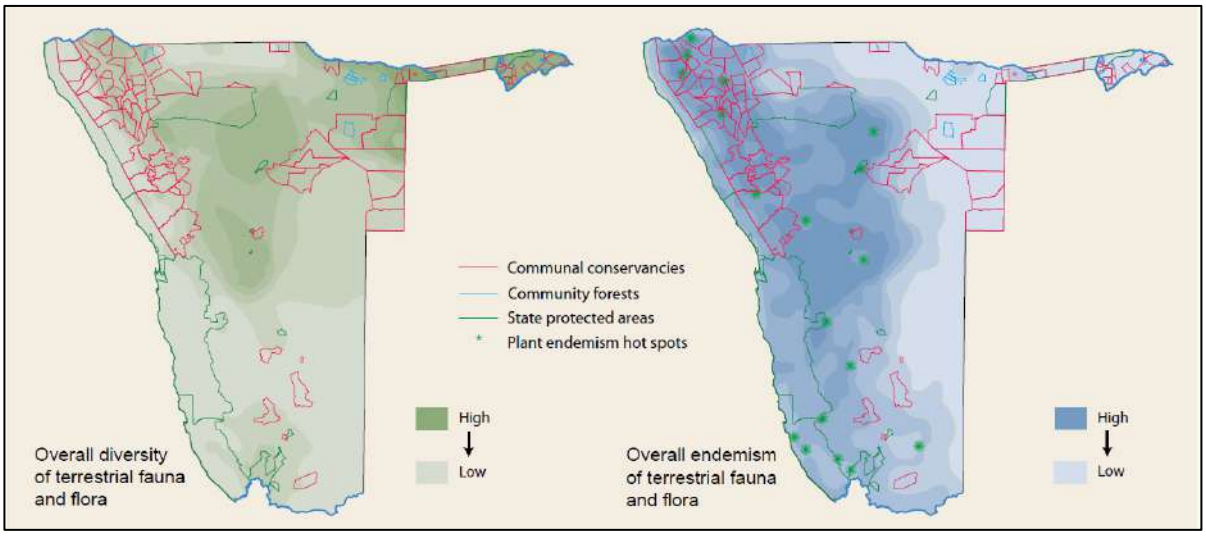


FIGURE 13 - SHOWING THE OVERALL SPECIES DIVERSITY AND ENDEMISM IN NAMIBIA (MET/NACSO, 2018).

Protected species such as the rhino are occasionally present in proximity to project's area, poaching of high-value conservation species in Namibia is illegal. There are various protected mammal and bird species identified that might potentially be found within or around EPL 5445 (Appendix E).

The extensions of exploration operations were found to have potential impacts on biodiversity namely birdlife due to the potential effects of vibration and ambient noise as there are various ground-nesting (i.e. Ludwigs Bustards) species that occur within and around EPL 5445. These birds are ground-nesting, and research has shown (Simmons and Brown., 2015) that these birds are susceptible to ground vibrations and therefore could potentially be directly affected by the project activities.

The exploration and hauling process will be restricted to daylight, whilst processing and drilling may continue at night. Mitigation measures outlined in the EMP include possible relocation of species at risk (if viable), ongoing monitoring to determine if activities are impacting biodiversity, altering exploration plans to avoid activities that impact nesting during nesting periods (the egg-laying season is from February-May in Namibia) and other species movement during different seasons (i.e. rainy season attracts more biodiversity).

TABLE 13 - SUMMARY OF EFFECTS ON AVIAN FAUNA AND HIGH-VALUE CONSERVATION SPECIES

RECEPTOR	ACTIVITY	IMPACT	NATURE OF IMPACT	VALUE & SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT
Terrestrial ecology and biodiversity	Vegetation clearing for access routes and exploration activities	High-Value Conservation Species: Loss/alteration of terrestrial habitats and loss of species. Various protected plant species (i.e. Welwitschia , a very slow-growing plant) might be negatively impacted.	Adverse Direct Partly-Reversible High/Major Short term Regional Likely	High	High / Major	**Adverse**
Terrestrial ecology and biodiversity	Ambient noise as a result of machinery use (i.e.	High Value Conservtion Species: With various species	Adverse Direct Reversible Moderate	High	Moderate	**Adverse**

RECEPTOR	ACTIVITY	IMPACT	NATURE OF IMPACT	VALUE & SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT
	drill rigs), hammering on metal surfaces the diesel generator, and vehicle movement (also through the use of airborne equipment)	protected by legislation including, mammal species (Black Rhinos, Elephants, desert-adapted Lions), birds (white back vultures) and various other animals that might be disturbed. Additionally Ground nesting birds could also be impacted.	Short Term Local Likely			
Community and Terrestrial Biodiversity	The increased movement of vehicles and people during the conducting of exploration activities.	Could potentially increase the risk of poaching, of critically endangered Black rhinos or other threatened species. This could lead to poisoning of the carcasses to hide the act, which in turn could be responsible for the death of other endangered species, such as	Adverse Cumulative Partly reversible High Medium Term National Likely	High	Major	**Adverse**

RECEPTOR	ACTIVITY	IMPACT	NATURE OF IMPACT	VALUE & SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT
		the critically endangered white back vulture.				

Impact management/control measures may include, but not limited to the follow:

- Restrict excessive noise to areas of activities only and use existing roads for access;
- Minimise clearance areas through proper planning of the exploration activities, especially at drill areas;
- Where necessary, rescue and relocate plants of significance and promote revegetation of cleared areas upon completion of exploration activities.
- Prevent the removal of protected plants or acquire the appropriate permits for relocation;
- Restrict excessive noise to daytime hours (7 am to 5 pm weekdays and 7 am until 1 pm on Saturday);
- No activities between dusk and dawn and avoid night driving as practically as possible;
- Exploration equipment shall be suitably positioned to ensure that noisy equipment is away from receptors;
- All equipment to be shut down or throttled back between periods of use;
- Have an anti-poaching unit on-site 24/7 and keep track of Rhinos in the area as well as other high target species;
- Have MEFT, police and anti-poaching unit contact details on-site;
- Relevant authorities must be notified immediately in case of a poaching event;
- Company vehicles must be clearly marked and relevant roadblocks should be set up to check vehicles entering and exiting the area; and
- No unauthorised personnel/people/vehicles should be allowed on-site.

7.3.3 IMPACTS ON HERITAGE

Archaeological sites provide a snapshot of the past, showing where people lived at particular times (Mendelsohn et al., 2002). Record worldwide shows that hunting and

gathering was the predominant lifestyle during human history and only in the past few thousand years has a nomadic and crop growing lifestyle emerged. Namibia has an archaeological record of up to 1.8 million years ago and the Brandberg (UNESCO world heritage site) close to EPL 5445 represents an area with archaeological records between 2000 – 10000 years old (Mendelsohn et al., 2002).

The Afritn EPLs 5445 and 5670 are located in the western parts of Namibia close to the Dâures massif, or Brandberg, a feature of outstanding archaeological importance. Both EPLs sites present a focus of mining activities in the past and there is a considerable legacy of damage to the archaeological landscape. However, the greater part of the two EPLs is undisturbed and contains a significant concentration of archaeological sites that would require mitigation during the proposed exploration activities.

TABLE 14 – SUMMARY OF EFFECTS ON HERITAGE

RECEPTOR	ACTIVITY	IMPACT	NATURE OF IMPACT	VALUE & SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT
Heritage	Exploration activities, movement of machinery and vehicles	Potential damage to cultural heritage sites	Adverse Direct Partly Reversible Negligible Permanent Onsite Possible	High	Major	Adverse

Impact management/control measures may include, but not limited to the follow:

- Raise awareness about possible heritage finds;
- Report all finds that could be of heritage importance;
- In case archaeological remains to be uncovered, cease activities and the site manager has to assess and demarcate the area;
- Project manager to visit the site and determine whether work can proceed without damage to findings, mark exclusion boundaries and inform ECC with GPS position;
- If needed, further investigation has to be requested for a professional assessment and the necessary protocols of the Chance Find Procedure have to be followed;
- The archaeologist will evaluate the significance of the remains and identify appropriate action, (record and remove; relocate or leave premises, depending on the nature and value of the remains);

- Inform the police if the remains are human; and
- Obtain appropriate clearance or approval from the competent authority, if required, and recover and remove the remains to the National Museum or National Forensic Laboratory as directed.

8 ENVIRONMENTAL MANAGEMENT PLAN

The EMP for the proposed project is presented in Appendix A. It provides management options to ensure the impacts of the proposed project are minimised. An EMP is a tool used to take proactive action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary.

The management measures should be adhered to during all stages of the exploration activities. All persons involved and partaking in the proposed activities should be made aware of the measures outlined in the EMP to ensure activities are conducted in an environmentally responsible manner.

The objectives of the EMP are:

- To include all components of the development and operations of the project;
- To prescribe the best practicable control methods to lessen the environmental impacts associated with the project;
- To monitor and audit the performance of operational personnel in applying such controls; and
- To ensure that appropriate environmental training is provided to responsible operational personnel.

9 CONCLUSION

ECC's EIA methodology was used to undertake the environmental assessment for the proposed project to identify if there is potential for significant effects to occur because of the proposed project. Through the scoping process, there were various environmental and social risks and concerns identified for EPL 5445. The main risks for this EPL that was identified are the potential impacts of noise, increased movement of vehicles and people and other exploration activities on biodiversity, the soil, water resources and heritage. The area within and surrounding the EPL represents an area with high species endemism, home to various endangered species and has species that play an essential role in the local ecosystems. This area is home to critically endangered black Rhinos that freely roam the areas within and surrounding the EPL. Furthermore, desert-adapted elephants and lions also live or pass through these areas and both of these species have continuous declining populations. These species contribute to the revenue generated by the tourism industry and is a unique and iconic part of Namibia's biodiversity heritage, which is well known around the world.

If the recommended mitigations are closely followed and strictly adhered to these negative impacts could be minimised, but due to the sensitive nature of this site, any major impacts might still negatively affect the biodiversity of this untouched area, local tourism and the CBNRM programme. Various best practices and mitigation measures have been identified to avoid and reduce effects as far as reasonably practical, as well as ensure the environment is protected and unforeseen effects and environmental disturbances are avoided.

REFERENCES

Bazelet, C. & Naskrecki, P. 2014. *Pseudosaga maraisi*. *The IUCN Red List of Threatened Species* 2014:e.T62452865A62452868. https://dx.doi.org/10.2305/IUCN.UK.2014-3.RLTS.T62452865A62452868.en. Downloaded on 26 May 2021.

Bubenzer, O. (2002). *Project E1 - Atlas of Namibia*. [online] Available at: http://www.uni-koeln.de/sfb389/e/e1/download/atlas_namibia/e1_download_physical_geography_e.htm.

Christelis, G. & Struckmeier, W. (Eds.) (2001). Groundwater in Namibia – an explanation to the hydrogeological map. Windhoek: Ministry of Agriculture, Water and Rural Development (Department of Water Affairs).

Emslie, R. 2020. *Diceros bicornis*. *The IUCN Red List of Threatened Species* 2020: e.T6557A152728945. https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T6557A152728945.en. Downloaded on 24 May 2021.

Elephant-Human Relations Aid. (2020). Learn about Desert Elephants. [online] Available at: https://www.ehranamibia.org/about-desert-elephants Downloaded on 27 May 2021.

Hearn, M. E., Loutit, B. D., & Uri-Khob, S. (2000). The black rhinoceros of north-western Namibia (diceros bicornis bicornis): the role of density-dependence and its management implications. *Journal of the Namibia Scientific Society*, *48*, 11-39.

Herbig, F. and Minnaar, A. (2019) "Pachyderm Poaching in Africa: Interpreting Emerging Trends and Transitions," *Crime, Law and Social Change : An Interdisciplinary Journal*, 71(1), pp. 67–82. doi: 10.1007/s10611-018-9789-4.

Institute for Health Metrics and Evaluation (IHME) 2016. Namibia- State of the nation's health: Findings from the global burden of disease. Seattle: IHME

IUCN 2021. The IUCN Red List of Threatened Species. Version 2021-1. https://www.iucnredlist.org. Downloaded on [20 05 2021].

Irish, J. (2021). Namibia Biodiversity Database. [online] Namibia Biodiversity Database. Available at: http://biodiversity.org.na/index.php [Accessed 20 May 2021].

Mendelshon, J., Jarvis, A., Roberts, C., & Robertson, T. (2002). Atlas of Namibia. A portrait of the land and its people. Cape Town: David Philip Publishers

Ministry of Health and Social Services (MHSS) (2020). Diseases. Retrieved from www.mhss.gov.na

Ministry of Health and Social Services (MoHSS) [Namibi] and ICF Macro.2010. *Namibia Health Facility Census 2009.* Windhoek, Namibia. MoHSS and ICF Macro.

Mannheimer, C., Curtis, B., Piet Le Roux, M A N Müller and Mick Müller (2009). Le Roux and Müller's field guide to the trees & shrubs of Namibia. Windhoek: Macmillan Education Namibia.

meteoblue. (2021). *Climate Uis*. [online] Available at: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/uis_namibia_3352523 [Accessed 14 Jul. 2021].

MET/NACSO. 2018. The state of community conservation in Namibia – a review of communal conservancies, community forest and other CBNRM activities (Annual Report 2017). MET/NACSO, Windhoek.

MEAC/MEFT. 2020. National Strategy On Sustainable Heritage Tourism Development & Employment Creation Opportunities At Community Level. MEAC/MEFT, Windhoek.

Murn, C. and Botha, A., (2018) "A Clear and Present Danger: Impacts of Poisoning on a Vulture Population and the Effect of Poison Response Activities," *Oryx*, 52(3), pp. 552–558. doi: 10.1017/S0030605316001137.

Namibia Inter-censal Demographic Survey (2016). Report. Retrieved from https://cms.my.na/assets/documents/NIDS_2016.pdf

Namibia Statistics Agency (NSA). (2017). Namibia inter-censal demographic survey 2016 report. Windhoek: NSA

Namibia Statistics Agency (NSA). (2019). The Namibia labour force survey 2018 report. Windhoek: NSA

Namibia Minerals Yearbook. (2016). Retrieved from https://prd-wret.s3-us-west-2.amazonaws.com/assets/palladium/production/atoms/files/myb3-2016-wa.pdf

Panthera.org. (2019). *Lion | Panthera*. [online] Available at: https://www.panthera.org/cat/lion.

Plecher, H. (2020, May 13). Namibia: Inflation rate from 1994 to 2021. Retrieved from Statista: https://www.statista.com/statistics/510131/inflation-rate-in-namibia/

Save the Rhino Trust Namibia. (n.d). *Helping secure a future for the worlds last truly wild black rhino population*. [online] Available at: http://www.savetherhinotrust.org/ [Accessed 31 May 2021].

Schreuder, CP., Roesener, H. (1985) Retrieved from http://www.gsn.gov.na/pdf/uranium.pdf

Simmons, R.E. and Brown, C.J., (2015). Birds to Watch in Namibia: Red, rare and endemic species. National Biodiversity Programme, Windhoek, Namibia.

Stuart, C. and Stuart, M. (2015). Stuarts' field guide to mammals of southern Africa, including Angola, Zambia & Malawi. Cape Town: Struik Nature.

Rhino Recovery Fund. (2021). *Rhino and Elephant Poaching on the Decline in Namibia*. [online] Available at: https://www.rhinorecoveryfund.org/stories/rhino-and-elephant-poaching-on-the-decline-in-namibia/ [Accessed 31 May 2021].

the Guardian. (2018). *Can Namibia's desert lions survive humanity?* [online] Available at: https://www.theguardian.com/environment/radical-conservation/2018/aug/22/can-namibias-desert-lions-survive-humanity [Accessed 15 Jul. 2021].

Thomas, G.P., *Namibia: Mining, minerals and, fuel resources*. AZO Mining. (2012). Retrieved from https://www.azomining.com/Article.aspx?ArticleID=61
World Health Organization (WHO) 2016. WHO country cooperation strategy 2010 – 2015 Namibia. Windhoek: WHO

World population review. (2020). Namibian Population 2020 retrieved from http://worldpopulationreview.com/countries/namibia-population/

The Impact of Mining sector to the Namibia economy. (2019). Retrieved from https://www.npc.gov.na/download/Researches_by_NPC/mining-research-paper-18-11-2020.pdf

Ulrich Oberprieler and Burger Cillié (2008). The bird guide of Southern Africa. Pretoria: Game Parks Publishing.

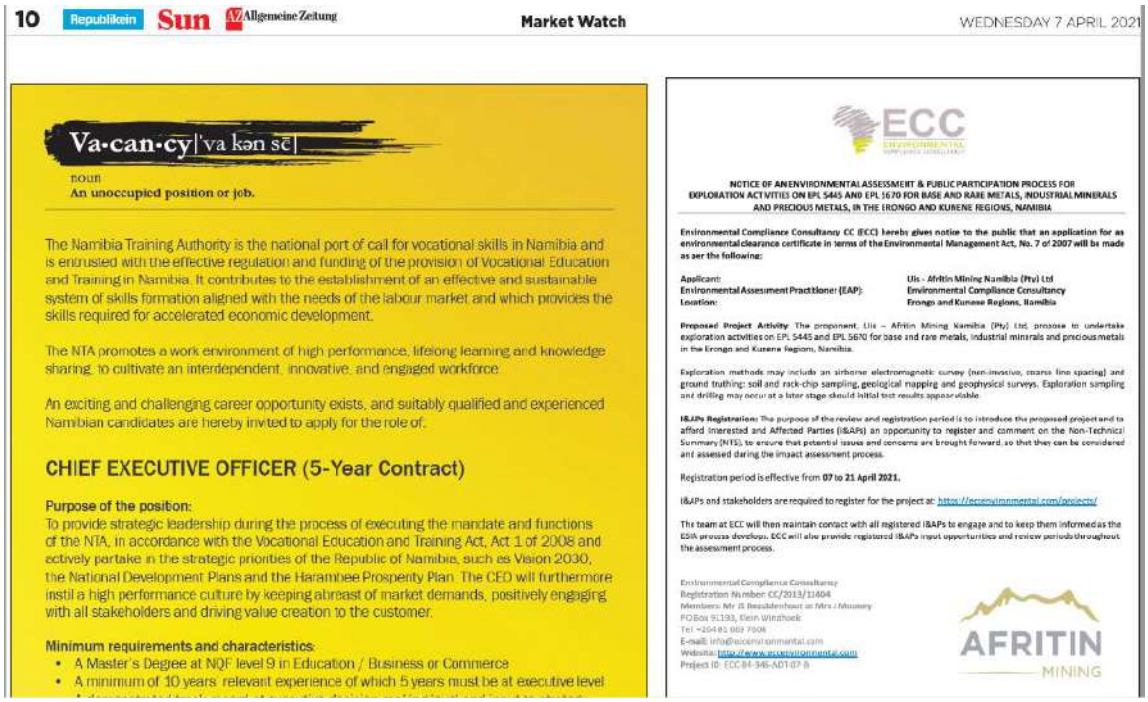
www.desertlion.info. (n.d.). *Vision - Desert Lion Conservation - Desert Lion Conservation*. [online] Available at: https://www.desertlion.info/vision/ [Accessed 24 May 2021].

APPENDIX A- EMP

APPENDIX B - NON-TECHNICAL SUMMARY

APPENDIX C- EVIDENCE OF PUBLIC CONSULTATION

The following was advertised in the 'Republikein, Sun, and Allgemeine Zeitung' newspapers on the 7th April 2021.



10 Republikein Sun Allgemeine Zeitung — Market Watch — WEDNESDAY 7 APRIL 2021

Va·can·cy /'va kən sē/
noun
An unoccupied position or job.

The Namibia Training Authority is the national port of call for vocational skills in Namibia and is entrusted with the effective regulation and funding of the provision of Vocational Education and Training in Namibia. It contributes to the establishment of an effective and sustainable system of skills formation aligned with the needs of the labour market and which provides the skills required for accelerated economic development.

The NTA promotes a work environment of high performance, lifelong learning and knowledge sharing, to cultivate an interdependent, innovative, and engaged workforce.

An exciting and challenging career opportunity exists, and suitably qualified and experienced Namibian candidates are hereby invited to apply for the role of:

CHIEF EXECUTIVE OFFICER (5-Year Contract)

Purpose of the position:
To provide strategic leadership during the process of executing the mandate and functions of the NTA, in accordance with the Vocational Education and Training Act, Act 1 of 2008 and actively partake in the strategic priorities of the Republic of Namibia, such as Vision 2030, the National Development Plans and the Harambee Prosperity Plan. The CEO will furthermore instil a high performance culture by keeping abreast of market demands, positively engaging with all stakeholders and driving value creation to the customer.

Minimum requirements and characteristics:
- A Master's Degree at NQF level 9 in Education / Business or Commerce
- A minimum of 10 years' relevant experience of which 5 years must be at executive level

ECC ENVIRONMENTAL COMPLIANCE CONSULTANCY

NOTICE OF AN ENVIRONMENTAL ASSESSMENT & PUBLIC PARTICIPATION PROCESS FOR EXPLORATION ACTIVITIES ON EPL 5445 AND EPL 5670 FOR BASE AND RARE METALS, INDUSTRIAL MINERALS AND PRECIOUS METALS, IN THE ERONGO AND KUNENE REGIONS, NAMIBIA

Environmental Compliance Consultancy CC (ECC) hereby gives notice to the public that an application for an environmental clearance certificate in terms of the Environmental Management Act, No. 7 of 2007 will be made as per the following:

Applicant: Ulx - Afritin Mining Namibia (Pty) Ltd
Environmental Assessment Practitioner (EAP): Environmental Compliance Consultancy
Location: Erongo and Kunene Regions, Namibia

Proposed Project Activity: The proponent, Ulx – Afritin Mining Namibia (Pty) Ltd, proposes to undertake exploration activities on EPL 5445 and EPL 5670 for base and rare metals, industrial minerals and precious metals in the Erongo and Kunene Regions, Namibia.

Exploration methods may include an airborne electromagnetic survey (non-invasive, coarse line spacing) and ground truthing: soil and rock-chip sampling, geological mapping and geophysical surveys. Exploration sampling and drilling may occur at a later stage should initial test results appear viable.

I&APs Registration: The purpose of the review and registration period is to introduce the proposed project and to afford interested and Affected Parties (I&APs) an opportunity to register and comment on the Non-Technical Summary (NTS), to ensure that potential issues and concerns are brought forward, so that they can be considered and assessed during the impact assessment process.

Registration period is effective from **07 to 21 April 2021.**

I&APs and stakeholders are required to register for the project at: https://eccenvironmental.com/projects/

The team at ECC will then maintain contact with all registered I&APs to engage and to keep them informed as the ESIA process develops. ECC will also provide registered I&APs input opportunities and review periods throughout the assessment process.

Environmental Compliance Consultancy
Registration Number: CC/2013/11404
Members: Mr JS Beuidenhout or Mrs J Mooney
PO Box 91193, Klein Windhoek
Tel: +264 81 669 7906
E-mail: info@eccenvironmental.com
Website: http://www.eccenvironmental.com
Project ID: ECC-84-346-ADT-07-B

AFRITIN MINING

The following was advertised in the 'Republikein, Sun, and Allgemeine Zeitung' newspapers on the 14th April 2021.

2 Republikein Sun Allgemeine Zeitung — Market Watch — WEDNESDAY 14 APRIL 2021

ECC ENVIRONMENTAL COMPLIANCE CONSULTANCY

NOTICE OF AN ENVIRONMENTAL ASSESSMENT & PUBLIC PARTICIPATION PROCESS FOR EXPLORATION ACTIVITIES ON EPL 5445 AND EPL 5670 FOR BASE AND RARE METALS, INDUSTRIAL MINERALS AND PRECIOUS METALS, IN THE ERONGO AND KUNENE REGIONS, NAMIBIA

Environmental Compliance Consultancy CC (ECC) hereby gives notice to the public that an application for an environmental clearance certificate in terms of the Environmental Management Act, No. 7 of 2007 will be made as per the following:

Applicant: Ulx - Afritin Mining Namibia (Pty) Ltd
Environmental Assessment Practitioner (EAP): Environmental Compliance Consultancy
Location: Erongo and Kunene Regions, Namibia

Proposed Project Activity: The proponent, Ulx – Afritin Mining Namibia (Pty) Ltd, proposes to undertake exploration activities on EPL 5445 and EPL 5670 for base and rare metals, industrial minerals and precious metals in the Erongo and Kunene Regions, Namibia.

Exploration methods may include an airborne electromagnetic survey (non-invasive, coarse line spacing) and ground truthing: soil and rock-chip sampling, geological mapping and geophysical surveys. Exploration sampling and drilling may occur at a later stage should initial test results appear viable.

I&APs Registration: The purpose of the review and registration period is to introduce the proposed project and to afford interested and Affected Parties (I&APs) an opportunity to register and comment on the Non-Technical Summary (NTS), to ensure that potential issues and concerns are brought forward, so that they can be considered and assessed during the impact assessment process.

Registration period is effective from **07 to 21 April 2021.**

I&APs and stakeholders are required to register for the project at: https://eccenvironmental.com/projects/

The team at ECC will then maintain contact with all registered I&APs to engage and to keep them informed as the ESIA process develops. ECC will also provide registered I&APs input opportunities and review periods throughout the assessment process.

Environmental Compliance Consultancy
Registration Number: CC/2013/11404
Members: Mr JS Beuidenhout or Mr J Mooney
PO Box 91193, Klein Windhoek
Tel: +264 81 669 7906
E-mail: info@eccenvironmental.com
Website: http://www.eccenvironmental.com
Project ID: ECC-84-346-ADT-07-B

AFRITIN MINING

Scheme worth R200 billion

SA extends Covid-19 loan scheme deadline

The aim was to encourage banks to lend more on favourable terms, to businesses affected by the coronavirus crisis.

South Africa has extended by a further three months the deadline of a loan scheme that is central to efforts to counter the economic impact of the Covid-19 pandemic, the Treasury said on Monday.

President Cyril Ramaphosa announced the bank loan scheme for businesses, worth up to R200 billion in total and partly guaranteed by the government, in April 2020.

The availability of the loans in the scheme has been extended to July 11, from an earlier deadline of April 11, the Treasury said in a statement issued jointly with the South African Reserve Bank and

South African president Cyril Ramaphosa announced the R200 billion loan scheme in April last year. PHOTO NAMPA/REUTERS

The scheme has not been as effective as originally envisaged, as many distressed

into its largest annual contraction in a century.

But the uptake has been low, with just 18.16 billion paid out as of March 27.

"The scheme has not been as effective as originally envisaged, as many distressed companies have been reluctant to assume more liabilities with little certainty of the length and severity of the

APPENDIX C.2 SITE NOTICE AND STAKEHOLDERS LETTER

NOTICE OF ENVIRONMENTAL ASSESSMENT AND PUBLIC PARTICIPATION PROCESS FOR EXPLORATION ACTIVITIES ON EPL 5445 FOR BASE AND RARE METALS, PRECIOUS METALS, IN THE ERONGO AND KUNENE REGIONS, NAMIBIA

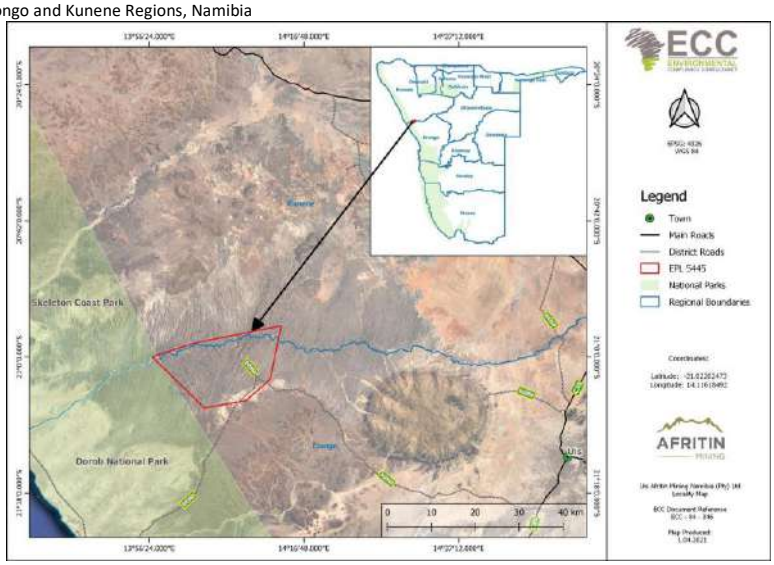
Environmental Compliance Consultancy cc (ECC) hereby gives notice to the public that an application for an environmental clearance certificate in accordance with the Environmental Management Act, No. 7 of 2007 will be made as per the following:

Applicant:	**Uis – Afritin Mining Namibia (Pty) Ltd**
Environmental Assessment Practitioner (EAP):	**Environmental Compliance Consultancy**
Location:	**Erongo and Kunene regions, Namibia**
Project ID:	**ECC-84 - 346**

Proposed Project Activity: The proponent, Uis – Afritin Mining Namibia (Pty) Ltd, propose to undertake exploration activities on EPL 5445 and EPL 5670 for base and rare metals, precious metals in the Erongo and Kunene regions, Namibia.

The site can be accessed via the D2303 road. Exploration methods may include an airborne electromagnetic survey (non-invasive, coarse line spacing) and ground truthing: soil and rock-chip sampling, geological mapping and geophysical surveys. Exploration sampling and drilling may occur at a later stage should initial test results appear viable.

Location: Erongo and Kunene Regions, Namibia



I&APs Registration: The purpose of the review and registration period is to introduce the proposed project and to afford Interested and Affected Parties (I&APs) an opportunity to register and comment on the Non-Technical Summary (NTS), to ensure that potential issues and concerns are brought forward, so that they can be considered and assessed during the impact assessment process.

I&APs and stakeholders are required to register for the project at: https://eccenvironmental.com/projects/

The team at ECC will then maintain contact with all registered I&APs to engage and to keep them informed as the ESIA process develops. ECC will also provide registered I&APs input opportunities and review periods throughout the assessment process.

Contact: Mr JS Bezuidenhout or Mrs J Mooney
Environmental Compliance Consultancy
Registration Number CC/2013/11404
PO Box 91193, Klein Windhoek
Tel: +264 81 669 7608
E-mail: info@eccenvironmental.com
Website: http://www.eccenvironmental.com

SITE NOTICE

S 20.96370°; E 14.13387°

STAKEHOLDERS LETTER SUBMITTED

+264 81 669 7608
info@eccenvironmental.com
www.eccenvironmental.com

ECC Ref: ECC-84-346-LET-10-A
21 April 2021

Identified Stakeholder and Potentially Interested Party for:
Uis - Afritin Mining Namibia (Pty) Ltd Exploration Activities

Dear Sir or Madam:

RE: NOTIFICATION OF ENVIRONMENTAL ASSESSMENT FOR EXPLORATION ACTIVITIES ON EPL 5445 AND EPL 5670 FOR BASE AND RARE METALS, INDUSTRIAL MINERALS AND PRECIOUS METALS, IN THE ERONGO AND KUNENE REGIONS, NAMIBIA.

Environmental Compliance Consultancy (ECC) has been engaged by Uis - Afritin Mining Namibia (Pty) Ltd (the Proponent) to act on their behalf for the environmental clearance certificate application in terms of the Environmental Management Act, No. 7 of 2007 for the proposed exploration activities activities on EPL 5445 and EPL 5670 for base and rare metals, industrial minerals and precious metals in the Erongo and Kunene Regions, Namibia.

This letter is intended to engage potentially Interested and Affected Parties (I&APs) of the project and provide a communication channel to ECC for the project. You have been identified as an, interested or affected party and therefore ECC wishes to inform you of how you can interact with the ESIA

The proposed project is to conduct mineral exploration activities. Specific areas of focus will be developed by the proponent on which initial exploration activities will commence in certain areas (e.g. outcrop inspection or mapping, soil and rock chip sampling, and a low-level coarse-spacing airborne survey). As part of the proposed exploration project, the following activities are thus envisaged, which shall be confirmed, as the exploration program is refined:

- Airborne geophysical survey (non-invasive, coarse line spacing);
- Potential creation of access tracks, where existing tracks cannot be utilised;
- Limited vegetation clearing for the creation of tracks, and survey access; and
- Ground exploration activities may include soil and rock-chip sampling, geological mapping, geophysical surveys, temporary trenching, drilling and drill-core sampling.

Public participation is an important part of the ESIA process, as it allows the I&APs to obtain information about the proposed project and provide feedback. Communication with the I&APs occurs at various stages throughout a project lifecycle including:

- Advertising in newspapers; public notice boards (already done);
- Distributing a Non-Technical Summary (NTS) to identified I&APs; available on line at (https://eccenvironmental.com/projects/)

ENVIRONMENTAL COMPLIANCE CONSULTANCY CC
PO BOX 91193 WINDHOEK, NAMIBIA
MEMBERS: J L MOONEY & JS BEZUIDENHOUT
REGISTRATION NUMBER: CC/2013/11404

- Registered I&APs will also be informed of the available draft scoping report for a review period, during this period I&APs will have the opportunity to review the draft document and raise any issues or concerns, and
- I&APs who wish to register as such must do so on the ECC website as per the link provided below: https://eccenvironmental.com/projects/

If you are unable to complete the registration form online, please contact us via email for assistance. info@eccenvironmental.com
ECC values community input and participation in our projects and we look forward to working with you as the project develops.
Should you have any questions or require additional information please do not hesitate to contact either of us.

Yours sincerely,

Stephan Bezuidenhout
Environmental Compliance Consultancy
Office: +264 81 669 7608
Email: stephan@eccenvironmental.com

Jessica Bezuidenhout Mooney
Environmental Compliance Consultancy
Office: +264 81 669 7608
Email: jessica@eccenvironmental.com

ENVIRONMENTAL COMPLIANCE CONSULTANCY CC
PO BOX 91193 WINDHOEK, NAMIBIA
MEMBERS: J L MOONEY & JS BEZUIDENHOUT
REGISTRATION NUMBER: CC/2013/11404

Environmental Compliance Consultancy website:
www.eccenvironmental.com

APPENDIX C.3

Commentary log of comments received from registered I&APs.

LOG OF ALL COMMENTS AND RESPONSES GENERATED THROUGHOUT PUBLIC CONSULTATION

NO.	CHAPTER	SECTION	I&AP / STAKEHOLDER COMMENT RECEIVED	STAKEHOLDER DETAILS	RESPONSE / CLARIFICATION
COMMENTS RECEIVED BASED ON THE ADVERTS PUBLISHED AND THE NON-TECHNICAL SUMMARY PROVIDED TO REGISTERED INTERESTED AND AFFECTED PARTIES (I&APS)					
1	-	-	We would like to be invited to public consultations and kept up to speed on any proposed developments. Any possbile disturbance of black rhino in the region. I have suggested that the communal conservancies in the area get in touch with your office to register as I&AP. These are: i. sorris sorris conservancy ii. Doro !nawas iii. Tsiseb iv. Uibasen/Twyfelfontein	Rhino conservation in NW Namibia andrew@rhino-trust.org.na +264816987631	Standard I&AP email
2.	-	-	Dear sir/madam Kindly register me as an Interested and Affected Party (IAP) on behalf of the National Botanical Research Institute (NBRI). If the Background and Information Document (BID) is available, please forward it to me as well. Our concern is mainly on the vegetation that will be disturbed when it boils down to vegetation clearance to accommodate machinery, roads/tracks, or structures (even just temporary ones) The location of this project lies in the QDS 2114AA, and this area is known for Welwitschia and Hoodia sp. occurrence.	Vanessa Stein Forestry Tel: +264-61-2022013 Fax: +264-61-258153 E-mail: Vanessa.Stein@mawf.gov.na webpage: www.nbri.org.na	Standard I&AP email

			We have done a preliminary data extraction from our botanical database for this QDS and have found 29 endemic species, of which 4 are protected. These protected species include: - *Hoodia currorii subsp. currorii* - *Aloe asperifolia* - *Moringa ovalifolia* - *Welwitschia mirabilis* Recommendations: A full botanical study must be conducted by qualified botanist on account of the fact that the proposed project will impact the vegetation (including possible rare and threatened plant species). The NBRI must be contacted to request a list of species for that specific QDS 2114AA. Areas that will be impacted by infrastructure/vegetation clearance should be searched for vulnerable species (possible relocation of species if need be).		
3	-	-	Wants to be registered	Jürgen Hoffmann heidehoffmann@gmx.net	Standard I&AP email
4	-	-	For your reference, we recently build a N$ 20 million tourist camp in a JV with the Doro !Nawas Conservancy in the area north of the proposed mining area (farm Witwatersrand), so would probably be impacted by things such as blasting or any impact on the resident rhino population.	OFFICE: +264 (0) 61 248137 24-HOUR EMERGENCY: +264 (0) 81 141 2275 or emergency@ultimatesafaris.na tristan@ultimatesafaris.na	Standard I&AP email
COMMENTS RECEIVED BASED ON THE DRAFT SCOPING REPORT AND EMP PROVIDED TO REGISTERED INTERESTED AND AFFECTED PARTIES (I&APS)					

APPENDIX D – ARCHAEOLOGICAL REPORT

ARCHAEOLOGICAL ASSESSMENT ON EPLS 5445 AND 5670 LOCATED IN THE KUNENE AND ERONGO REGIONS, NAMIBIA

PREPARED BY

J.KINAHAN, Archaeologist
P.O. Box 22407, Windhoek, Namibia
Email *jkinahan@iafrica.com.na*

PREPARED FOR:

ECC ENVIRONMENTAL COMPLIANCE CONSULTANCY

ON BEHALF OF AFRITIN MINING NAMIBIA (PTY) LTD

AFRITIN MINING

10 May 2021

DECLARATION

I hereby declare that I do:

(a) have knowledge of and experience in conducting assessments, including knowledge of Namibian legislation, specifically the National Heritage Act (27 of 2004), as well as regulations and guidelines that have relevance to the proposed activity;

(b) perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

(c) comply with the aforementioned Act, relevant regulations, guidelines and other applicable laws.

I also declare that I have no interests or involvement in:

(i) the financial or other affairs of either the applicant or his consultant

(ii) the decision-making structures of the National Heritage Council of Namibia.

Note: The purpose of this report is to assist the client in gaining consent under the National Heritage Act (27 of 2004) to proceed with mineral exploration and related activities at specific locations as defined herein. The report must always be quoted in full, and not in part, summary or précis form. The report may not be distributed or used for any other purpose by the client, the National Heritage Council of Namibia or any other party and remains the copyright of the author.

John Kinahan, Archaeologist

EXECUTIVE SUMMARY

An archaeological field survey and assessment was carried out on EPLs 5445 and 5670 located in the western parts of Namibia close to the Dâures massif, or Brandberg, a feature of outstanding archaeological importance. Both exploration leases have been the focus of mining activity in the past and there is a considerable legacy of damage to the archaeological landscape. However, the greater part of the two leases is undisturbed and contains a significant concentration of archaeological sites that would require more detailed work in mitigation of proposed exploration and mining. It is recommended that such detailed work as is outlined in this report should be a requirement for approval of any mechanically assisted exploration such as drilling, trenching and bulk sampling.

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background

Environmental Compliance Consultancy (ECC) is carrying out an environmental assessment of two exploration leases held by AfriTin Mining in western Namibia and close to the Dâures massif, or Brandberg, a feature of outstanding archaeological importance. EPL 5445 lies to the west of the Dâures massif and mainly on the south side of the Ugab River, and therefore falls within the Erongo Region, while EPL 5670 lies to the north of the Ugab River in the Kunene Region. Mining and exploration are listed in the Environmental Management Act (2007) as requiring environmental assessment and the issuance of an Environmental Clearance Certificate.

Archaeological remains in Namibia are protected under the National Heritage Act (27 of 2004) and National Heritage Regulations (Government Notice 106 of 2005), and ECC has accordingly appointed the undersigned, J. Kinahan, archaeologist, to carry out an assessment of the AfriTin leases. A field visit and reconnaissance survey of the two leases was carried out between 22nd and 27th March 2021. The following report sets out the results of the survey and an assessment of the archaeological significance of the leases against the background of previous work in the same area.

1.2 Terms of Reference

The primary task of the archaeological assessment reported here was to identify sensitive archaeological sites that could be affected by the proposed exploration and mining activities. The archaeological assessment forms the basis of recommended management actions to avoid or reduce negative impacts, as part of the environmental assessment. The study is intended to satisfy the requirements of the relevant legislation and regulations, in which the process of review and clearance may require further, or different mitigation measures to be adopted.

Specifically, the archaeological assessment addresses the following primary elements:

1. The identification and assessment of potential impacts on archaeological/heritage resources, including historical sites arising from the proposed exploration and mining activities.
2. The identification and demarcation of highly sensitive archaeological/heritage sites requiring special mitigation measures to eliminate, avoid or compensate for possible destructive impacts.
3. Formulation and motivation of specific mitigation measures for the project to be considered by the authorities for the issuance of clearance certificates.
4. Identify permit requirements as related to the removal and/or destruction of heritage resources.

1.3 Assumptions & Limitations

Archaeological assessment relies on the indicative value of surface finds recorded in the course of field survey. Field survey results are augmented wherever possible by inference from the results of surveys and excavations

carried out in the course of previous work in the same general area as the proposed project, as well as other sources such as historical documentation. Based on these data, it is possible to predict the likely occurrence of further archaeological sites with some accuracy, and to present a general statement (see Archaeological setting, below) of the local archaeological site distribution and its sensitivity. However, since the assessment is limited to surface observations and existing survey data, it is necessary to caution the proponent that hidden, or buried archaeological or palaeontological remains might be exposed as the project proceeds

2. LEGAL REQUIREMENTS

The principal instrument of legal protection for archaeological/heritage resources in Namibia is the National Heritage Act (27 of 2004). Part V Section 46 of the Act prohibits removal, damage, alteration or excavation of heritage Site s or remains. Section 48 *ff* sets out the procedure for application and granting of permits such as might be required in the event of damage to a protected site occurring as an inevitable result of development. Section 51 (3) sets out the requirements for impact assessment. Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council. Heritage Site s or remains are defined in Part 1, Definitions 1, as "any remains of human habitation or occupation that are 50 or more years old found on or beneath the surface".

It is important to be aware that no specific regulations or operating guidelines have been formulated for the implementation of the National Heritage Act in respect of archaeological assessment. However, archaeological impact assessment of large projects has become accepted practice in Namibia during the last 25 years, especially where project proponents need also to consider international guidelines. A document entitled *Archaeological Guidelines for Exploration and Mining in the Namib Desert*[1] has been compiled and widely circulated in the mining community. In cases where international guidelines are applicable, those of the World Bank OP/ BP 4.11 in respect of "Physical Cultural Resources" (R2006-0049, revised April 2013) are most appropriate. Of these guidelines, those relating to project screening, baseline survey and mitigation are the most relevant.

Archaeological impact assessment in Namibia may also take place under the rubric of the Environmental Management Act (7 of 2007) which specifically includes anthropogenic elements in its definition of environment. The List of activities that may not be undertaken without Environmental Clearance Certificate: Environmental Management Act, 2007 (Govt Notice 29 of 2012), and the Environmental Impact Assessment Regulations: Environmental Management Act, 2007 (Govt Notice 30 of 2012) both apply to the management of impacts on archaeological Site s and remains whether these are considered in detail by the environmental assessment or not.

[1] Kinahan, J. (2012)

3. ARCHAEOLOGICAL SETTING

The western parts of Namibia including the Dâures massif, or Brandberg, are recognized as a globally important archaeological landscape, having abundant evidence of human settlement spanning the last one million years.[2] Of particular interest and significance are archaeological site s dating to within the last 10 000 years, a period of marked climatic instability that brought many changes in human settlement and subsistence behaviour.[3] This period, the Holocene, commenced with the onset of warm, moist conditions following the Last Glacial Maximum, and saw a rapid expansion of human occupation over the entire Namib Desert. A sudden onset of arid conditions about 5 000 years ago caused a general retreat from the desert, but with a small number of notable exceptions. One of these was the Dâures massif where high elevation and favourable rainfall catchments sustained a refugium habitat suitable for small groups of hunter-gatherers. Systematic archaeological studies of the Dâures have shown the development of food gathering and processing techniques during this period, as well as the existence of extended social networks maintained by mutual gift exchange. Of major significance is the elaboration of a complex ritual rock art tradition linked to the rise of specialized shamans, or ritual practitioners. During the last 2 000 years, hunter-gatherer communities in this area acquired domestic sheep and pottery, establishing a highly productive semi-nomadic pastoral mode of subsistence.

An essential component of the Namib Desert pastoral economy was the extensive and highly specialized use of wild food plants including !nara *Acanthsicyos horridus* melons which were processed to be stored for later use, and grass seed obtained from the underground storage caches of harvester ants *Messor denticornis*. The use of these plants enabled desert communities to achieve a measure of food security which seems to have resulted in improved infant survival and a growth in human population during the last two thousand years. The archaeology of these adaptations is subtle and requires detailed analysis of a range of related evidence, including that of pottery, site position and layout as well as isotopic evidence which allows the reconstruction of human diet from skeletal remains. The evidence of settlement in the desert by hunter-gatherer and nomadic pastoral communities tends to be widespread and insubstantial, requiring the recording and investigation of large numbers of small, scattered sites. Field survey and analytical methods have been developed in the last few decades of research in this area, to obtain the maximum yield of high precision data from the available archaeological sites. Each new field survey and investigation draws from and builds upon previous work, leading thus to an improved understanding of the regional archaeology.[4]

---

[2] Mitchell, P. 2002. *The archaeology of southern Africa.* Cambridge: Cambridge University Press.

[3] Deacon, J. & Lancaster, N. 1988. *Late Quaternary palaeoenvironments of southern Africa.* Oxford: Oxford University Press.

[4] Kinahan, J. 2020. *Namib: the archaeology of an African desert*. Windhoek, University of Namibia Press

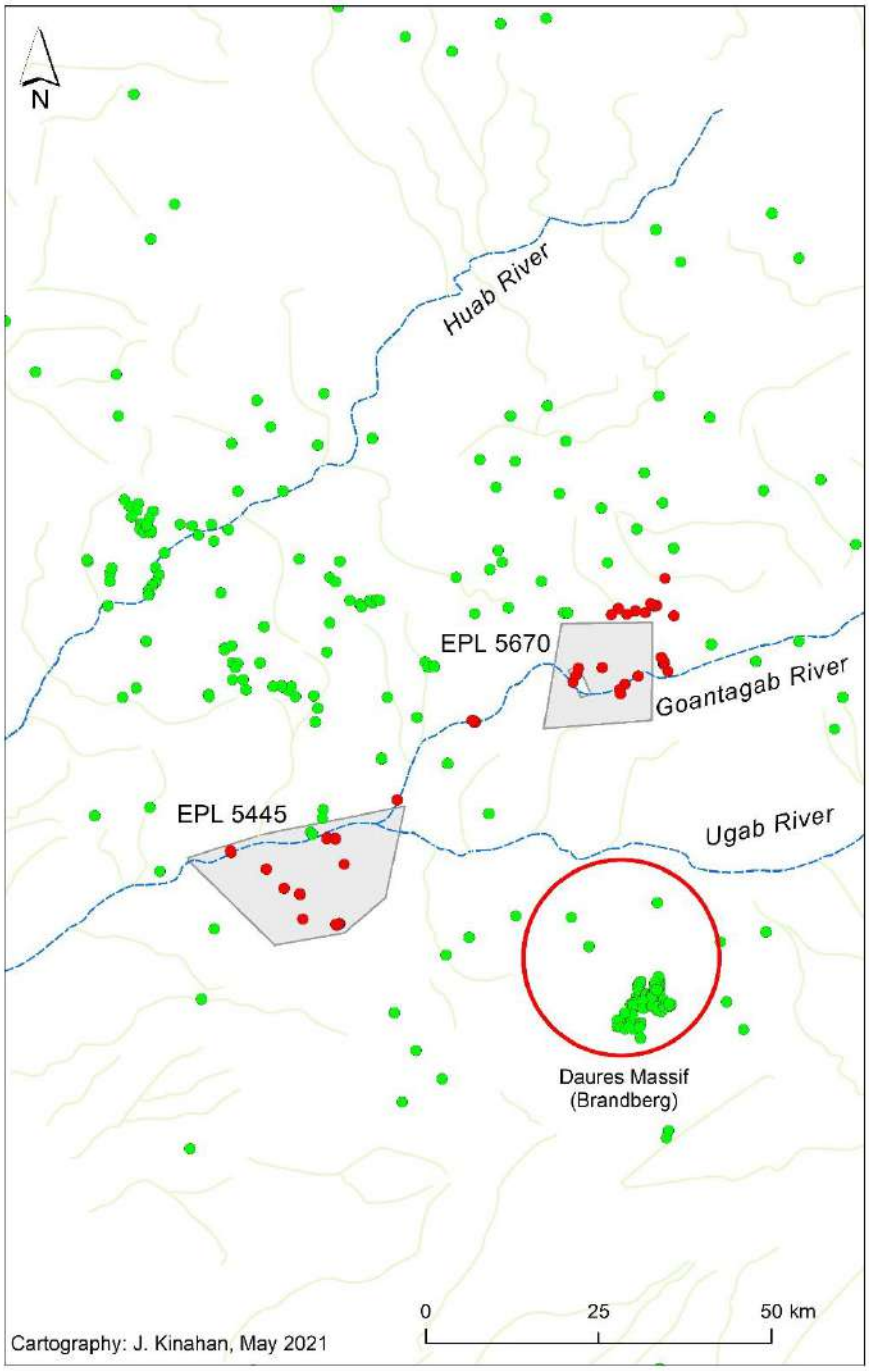


Figure 1: The archaeological setting (green circles) of EPLs 5445 and 5670 with archaeological sites located in the present survey indicated as red circles.

4. OBSERVATIONS

A reconnaissance survey was carried out over EPLs 5445 and 5670 to locate and document their most important archaeological features. The terrain in both lease areas is rugged and there are few negotiable tracks. Such tracks as there were provided access into key valley areas which were then explored on foot. Archaeological sites were located by hand-held GPS, and recorded as to size, estimated age and affinity and then assessed as to their archaeological significance and vulnerability (S/V) using standard 0-5 scales. The Site gazetteer below lists the sites with their location and S/V ranking. The general distribution of sites located in the course of the reconnaissance survey is shown in Figure 1 which also indicates the known distribution of archaeological sites in the surrounding area. Figures 2 and 3 show the distribution of archaeological sites within EPLs 5445 and 5670 at a larger scale. Photographs of some of the sites and their most important features are assembled in Appendix 1.

EPL 5445: The group labelled "A" in Figure 2 includes sites 293/483 – 293/488, all clustered around a number of small granite outcrops. The sites comprise approximately ten stone shelters of windbreak features as well as a number of storage cairns and other features. The sites are associated with pottery estimated to date from within the last 600 years and represent a typical encampment used during expeditions to gather grass seed. Similar sites have been documented in the surrounding area[5]. In the present case the sites are located at the head of a valley leading down to the Ugab River approximately 16km to the northwest.

The group labelled "B" in Figure 2 includes sites 293/493 – 293/496, comprising three groups of substantial stone hut features built on the lower slopes of the hillside overlooking the Ugab. The sites are associated with the same pottery as found in the "A" group, suggesting that the sites on the river which represent permanent homesteads were contemporaneous with the temporary seed gathering camps. Included among the "B" group of sites is a well preserved grave or burial. The importance of these "A" and B" groups of sites is that they represent the two main components of the late pre-colonial settlement pattern in this area. The group labelled "C" in Figure 2 includes sites 293/500– 293/502, comprising a small livestock post and two groups of huts.

The sites also include a group of two Christian burials with unmarked headstones (293/499). The livestock post appears to date from the 1950s and may relate to the first establishment of the Brandberg West tin mine, while the groups of huts, like several other such sites in the vicinity of the mine may relate to the artisanal tin mining operations of local communities carried out before and after the period in which the mine was active between 1946 and 1980[6]. Due to limited field time and difficulty of access along the Ugab River which was in flood at the time of the survey, two potentially important valleys between those covered here were not visited at all. On the basis of the observations made however, it is likely that these valleys would contain similar archaeological sites.

---

[5] Speich, R. 2002. Die Bauten die Wanderhirten, Beobachtungen zur Steinkreis-Architektur in Namibia. *Journal SWA Scientific Society* 47: 89 – 130; Speich, R. 2005. Siedlungen der Wanderhirten zwischen Huab und Cape Cross. *Journal SWA Scienific Society* 53: 39 – 77.

[6] Schneider, G. 2004. *The Roadside Geology of Namibia*. Sammlung Geologischer Führer, Berlin: Gebr. Borntraeger.

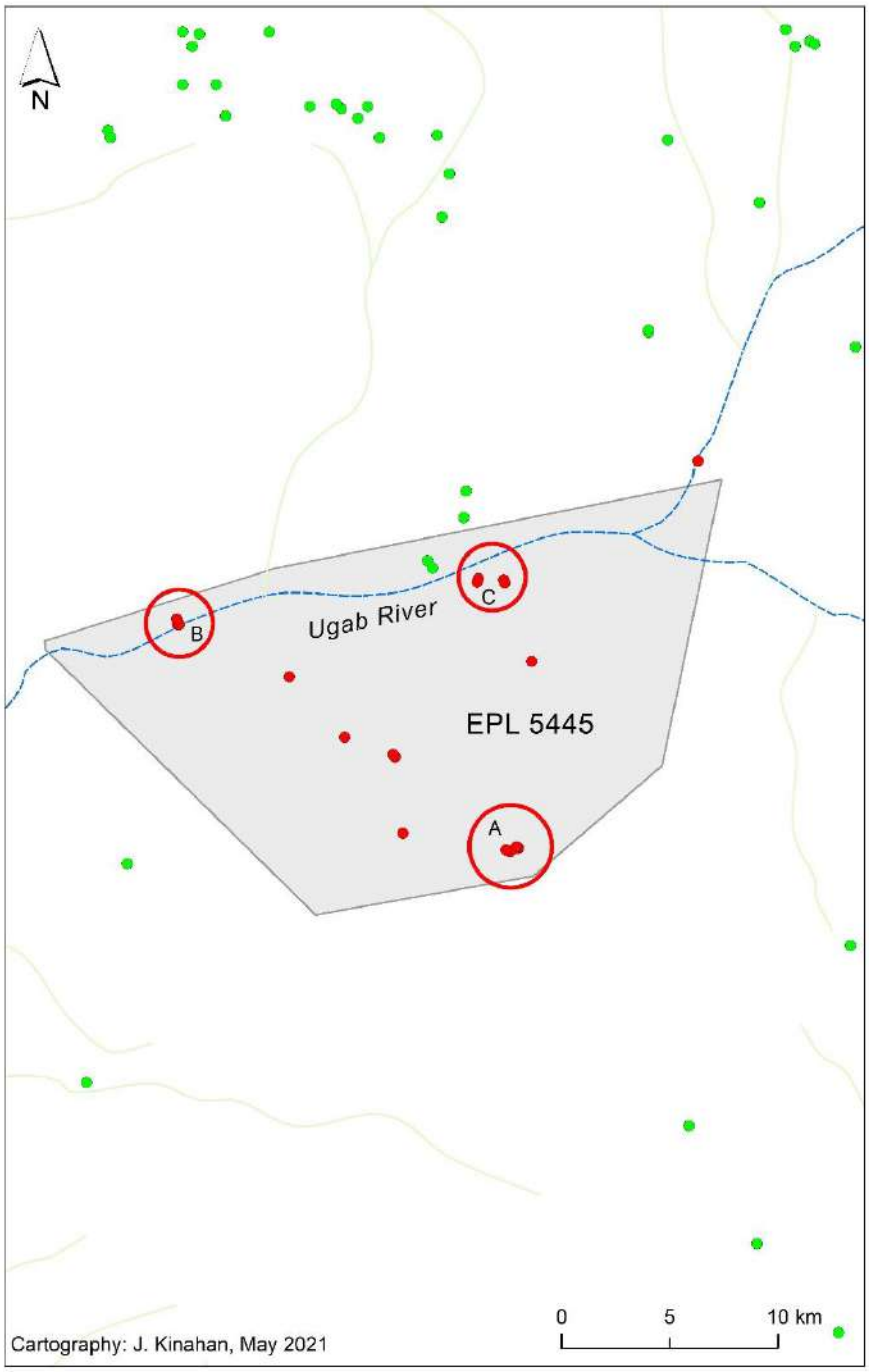


Figure 2: Archaeological sites on EPL 5445 (red dots), with groups “A” to “C” as described in the text.

EPL 5670: The site distribution shown in Figure 3 indicates eight sites within EPL 5670 on either side of the Goantagab River, and a further sixteen on the eastern and north-eastern margins of the lease area. The sites outside the lease area represent the same activity of grass seed gathering as observed among the sites on EPL 5445. Although they lie outside the lease, these sites are the path of the likely routes of access to a potential mining site located in the inner polygon shown in Figure 3. The sites within the lease area represent small groups of huts associated with evidence of artisanal tine ore dressing. It is generally known in this area that artisanal miners processed ore from minor deposits and sold it to the tin mine at Uis.

Ore processing employed a stone mortar and pestle to reduce it to a coarse gravel from which impurities, or gangue, could be removed. The separation of crushed ore from the gangue was done by a combination of hand-picking and winnowing, using a traditional wooden tray or *gaub*. The age of the Goantagab sites can be estimated from the type of debris such as discarded bottles and food cans found on the sites. On this basis it can be suggested that the Goantagab sites are up to 50 years old, and therefore fall within the period of protection envisaged by the National Heritage Act (27 of 2004). The sites are of cultural historical interest because they also provide an example of the adaptation of in this case a traditional technology for processing wild grass seed, to the processing of tin ore for sale.

4.1 Site gazetteer

EPL 5445

SITE 293/483 Lat. -21,084429 Long. 14,145859 S/V = 3/3

SITE 293/484 Lat. -21,084355 Long. 14,145107 S/V = 3/3

SITE 293/485 Lat. -21,084403 Long. 14,144866 S/V = 2/3

SITE 293/486 Lat. -21,083927 Long. 14,144893 S/V = 2/3

SITE 293/487 Lat. -21,085977 Long. 14,142322 S/V = 4/3

SITE 293/488 Lat. -21,085285 Long. 14,14072 S/V = 4/3

SITE 293/489 Lat. -21,078293 Long. 14,097688 S/V = 3/3

SITE 293/490 Lat. -21,046529 Long. 14,094471 S/V = 2/2

SITE 293/491 Lat. -21,045557 Long. 14,093653 S/V = 2/2

SITE 293/492 Lat. -21,013284 Long. 14,050446 S/V = 2/2

SITE 293/493 Lat. -20,9913 Long. 14,003756 S/V = 4/4

SITE 293/494 Lat. -20,991003 Long. 14,004292 S/V = 2/3

SITE 293/496 Lat. -20,989151 Long. 14,003534 S/V = 3/4

SITE 293/497 Lat. -21,038357 Long. 14,073407 S/V = 2/3

SITE 293/498 Lat. -21,00687 Long. 14,151329 S/V = 3/3

SITE 293/499 Lat. -20,972318 Long. 14,129233 S/V = 3/4

SITE 293/500 Lat. -20,973845 Long. 14,128599 S/V = 3/3

SITE 293/501 Lat. -20,972963 Long. 14,139707 S/V = 3/3

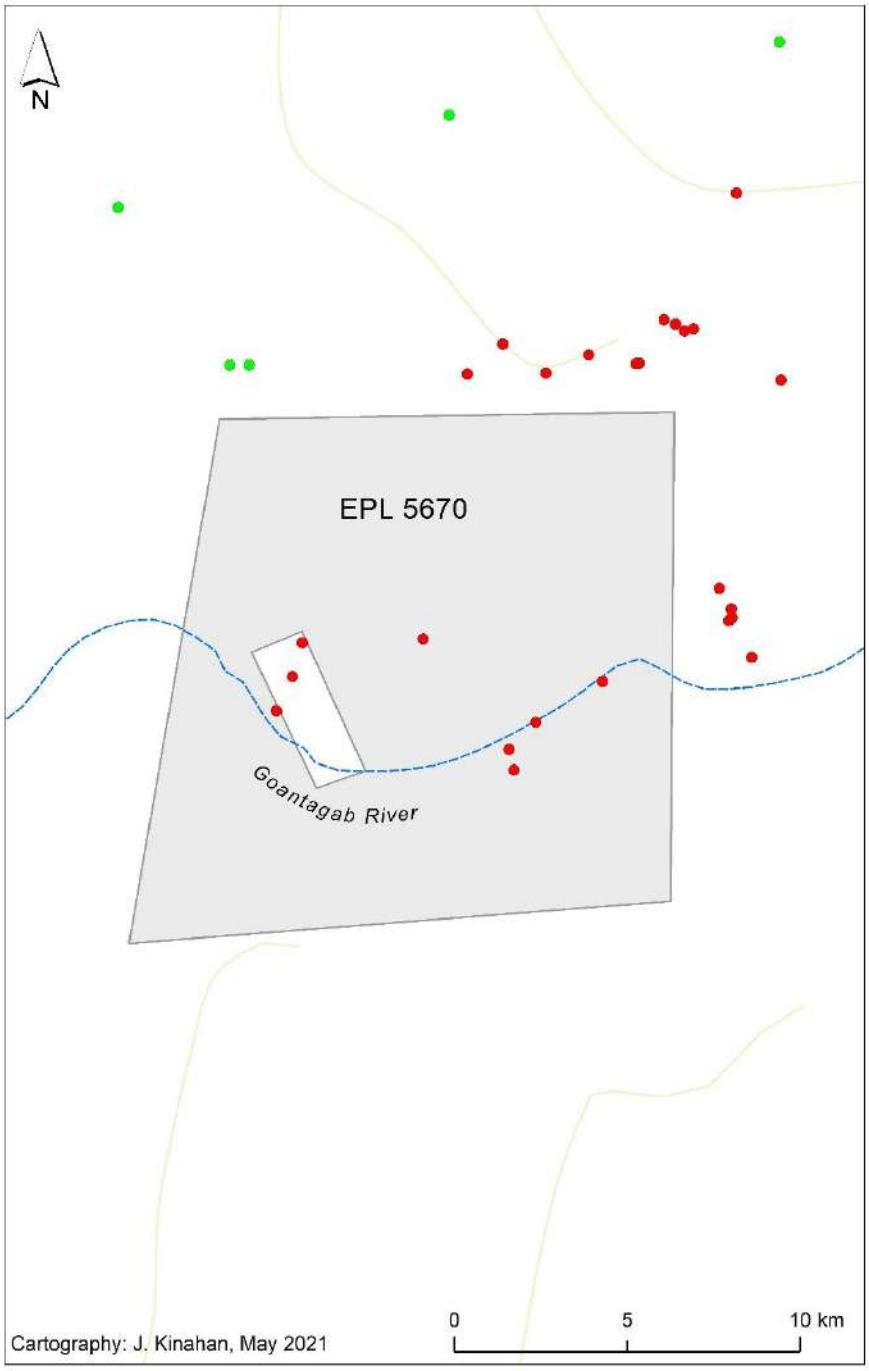


Figure 3: Archaeological sites on EPL 5670 (red dots)

SITE 293/502 Lat. -20,974185 Long. 14,140109 S/V = 3/3

EPL 5670

SITE 293/504 Lat. -20,822684 Long. 14,320881 S/V = 3/4

SITE 293/505 Lat. -20,822145 Long. 14,322078 S/V = 3/4

SITE 293/506 Lat. -20,820434 Long. 14,319623 S/V = 2/3

SITE 293/507 Lat. -20,819897 Long. 14,317991 S/V = 3/3

SITE 293/508 Lat. -20,76993 Long. 14,449126 S/V = 3/3

SITE 293/509 Lat. -20,76103 Long. 14,45331 S/V = 3/3

SITE 293/510 Lat. -20,752266 Long. 14,455927 S/V = 3/3

SITE 293/511 Lat. -20,751228 Long. 14,48737 S/V = 2/3

SITE 293/512 Lat. -20,671153 Long. 14,555348 S/V = 3/3

SITE 293/513 Lat. -20,670612 Long. 14,557672 S/V = 3/3

SITE 293/514 Lat. -20,66938 Long. 14,552989 S/V = 3/3

SITE 293/515 Lat. -20,668185 Long. 14,549939 S/V = 3/3

SITE 293/516 Lat. -20,67956 Long. 14,543486 S/V = 3/3

SITE 293/517 Lat. -20,679644 Long. 14,542676 S/V = 3/3

SITE 293/518 Lat. -20,677372 Long. 14,530415 S/V = 3/4

SITE 293/519 Lat. -20,682044 Long. 14,519257 S/V = 2/3

SITE 293/521 Lat. -20,674567 Long. 14,508016 S/V = 3/4

SITE 293/522 Lat. -20,682392 Long. 14,498829 S/V = 2/3

SITE 293/523 Lat. -20,762379 Long. 14,533986 S/V = 3/3

SITE 293/524 Lat. -20,772887 Long. 14,516658 S/V = 2/3

SITE 293/525 Lat. -20,779937 Long. 14,509655 S/V = 3/4

SITE 293/526 Lat. -20,785319 Long. 14,51096 S/V = 3/3

SITE 293/527 Lat. -20,756032 Long. 14,572828 S/V = 2/2

SITE 293/528 Lat. -20,746492 Long. 14,56681 S/V = 2/2

SITE 293/529 Lat. -20,745665 Long. 14,567669 S/V = 2/2

SITE 293/530 Lat. -20,743462 Long. 14,567506 S/V = 2/2

SITE 293/531 Lat. -20,73804 Long. 14,564333 S/V = 2/2

SITE 293/532 Lat. -20,683886 Long. 14,58043 S/V = 2/2

5. CONCLUSIONS & RECOMMENDATIONS

The field survey of EPLs 5445 and 5670 reported here documented evidence of late pre-colonial settlement and a particular mode of subsistence with a degree of reliance on the gathering and processing of wild grass seed, a form of human adaptation that is unique in southern Africa.[7] The evidence from the two leases also shows something of the relationship between indigenous communities and mining operations, specifically tin, during the colonial era.

The recent archaeological sites from the vicinity of the now abandoned Brandberg West and Goantagab mines reflects indigenous artisanal mining and ore processing using an adapted form of the technology used in the processing of wild grass seed. Cash income from such enterprises may have served a similar purpose to grass seed exploitation because it enabled people to buy food. The difference that is important to note is that while seed gathering and processing was primarily a women's occupation, that of tin ore mining and dressing may have been primarily men's work.

The site gazetteer (4.1 above) lists the site numbers and co-ordinates together with their archaeological significance and vulnerability (S/V) using standard 0-5 scales. The scales which are set out in Table 1, below, allow a simplified sorting of the archaeological sites as the first step towards sensitivity mapping. Full sensitivity mapping with point values derived from the product of S and V, require a more dense and evenly spread survey cover, as should be achieved in the process of full heritage assessment at the mitigation stage of the project.

Table 1: Archaeological Significance and Vulnerability rankings

SIGNIFICANCE RANKING		**VULNERABILITY RANKING**	
0	no significance	0	not vulnerable
1	disturbed or secondary context	1	no threat posed
2	isolated minor find	2	low or indirect threat
3	archaeological site	3	probable threat
4	multi-component site	4	high likelihood of disturbance
5	major archaeological site	5	direct and certain threat

Average Significance values for the EPL 5445 and 5670 sites is between 2 and 3, reflecting a combination of isolated finds and minor archaeological sites. A small number of site have Significance 4 values and these include the sites in groups "A" and "B" in Figure 2 which are multicomponent sites forming an integral part of an

[7] Kinahan, J. 2020. *Namib: the archaeology of an African desert*. Windhoek: University of Namibia Press.

archaeological landscape pattern. Vulnerability rankings for the sites on the leases also ranges between 2 and 3 with a small number ranked as Vulnerability 4. These values reflect the current situation and would need to be reconsidered and adjusted when exploration activities have advanced further.

It is therefore recommended that further investigation of the leases should be carried out if the project proceeds further, although this action will require a permit from the National Heritage Council. It is further recommended that the proponent should adopt the Chance Finds Procedure in Appendix 2 as part of the project Environmental Management Plan.

Appendix 1: Site photographs

Site 293/488: windbreak shelter on seed gathering site

Site 293/488: storage cairn on seed gathering site, with hammer for scale

Site 293/493: hut feature on homestead site overlooking Ugab River

Site 293/496: Late pre-colonial burial cairn on silt terrace above Ugab River

Site 293/499: Two Christian graves on stream terrace above Ugab River

Site 293/ 518: recent burial sites (latest interment //Gaseb 2015)

Site 293/501: hut feature on artisanal tin mining site

Site 293/502: hut feature on artisanal tin mining site

Site 293/510: Typical artisanal tin ore dressing assemblage with deeply dimpled mortar (schist) and pestle (columnar basalt) at left. The pestle is held vertically.

Appendix 2: Chance Finds procedure

Areas of proposed development activity are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that Site s or items of heritage significance will be found in the course of development work. The procedure set out here covers the reporting and management of such finds.

Scope: The "chance finds" procedure covers the actions to be taken from the discovery of a heritage Site or item, to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

Compliance: The "chance finds" procedure is intended to ensure compliance with relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): *"a person who discovers any archaeological …. object ……must as soon as practicable report the discovery to the Council".* The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

Responsibility:

Operator	To exercise due caution if archaeological remains are found
Foreman	To secure Site and advise management timeously
Superintendent	To determine safe working boundary and request inspection
Archaeologist	To inspect, identify, advise management, and recover remains

Procedure:

Action by person identifying archaeological or heritage material

a) If operating machinery or equipment stop work

b) Identify the Site with flag tape

c) Determine GPS position if possible

d) Report findings to foreman

Action by foreman

a) Report findings, Site location and actions taken to superintendent

b) Cease any works in immediate vicinity

Action by superintendent

a) Visit Site and determine whether work can proceed without damage to findings

b) Determine and mark exclusion boundary

c) Site location and details to be added to project GIS for field confirmation by archaeologist

Action by archaeologist

a) Inspect Site and confirm addition to project GIS

b) Advise NHC and request written permission to remove findings from work area

c) Recovery, packaging and labelling of findings for transfer to National Museum

In the event of discovering human remains

a) Actions as above

b) Field inspection by archaeologist to confirm that remains are human

c) Advise and liaise with NHC and Police

d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.

APPENDIX 3

Archaeological Guidelines
for
Exploration & Mining
in the
Namib Desert

John Kinahan

SUMMARY

This handbook is intended to help exploration and mining projects to minimize their impact on the archaeology of the Namib Desert, a unique environment of global importance to the understanding of the human past. A short introduction to the National Heritage Act is followed by an overview of the archaeological evidence, and a description of the most sensitive elements of the archaeological landscape. With this background and a few principles of site management, it is possible to avoid inadvertent damage to archaeological sites. Also included is an outline of the basic standards for archaeological field survey and assessment that are most widely applied in the Namib.

An archaeological landscape in the southern Namib Desert: the basin or playa in the middle distance has dense shoreline scatters of late Pleistocene artefact debris, and the inselberge on the margins of the basin have densely clustered mid- to late Holocene settlement remains including hunting blinds, grave cairns, ritual sites and rock shelters with stratified archaeological deposits.

CONTENTS

Preface

Modern humans and their ancestors have lived in the Namib Desert for more than one million years, leaving a rich legacy of archaeological remains which lie scattered over the landscape. This is by far the longest archaeological record in all the deserts of the southern hemisphere, and it contains unique evidence of how humankind learned to cope with one of the most hostile environments on earth[8].

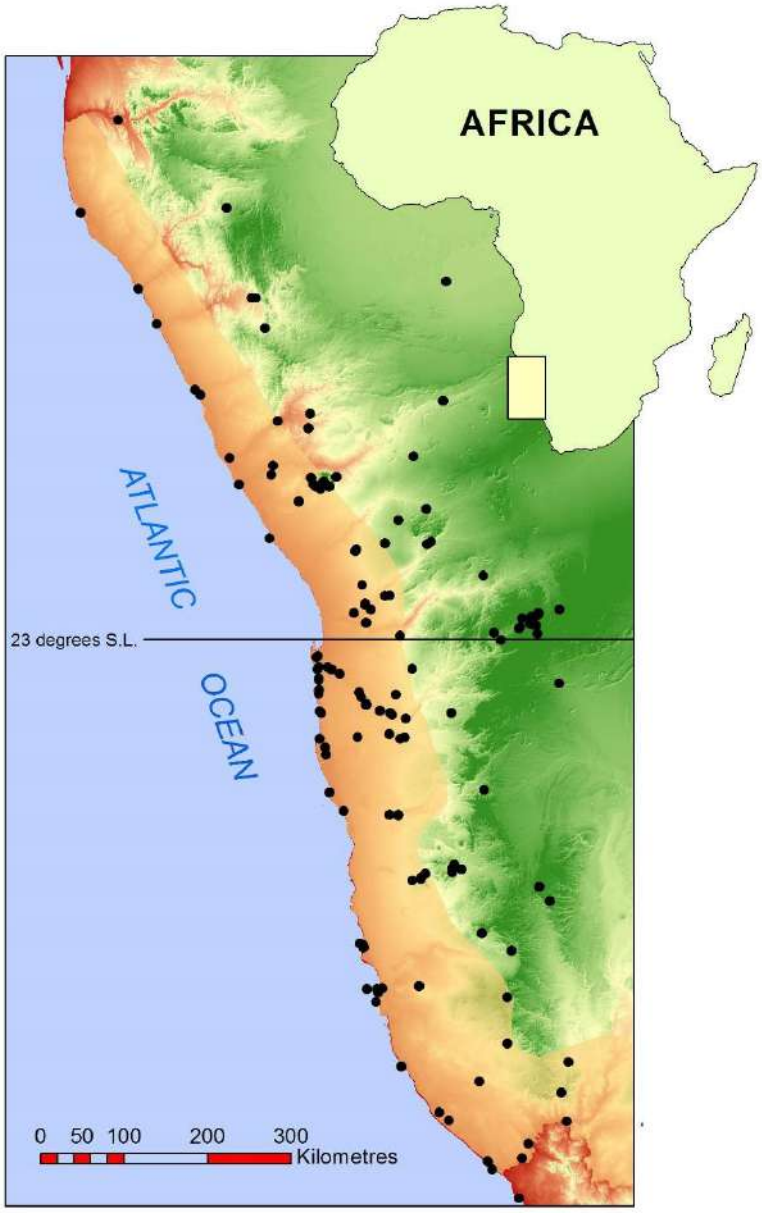
Indigenous communities, the descendants of people who lived in the Namib over thousands of years, still maintain important cultural links with the desert. Much of the Namib is enclosed by national parks and wildlife reserves, but this is no wilderness. Desert plants and animals, and the landscape itself, are an integral part of the cultural heritage of desert communities.

You and I are the most recent visitors to this extraordinary place, but our activities have the potential to cause it irreversible damage. If we do not proceed with caution and consideration, our legacy will be a wasteland of destruction. Of course one cannot build a mine, a road or a power-line without impact, but we can reduce this impact significantly by avoiding unnecessary damage.

It is important to realize that every archaeological site is part of a large and very complex puzzle. Damage to archaeological sites cannot be repaired, and the best way to avoid damaging them is to make sure by means of field survey and assessment, what sites lie in the path of a potential development. Only then is it possible to either conserve the sites or mitigate the impact of development.

This handbook contains simple guidelines for exploration and mining projects, as well as their associated infrastructure. It is based on the premise that we only see what we already know. If this publication helps the geologist, engineer or project manager to see and understand the archaeology of the desert, it may succeed where legislation and policy often fail.

[8] See Mitchell, P. 2002. *The archaeology of southern Africa.* Cambridge University Press, for a general introduction.



The Namib Desert forms a continuous strip 100-150km wide between the Atlantic coast and the escarpment. Here, the desert is shown in light brown, with the escarpment zone in shades of green. During the Last Glacial Maximum, ending approximately 10 000 years ago, the coastline lay up to 100km further west and the desert extended at least 400km into the interior. The black dots are dated archaeological sites.

1. First steps:
the law and best practice

Almost every country has some sort of legislation to protect its cultural heritage, and compliance with these laws is important for any exploration and mining operation. Most large mining companies also have their own cultural heritage policies and procedures to guide their operations and reduce the risk of damaging their reputation.

The principal instrument of legal protection for archaeological sites or remains in Namibia is the National Heritage Act (27 of 2004). Some incidental but nonetheless important protection is provided by the Environmental Management Act (7 of 2007) which includes man-made features in its definition of the environment. Other guidelines include those of the IFC (International Finance Corporation) and the ICMM (International Council on Mining and Metals).

A short guide to the National Heritage Act

The National Heritage Council of Namibia is a statutory body and its work is administered by a Secretariat, based in Windhoek and assisted by a number of specialist committees. All enquiries and applications for permits should be addressed to:

The Director

National Heritage Council

Private Bag 12043

Ausspannplatz

Windhoek

There are as yet no official regulations or guidelines to the Act for exploration and mining projects to consult. The following précis and commentary is intended to indicate and explain some important provisions of the Act. However, it is strongly recommended that exploration and mining project managers obtain legal advice especially with regard to permits.

PART I: In terms of the Act, "heritage" is restricted to places and objects, including those of archaeological, cultural, historical, scientific and social significance. The legislation does <u>not</u> address what is sometimes known as "intangible heritage", such as customs, beliefs and oral history.

The Act defines "archaeological" as *any remains of human habitation or occupation that are more than 50 years old found on or beneath the surface on land or in the sea*, and especially notes *rock art, being any form of painting, engraving or other representation on a fixed rock surface or loose rock or stone which is 50 or more years old.*

It is important to understand that legal protection can extend beyond the archaeological object or site, to include *the natural or existing condition or topography of land,* as well as the *trees, vegetation or topsoil.*

PART IV: The Council has the responsibility of establishing and maintaining the Namibian Heritage Register which records heritage places and objects. The register is defined as a public document, and project managers may inspect it to determine whether any protected sites lie within their exploration or mining lease area.

However, not all archaeological or other heritage sites qualify for listing in the register. Listing is subject to a prolonged process of approval based on the "heritage significance" of the object or site, and this ultimately involves publication of the site in the *Government Gazette.* Unless there is a listed site, or unless a previously unknown site of high significance comes to light, this part of the Act is of limited concern for exploration and mining projects.

PART V: Damage, disturbance and encroachment on protected sites is strictly prohibited. However, a permit may be granted in some circumstances, and the Council is also empowered to suspend protection of a listed site under some circumstances. This means that protected status is not irrevocable.

Before issuing a permit, the Council may require the applicant to *obtain from a person with appropriate professional qualifications or experience, at the applicant's expense, a statement as to the impact the proposed works and activities may have on the place or object to which the application relates and the risk of damage to the place or object.*

In view of the fact that large areas of Namibia, including much of the Namib Desert, are archaeologically unknown, the precautionary principle dictates that an archaeological survey and assessment should be carried out at an early stage in any large exploration and mining project. Most large mining companies will commission a field survey and assessment as a matter of course.

The Act stipulates that all archaeological assessment, including field surveys, is subject to permits issued by the National Heritage Council. This means that the archaeologist who carries out the survey must be appropriately qualified and in good standing with the authorities.

The appointment of an archaeologist is the prerogative of the project proponent. Best practice requires that the archaeologist should be independent of the National Heritage Council and all other national authorities.

PART VI: All archaeological objects are the property of the State. It is important to note that State ownership extends to all archaeological remains, known or unknown. This means that mining personnel and contractors need to be aware of the legal status of archaeological remains and their legal obligation to report the discovery of any new archaeological remains to the National Heritage Council.

Relevant provisions of the Environmental Management Act

PART I: The definition of the environment employed by the Environmental Management Act (7 of 2007) specifically includes “anthropogenic factors” such as archaeological remains or any other evidence of human activity.

PART II: Environmental impact assessment (EIA) in Namibia is governed by this legislation and usually includes a specialist archaeological survey and assessment, following the stated Principles of Environmental Management which require that *Namibia’s cultural…heritage…must be protected and respected for the benefit of present and future generations.*

In the process of environmental assessment set out in the regulations to the Act there are several stages of consultation, including public participation, preceding the issue of an environmental clearance certificate by the Environmental Commissioner. There is also provision for external review, and an appeal process in the event that environmental clearance is withheld.

Credible environmental assessment must be independent of both the project proponent and the national authority. For this reason environmental assessment, as well as archaeological assessment is not carried out by government institutions and should not include government scientists as specialist consultants.

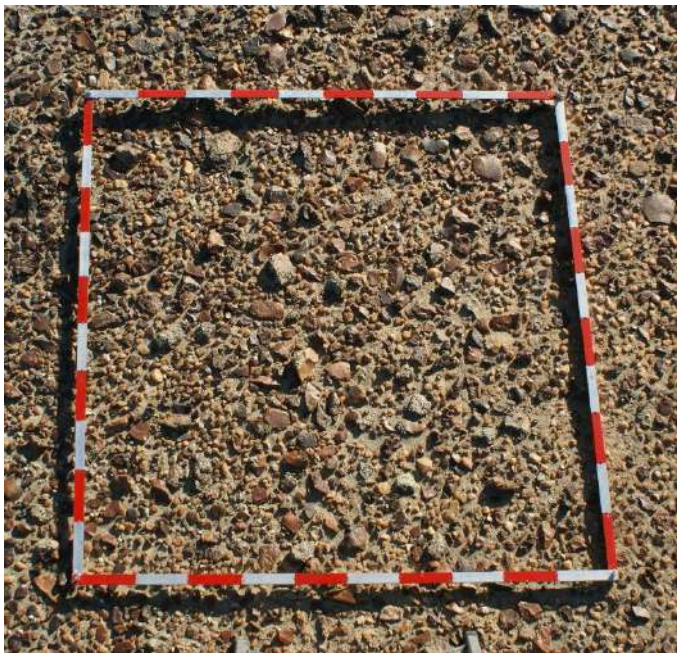
In addition:

The International Finance Corporation (IFC) has specific guidance notes and performance standards applicable to cultural heritage preservation. These standards refer to both tangible forms of cultural heritage, such as archaeological sites and objects, and intangible forms. The standards apply whether or not the archaeological material is protected, and irrespective of whether is may have been previously disturbed. To comply with these standards, a baseline survey and assessment is required.

There are general guidelines issued by the International Council on Mining and Metals (ICMM) and detailed cultural heritage management guidance notes issued by large corporations, for example, Rio Tinto (RT) and Santos. Where such guidelines indicate standards other than the laws of Namibia, their application is subject to group member standards. Best practice in Namibia directly benefits from mining companies with group standards and global experience.

2. Seeing things:
what the archaeological evidence looks like

Human occupation of the Namib Desert in the past was entirely dependent on prevailing climatic conditions, and the climate of the last one million years has been consistently arid, with short periods of higher than usual rainfall. Occupation was therefore sporadic, with long periods in which the desert was unoccupied. Evidence of human occupation is widespread, but thinly scattered. Interpretation of this archaeological record relies on piecing together a large number of fragile and subtle clues[9]. Some of these clues will be easily noticed by the observant field geologist, and noted as an indication that the area might have sensitive archaeological sites.



The most abundant traces of human occupation in the Namib Desert are stone artefacts. These are easily recognized as isolated finds and as surface scatters on the gravel plains of the Namib. Other less common traces include shell middens (usually within less than 5km of the coast), natural rock shelters with evidence of occupation, including rock art, and stone features such as hut circles, hunting blinds and grave cairns. Historical sites include cemeteries, old mine workings, and important traces of World War I military engagements. While some kinds of archaeological sites are highly visible (such as the larger grave cairns), their significance is not obvious. Most archaeological sites in the Namib are difficult for the untrained eye to recognize and most damage to the sites is therefore unintentional.

LEFT: A dense scatter of late Pleistocene artefact debris.

[9] See Deacon, J. and Lancaster, N. 1988. *Late Quaternary Palaeoenvironments of Southern Africa*. Oxford, Clarendon Press; and Kinahan, J. 2011. From the beginning: the archaeological evidence. In Wallace, M. and Kinahan, J. 2011. A History of Namibia. London, Hurst.

ABOVE: A late Pleistocene artefact workshop with chert core flakes and dolerite hammer-stone (pocket-knife for scale). The site is intact and undisturbed after approximately 120 000 years.

Identifying stone artefacts

Stone artefacts were made by removing flakes from a selected core, or block of raw material, using precise blows that leave unmistakeable evidence of human manufacture. Similar breakage patterns very rarely occur in nature. Over time, methods of artefact production became more sophisticated and the different techniques of flaking provide some indication of age[10].

MODE 1: Pebble tool (mid- to late Pleistocene, >500 000 years)

This well preserved example made in fine-grained quartzite was loosely cemented in a conglomerate exposed by recent collapse of a stream bank south of the Omaruru River.

MODE 2: Bifacial hand-axe (late Pleistocene, <500 000 years)

This highly symmetrical tool made in weathered basalt was an isolated surface find on an outwash fan east of Cape Cross. The artefact is 150mm in length.

MODE 3: Blade flake with terminal retouch (end Pleistocene <100 000 years)

This punch-struck blade is 60mm in length. Such artefacts form part of complex toolkits including heavy spear points. Dense scatters of debris are found near outcrops and large nodules of chert.

[10] The modal classification used here is based on Clark, J.D. 1969. *Kalambo Falls prehistoric site Volume 1: the geology, palaeoecology and detailed stratigraphy of the excavations.* Cambridge, Cambridge University Press; this approach is generally applied by Barham, L. and Mitchell, P. 2008. *The First Africans: African archaeology from the first toolmakers to most recent foragers*. Cambridge, Cambridge University Press.

MODE 4: Bladelet flake with slight edge retouch (mid- to late Holocene <5 000 years)

This artefact in crystalline quartz is 15mm in length. Flaking debris on recent Holocene sites is characterized by fragments less than 10mm in length but these are often visible in gravel float. These scatters often contain raw material brought from sources up to 50km away.

Typical stone features sites

Settlements and grave sites are significant and often highly visible features of the archaeological landscape in the Namib. Most of these sites are less than 1 000 years old and they often contain important material evidence of desert subsistence strategies. Grave sites may be construed as evidence of traditional land ownership.

ABOVE: Hut circle within hilltop settlement dated 250 years bp, with shallow archaeological trench on left. Significant soil phosphorus concentrations in such features indicate that they supported wooden frameworks plastered with domestic animal dung.

BELOW: Large grave cairn probably dating to within the last few centuries. These features are usually found isolated from settlement sites, on natural routes across the desert.

The recent past

Visible evidence of early links with the outside world has been found in the course of mining operations on the Namib coast, such as the ca1552AD wreck of the *Bom Jesus*, north of Oranjemund. The intensive trade that developed around Walvis Bay in the 1700s has also left abundant traces, and the desert interior has many sites which document early colonial penetration of the country. Such remains

are often overlooked, or mistaken for modern trash. Glass bottles and trade beads are one of the most enduring types of evidence found in the Namib. The characteristic square "case" gin bottles found in the Namib mostly originated from distilleries in the Netherlands. Early bottles were hand blown and exhibit tell-tale imperfections, while more recent bottles show evidence of technological advances in glass production. Such clues make it possible to accurately estimate the age of bottles, trade beads and other items.

ABOVE: Neck and shoulder fragment of a "case" gin bottle from the distillery of Henkes in Delfthaven, Netherlands, found on the 19th century cattle-droveing route or "Bay Road" across the central Namib. Such items help to identify the overnight camps used on this route.

LEFT: One side of an iron ox shoe from the central Namib. These were commonly used in the mid-19th century, before the German colonial period, when oxen, rather than horses, were preferred as riding animals. The oxen were shoed to cope with long-distance travel in the rocky terrain in the Namib. These items are valuable indicators of the early colonial presence in some remote parts of the desert.

ABOVE: Well preserved waste rock walling around the edges of adits at the late 19th century Annaberg tin mine, near Trekopje.

3. Sensitive places:
where impacts happen

Water was the main limiting factor for human occupation of the Namib, and the distribution of archaeological sites tends to reflect this. However, it is not possible to accurately predict where archaeological sites are likely to occur on this basis alone. The reasons are simple: the availability of water has changed over time and during moist periods people occupied areas that are otherwise dry. In the past, small groups of people could live for many weeks on water trapped in natural rock basins, or by digging for water in drainage lines.

There were other important requirements for human settlement, such as shelter; the availability of edible plants; the movement of game species, and the location of raw material outcrops for stone tool manufacture. Together with all of these considerations people in the Namib had also to deal with competing claims for the same resources: the Namib was a pantry, but it was also a neighbourhood, and archaeologists are interested in trying to understand both the social and the ecological dimensions of life in this environment.

An exploration geologist or project manager who is sensitive to the archaeology of the desert can do a great deal to reduce the impact of exploration and mining because many field surveys have shown that there are particular kinds of terrain that have high concentrations of archaeological sites. Although some kinds of terrain are less sensitive none can be definitively excluded.

Archaeological sites commonly occur in these locations:

OUTCROPS and INSELBERGE: Features ranging in size from minor isolated outcrops to massifs are often associated with archaeological sites because they usually have some surface water and other resources. In most cases, archaeological sites are found only on the foot-slopes of these features, especially where very large boulders provide shelter. These sites may have high concentrations of rock art and stratified occupation deposits.

Archaeological sites usually occur in association with smaller outcrops, often so small that they are not indicated on the regional geological mapping. Important outcrop settings for archaeological sites include: early Cretaceous granites, dolerite ridges and sedimentary formations such as the Twyfelfontein (formerly Etjo) sandstones, and localized occurrences of fine-grained quartzite, crystalline quartz and fine- or crypto-crystalline chert. Marble outcrops have relatively few archaeological sites.

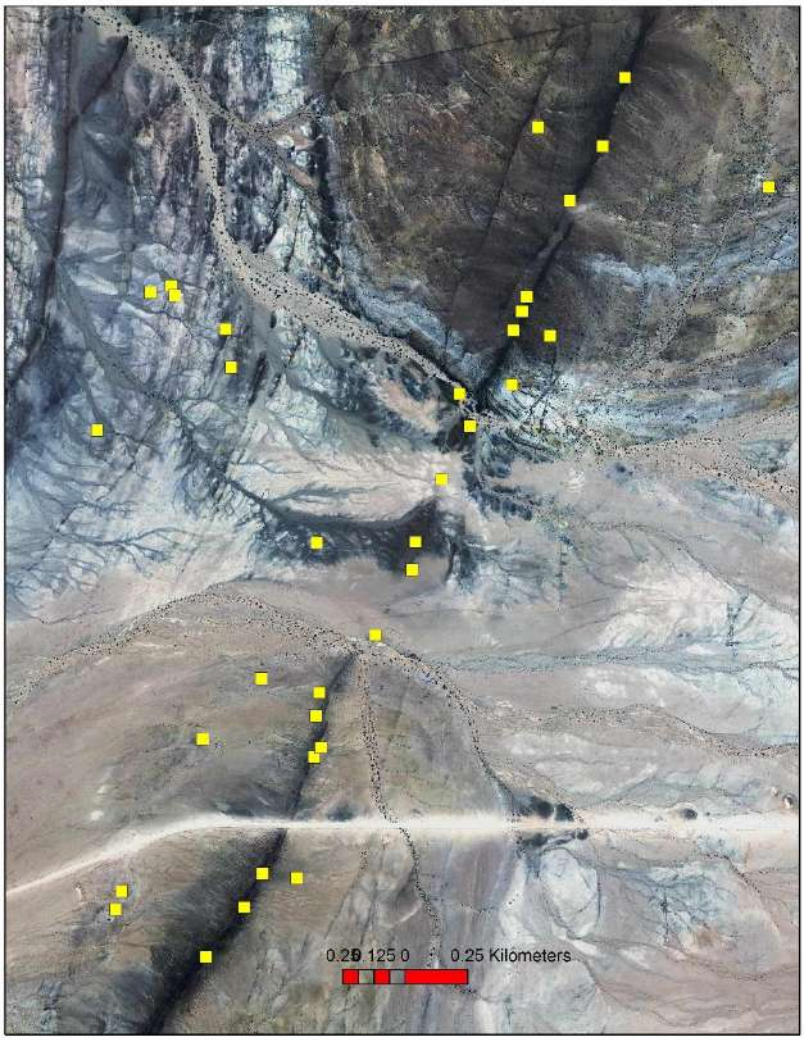
SADDLES: Natural routes between drainage basins often pass over low saddles. These locations sometimes have hut circle sites, grave cairns and, occasionally hunting blinds. Hill saddles with archaeological sites can be very minor terrain features, but the more significant examples are easily identified on topographic maps, aerial photographs and satellite imagery.

DRAINAGE LINES: River mouths on the Namib coast are invariably associated with shell middens and other archaeological remains. However, because most Namib drainage has a relatively steep gradient, high energy flooding results in extensive reworking of sediments. Outwash fans have

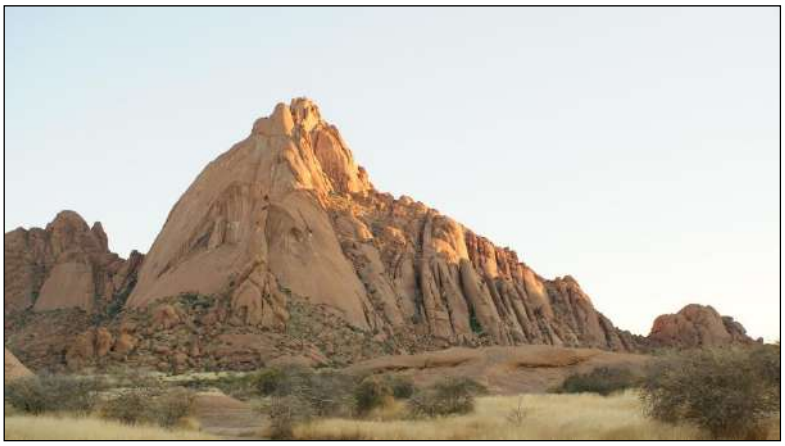
relatively few archaeological sites. Older river terraces and over-bank flood deposits provide level and elevated settings that often have archaeological sites.

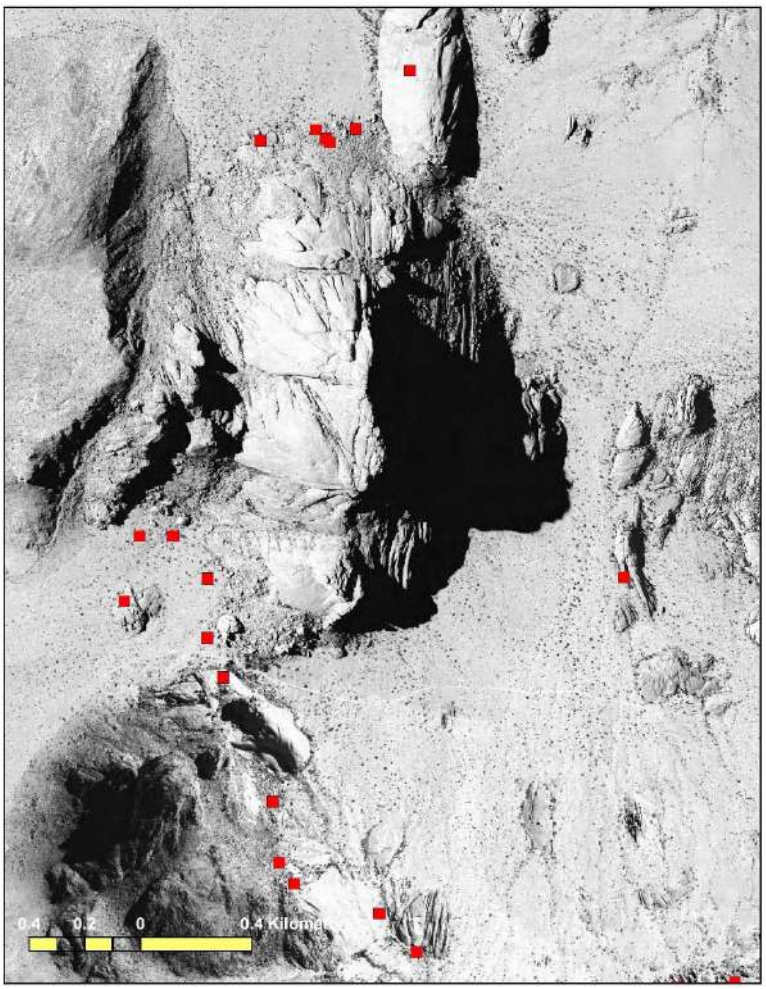
PANS: Pan-like drainage features in the Namib are subject to occasional flooding and may hold standing water for many weeks. Archaeological sites, mainly stone artefact scatters are commonly found on the strandlines of pans and up to 4km away, after which their density quickly declines. The lee-sides of stable dunes and small outcrops near pans have high archaeological concentrations, Saline pans have relatively few archaeological sites.

DUNEFIELDS and GRAVEL PLAINS: Coastal and near-coastal dunefields, especially those associated with exposed silt deposits (such as the Kuiseb) may have very high concentrations of archaeological sites within reach of water and other resources. Gravel plains in the Namib have highly stable features such as desert pavements, with well preserved and undisturbed artefact scatters.



ABOVE: Typical example showing the close association of archaeological sites with a minor dolerite ridge. The high ridge in the background of the photograph (top) has very few sites compared to the low ridge in the foreground and shown in the satellite image.





ABOVE: Archaeological sites associated with the prominent Spitzkuppe inselberg are primarily on the footslopes among large boulders. Most of the sites are within less than one kilometre of water seepages in the sheet joints of the granite, or rock hollows that retain water after rain.

4: Critical steps in exploration & mining

This chapter considers the archaeological impacts associated with mining activity, and how they might be avoided. Some measures are simple and carry no significant costs. Most impacts can be prevented by identifying archaeological sites in advance and avoiding them where possible. Adopting appropriate measures may save costs and delays, and will certainly enhance the reputation of the company as a responsible corporate citizen.

Relatively few exploration projects result in the development of a mine, but as far as destructive impacts on the archaeology of the Namib are concerned, exploration can result in a disproportionate amount of damage. Much of this damage can be avoided, and even if the project leads to the establishment of a mine it is possible to conserve key archaeological sites right through to the final closure of the mine. To achieve this, it is necessary to adopt key measures at each stage of the project.

Exploration

A pre-fieldwork archaeological assessment is a necessary precaution for exploration in the Namib. There is sufficient field survey data available to allow for an estimation of likely archaeological impacts, even if the exploration area itself has not been surveyed in detail. A pre-fieldwork assessment can form part of the environmental impact scoping study, but it can also be carried out independently to assist with practical planning of exploration fieldwork.

Some prior knowledge of likely archaeological impacts will provide valuable guidance for siting of field camps, access roads, lay-downs for contractors, fuel storage tank farms and various other facilities. The pre-fieldwork assessment can also identify high impact risk areas of the exploration tenement, such as the terrain features discussed in Chapter 3. The pre-fieldwork assessment can be a useful aid to exploration planning by helping to schedule field surveys of sensitive areas before exploration begins on the ground.

As soon as areas of likely archaeological impact have been identified, detailed field survey should be carried out. The elements of field survey are set out in Chapter 5, including data collection and the integration of archaeological spatial data into the exploration programme and area mapping. Here it is important to list the practical precautions required at the exploration stage of the project:

- Use existing access tracks as far as possible; signpost as private all tracks turning off from public roads; observe strict track discipline by employing verge markers, passing points, and clear demarcation at track junctions; avoid establishing new tracks parallel to gradient; rehabilitate redundant tracks for at least 100m from their junction with public roads.
- Field camps and other facilities should be established on archaeologically least sensitive surfaces, such as on drainage lines with naturally rehabilitating substrates. Where practical, temporary structures should be placed on pilings to reduce the development of a permanent footprint. All sensible precautions should be adopted for storage, waste disposal etc.
- All terrain features that are suspected to be archaeologically sensitive should be avoided until they have been surveyed in detail. For example, natural outcrop features should not be used to shelter camps or other facilities; terrain such as hill saddles, pan fringes and outcrop footslopes should be inspected on foot before being entered by vehicle. Highly sensitive sites may be designated as No-Go Areas (see Appendix).

- Personnel and contractors should be informed about the specific archaeological sensitivity of the exploration area, and the relevant terms of the National Heritage Act, through the application of a specific project archaeological management plan (AMP). As soon as baseline archaeological survey data are available these should be consulted on a continuous basis when planning access and exploration activities. Where new archaeological finds are located in the course of exploration, field personnel should observe the Chance Finds Procedure (see Appendix).

ABOVE: Drilling in progress on the central Namib gravel plains. This is an archaeologically sensitive surface and detailed survey should precede drilling.

Development and operation

Ideally, archaeological assessment and mitigation should be completed before development of the mine site commences. This is almost never the case, however, because the process of mine development can require multiple changes in design and layout – with possible implications for sensitive sites. Moreover, development requires infrastructure to link the mine with local road networks, as well as power and water supplies – again with possible implications for sensitive sites, both within and adjacent to the mine licence area. Even the most thorough field survey cannot exclude the possibility that new archaeological discoveries will be made in the course of mine development and operation. To accommodate these needs it is advisable for the mine to adopt a formal archaeological management plan at an early stage in the development process.

THE ARCHAEOLOGICAL MANAGEMENT PLAN (AMP): The purpose of an AMP is to ensure appropriate protection and preservation of archaeological sites through informed decision-making, in line with the law and best practice. The AMP should provide a framework in which management procedures are based on consistent standards and linked to expected outcomes. These procedures should serve as practical guidelines with clearly identified steps and responsibilities. To achieve this purpose, the AMP is accompanied by additional documentation including induction material for personnel and contractors, and detailed background information based on the results of the field survey carried out during the exploration phase.

The AMP should include the following elements:

- A baseline record of sites and remains protected in terms of the National Heritage Act
- A baseline record of mining activity (historical impacts) before and during present operations
- A management system with appropriate decision and risk assessment procedures
- Explicit measures to reduce impacts on known archaeological sites
- Procedures to secure approval for unavoidable disturbance of archaeological sites
- Procedures for the reporting of inadvertent disturbance of archaeological sites
- Measures to enlist the involvement of interested and affected parties in site conservation
- Consideration of indigenous communities' cultural rights in respect of archaeological sites

In principle, the AMP applies to all archaeological sites and remains found within the project licence area, and it applies to all personnel and contractors. It provides a practical means to manage site protection, using a functional and accessible database as a platform for risk management. The AMP is

integral to all land disturbance decision-making, and it provides a set of explicit management guidelines to deal with Chance Finds, and management of access to No-Go Areas (see Appendix).

SOME LANDSCAPE PRINCIPLES:

Landscape integrity is often neglected in the planning of mine infrastructure. Coordinated infrastructure planning should aim to minimize fragmentation of the landscape by establishing service corridors (roads, power-lines, pipelines &c), and consolidating infrastructure hubs (pump-stations, pipeline tee-offs, substations, road junctions) wherever possible.

In the Namib Desert surface rehabilitation by raking and other means has become a common practice in the final stages of exploration. This is a largely cosmetic practice, and its long-term benefit to the restoration of desert surfaces has to be weighed against the destructive effect on Pleistocene archaeological sites where raking merely propagates disturbance caused by vehicle tracks. It is therefore essential to integrate archaeological assessment with the rehabilitation programme.

Maintaining areas of archaeological value can provide an important and easily managed offset benefit within the mining licence area. This has obvious advantages: enclosed offset areas are easily managed by the mine because access is controlled; and such areas can provide important archaeological assets to assist the development of alternative land uses (e.g. tourism) after closure of the mine.

The archaeological record in the Namib Desert is a record of highly mobile and temporary settlement. To understand this record, archaeologists adopt a landscape perspective, combining evidence from many sites. Likewise, meaningful conservation of the Namib archaeological record requires a landscape approach, achieved by minimizing fragmentation, especially around areas of especially high significance.

TWO FURTHER POINTS TO REMEMBER: Mining operations, past and present, are part of the archaeological record of human activity in the Namib. It is historical nonsense to attempt to erase this imprint entirely. The remains of mining activity are not only an integral part of the “memory” of the desert landscape, they also provide a valuable physical demonstration of how the desert responds to disturbance and how the scars of human impact persist or vanish over time and under natural conditions. Such demonstration material will become more valuable in future, as impacts and management challenges accumulate. We all know that in physical terms the Namib has a very long memory; it is as well to consider what the legacy of our mining operations will be, and act thoughtfully.

The responsibility of mining companies to the conservation of Namib Desert archaeology extends beyond the mine site, the licence area and related infrastructure. Corporate responsibility and best practice require that mining companies also consider the impact of their personnel in the pursuit of recreation. It makes no sense to scrupulously observe archaeological conservation principles on site and ignore them elsewhere. Archaeological tourism, especially to coastal sites and inland rock art sites is increasingly popular. Mine personnel should consider the impact of uncontrolled archaeological tourism. Recreational use of archaeological sites requires a permit from the National Heritage Council. Tourism operators, both community-based and private should have such permits: *if in doubt ask your tour operator to produce his permit.*

ABOVE: There are many traces of historical exploration and mining enterprises in the Namib Desert. In some cases these may be considered as important cultural heritage assets because there are few written records and few people left to tell us anything about life on small remote mines.

5: Standards
for archaeological survey & assessment

In the absence of official regulations under the National Heritage Act, archaeological assessment in Namibia follows appropriate international best practice. The assessment process, set out in the flow diagram overleaf is based on a conventional three phase approach: a Phase 1 evaluation, usually a desk assessment; a Phase 2 site assessment involving detailed field survey, impact assessment and limited testing; and a Phase 3 mitigation programme, if required. Sometimes Phases 1 and 2 are combined, but Phase 3 is generally separate because it requires prior approval of mitigation measures.

The following notes are not intended as a manual of survey and assessment, but as a guide to the mining company or project proponent as to what the archaeological services to the project might include:

Basic survey requirements

The National Heritage Act stipulates that archaeological assessment should be carried out by a person with appropriate qualifications and experience. The mining company, or project proponent, may appoint an archaeologist of their own choosing. All archaeological fieldwork is however subject to permits issued by the Heritage Council.

Since the Phase 1 evaluation is usually based on literature and database sources, it is very important that the consulting archaeologist has a detailed familiarity with current knowledge and research directions in southern African archaeology. Phase 2 field survey and assessment will require a more detailed familiarity with Namibian archaeology although this is not a prerequisite. Phase 3 is based on mitigation measures approved by the Heritage Council and could be carried out by an archaeologist without local experience.

Best practice requires not only that archaeological survey and assessment should observe legal provisions and standards set out by company guidelines and lending institutions: they should also reflect acceptable standards of archaeological research. This means that the investigation should be based on an explicit methodology; employ standard techniques of field documentation; and provide an assessment that is well founded both in the field evidence presented and in the context of available knowledge.

Archaeological survey and assessment should consider the potential research value of a site, or what is sometimes referred to as the “knowledge dividend”. Conserving a particular site may have a high potential dividend for future research, and this should be taken into account, as would be the potential loss of dividend if the site is damaged or destroyed.

Field methods

Mineral exploration tenements (EPLs) are often very extensive, in excess of 500km^2. Archaeological survey should therefore reflect both the archaeology of the tenement, and place appropriate emphasis on areas of exploration interest. It should therefore be an informed survey in the sense that it considers the terrain context of the archaeology, thus allowing some extrapolation from representative sample

areas, and at the same time provide detailed knowledge of areas likely to be affected by exploration. Effective field survey is designed to be representative, informative, and practically feasible.

Some field reconnaissance is helpful in selecting terrain units for survey. The survey itself may be based on transects, random or stratified quadrats, whichever seems appropriate. Site locations should be established by hand-held GPS and plotted in the field on the standard topographic map scale (1: 50 000). The physical setting of the site must be noted, i.e. terrain type, prevailing geology and soil, vegetation cover; the type of site should be noted, i.e. surface scatter, stone feature, rock shelter; the site dimensions should be measured or estimated.

Field survey should include a provisional estimate of the site age, based on characteristic archaeological associations, and a field inventory of the archaeological evidence observed. Any samples collected for identification or analysis should be properly bagged and labelled. All field collecting is subject to permits issued by the National Heritage Council. The site should be photographed if appropriate, both close-up and in context, noting orientation. Further notes and sketches may be added as an aid to interpretation and as a record of any historical site disturbance.

Assessment

Field experience in Namibia has lead to the development of an assessment methodology based on two separate, parallel scales of archaeological *significance* and archaeological *vulnerability*. The two scales consist of interval values from zero to five, and allow the significance of the archaeological site to be considered separately from its vulnerability to disturbance resulting from the project under assessment. Thus sensitivity can be represented as a numerical value based on significance and vulnerability. For example, a site of very high significance that is not vulnerable will have a lower sensitivity value than one that is vulnerable, according to the values assigned on the separate scales. Sensitivity values generated in this way can be adjusted according to project design and brought, though mitigation, to an acceptable level. Note that both significance and vulnerability ranking can change: assessment is subjective and the judgement of the archaeologist may be mistaken or fail to anticipate the future significance of any one find or site.

SIGNIFICANCE RANKING:

0 no archaeological significance

1 disturbed or secondary context, without diagnostic material

2 isolated minor find in undisturbed primary context, with diagnostic material

3 archaeological site forming part of an identifiable local distribution or group

4 multi-component site, or central site with high research potential

5 major archaeological site containing unique evidence of high regional significance

VULNERABILITY RANKING:

0 not vulnerable

1 no threat posed by current or proposed development activities

2 low or indirect threat from possible consequences of development (e.g. soil erosion)

3 probable threat from inadvertent disturbance due to proximity of development

4 high likelihood of partial disturbance or destruction due to close proximity of development

5 direct and certain threat of major disturbance or total destruction

Mitigation

Archaeological mitigation consists in the reduction of a potential threat of destruction, either by timely intervention in the planning and execution of exploration and mining work, to avoid needless impacts, or by investigation or documentation of the site to a sufficient level of detail that its loss or destruction is in some way compensated by the existence of adequate records.

Archaeological survey and assessment will identify the sites and risks of impact that form the basis of a mitigation plan. The mitigation plan submitted to the National Heritage Council must provide sufficient detail for the Council to independently assess the significance of the site and the adequacy of the proposed mitigation measures.

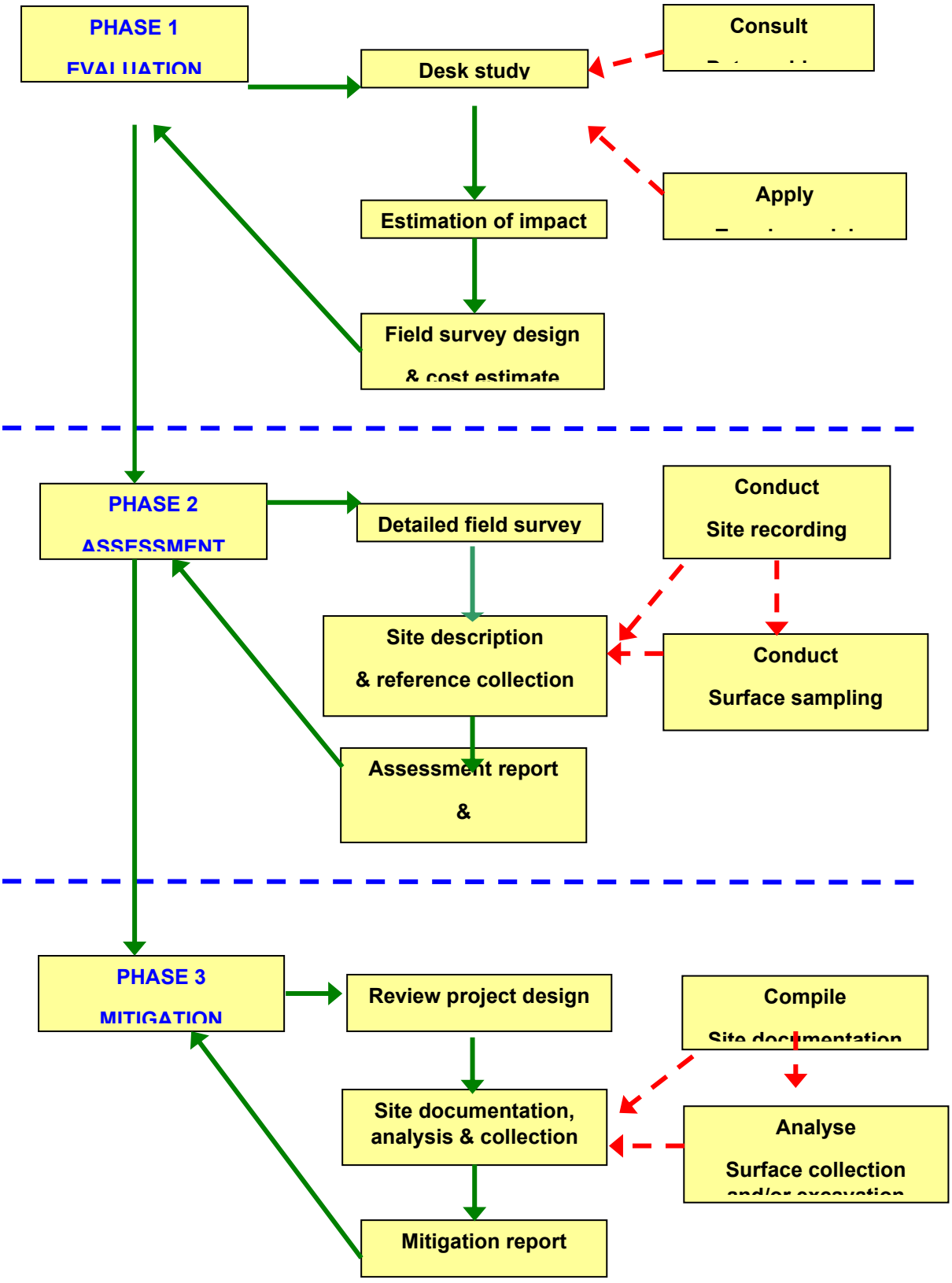
Damage or destruction of an archaeological site is subject to a permit issued by the National Heritage Council. The archaeological survey and assessment process can minimize or even avoid such impacts. In the form of an Archaeological Management Plan (AMP) the results of the survey and assessment will help to minimize or avoid destructive impacts during the operational life of the mine.

Reporting

The structure and layout of archaeological reports may be subject to standard company report templates, but the report should provide a detailed and systematic account of the investigation, with the evidential basis of all inferences clearly set out. The report should be accompanied by digital GIS files including field GPS data, spatial files with attribute tables for the sites, and other files such as sensitivity maps generated from the field survey data.

All reporting of archaeological survey, assessment and mitigation work is the confidential property of the project proponent. In some circumstances, such as mitigation, the National Heritage Council may request part of the investigation results. It is important to note that the project or mine will be the effective custodian of archaeological sites on its lease or licence area. It is therefore very important to consider the vulnerability of archaeological sites and strictly control the distribution of survey data. Site location data should be degraded to a maximum precision of 2.5km before being made available to other parties.

BELOW: Flow diagram illustrating the three phase process of archaeological assessment and mitigation in Namibia. The sequence of steps is indicated with green arrows, and the flow of information from the investigation is shown with dashed red arrows.

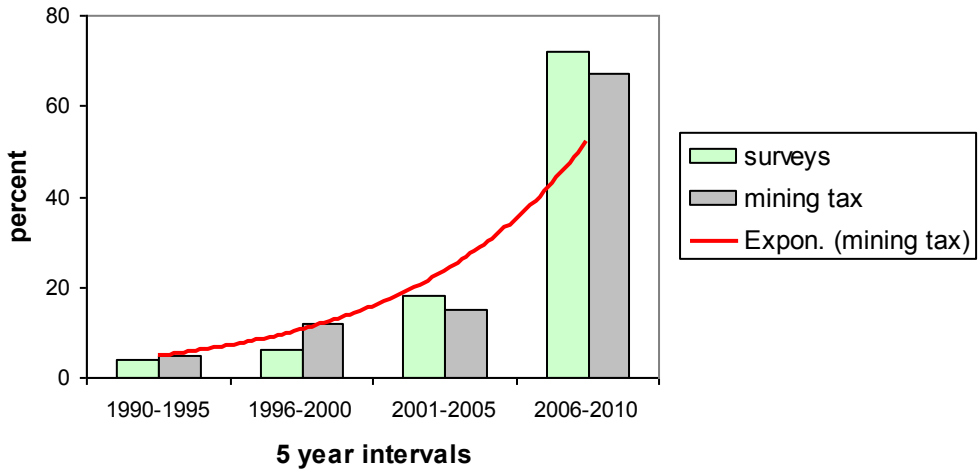

PHASE 1
Consult
Desk study
Estimation of impact
Apply
Field survey design
PHASE 2
Detailed field survey
Conduct
Site recording
Site description
& reference collection
Conduct
Surface sampling
Assessment report
&
PHASE 3
Review project design
Compile
Site documentation,
analysis & collection
Analyse
Surface collection
Mitigation report

6: In the public eye

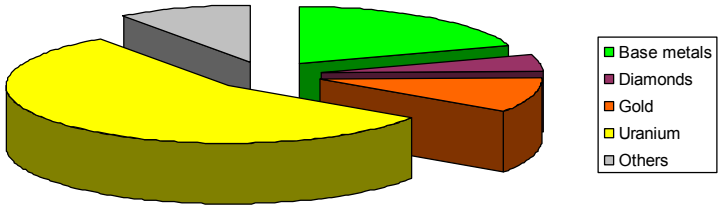
archaeology and the image of the mining industry

During the last two decades, exploration and mining in the Namib Desert have gone well beyond mere compliance with the law, to make a major contribution to furthering archaeological knowledge. On the basis of the accumulated record of archaeological survey from this period, the Namib is among the most intensively surveyed desert regions of the world. However, since nearly all of this survey cover is the result of exploration assessments, it is still patchy and much ground remains to be covered.

There is almost no official funding of archaeological research in Namibia, and survey results from mining and other project assessments represent the largest contributor to field research. The diagram below illustrates the proportionate increase in archaeological survey since Namibian independence, compared to the proportionate increase in taxable mining revenues (non diamond) as an illustration of the growth of archaeological survey in Namibia.

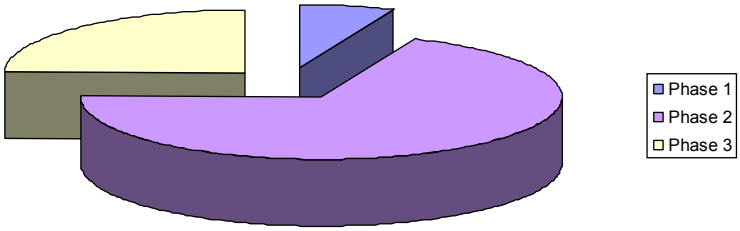


As reflects the general profile of exploration and mining in the Namib Desert, most archaeological surveys (55%) were carried out for uranium projects, followed by base metals (19%), with diamonds, gold and other projects such as dimension stone featuring less prominently. This pattern is likely to change as uranium projects enter the operational stage and exploration for other resources continues.



ABOVE: Relative importance of mining resources to archaeological survey and assessment in the Namib Desert.

The three phases of archaeological survey and assessment are clearly reflected in the record of exploration and mining in the Namib during this period. Phase 1 evaluation, or desk assessment, accounts for a relatively small proportion of archaeological investigation (7%). This may be related to the fact that uranium projects, as the dominant exploration field, combined the Phase 1 and Phase 2 stages in order to establish reliable baseline data. Thus, Phase 2 investigations account for 68% of the total. The fact that Phase 3 mitigation accounts for 25% of the total may reflect the advanced stage of development in a number of uranium projects.



ABOVE: Percentage distribution of archaeological survey and assessment phases in Namib Desert exploration and mining projects.

These simple statistics show that archaeological survey and assessment is an increasingly integral part of exploration and mining in the Namib, that archaeological investigations reflect the general resource profile of the industry in this part of the country, and that most projects accommodate the three phase sequence of archaeological evaluation, assessment and mitigation discussed here.

Beyond compliance with legal and policy requirements there are many opportunities for mining companies to make a contribution to archaeological conservation and education in Namibia. Some sites are suitable for small-scale tourism and could generate local employment and income; others may be used for school or university groups. There is also a need for informative and modern museum exhibitions on the subject of Namib Desert archaeology, and there is a ready demand for both popular and scientific publications on the subject. As mining in the Namib enters a more mature stage in its history it would be appropriate to consider some of these options.

The Namib Desert Archaeological Survey

In the last five years the Namibia Archaeological Trust (est. 1991) has launched a major project to maximize the research potential of archaeological survey and assessment results from the Namib. This project, the Namib Desert Archaeological Survey **http://antiquity.ac.uk/projgall/kinahan325/** has collated all available data to create a common spatial platform; collated all available radiocarbon dating results to provide a single integrated sequence; and adopted uniform standards of site and terrain description to aid regional scale comparative research. The results of the project will appear as a series of research publications, handbooks, and on-line data resources. Some of these are already available at **www.archaeologynamibia.com** The Namib Desert Archaeological Survey would welcome direct support from the mining sector to help it realize some of these goals.

RESOURCES

Namibian legislation

National Heritage Act (27 of 2004) Government Notice 287 29th December 2004

www.archaeologynamibia.com

Environmental Management Act (7 of 2007) Government Notice 232 27th December 2007

www.archaeologynamibia.com

Commencement of the Environmental Management Act, 2007. Government Notice 28 6th February 2012-04-27

www.archaeologynamibia.com

List of activities that may not be undertaken without Environmental Management Certificate: Environmental Management Act, 2007. Government Notice 29 6th February 2012-04-27

www.archaeologynamibia.com

Environmental Impact Assessment Regulations: Environmental Management Act, 2007. Government Notice 30 6 February 2012

www.archaeologynamibia.com

Baseline assessment

Strategic Environmental Assessment for the central Namib Uranium Rush (2011) Windhoek, Ministry of Mines and Energy, prepared by the Southern African Institute for Environmental Assessment

http://www.saiea.com/uranium/index.html

Cumulative effects analysis: Archaeology

http://www.saiea.com/uranium/24Chap7_8March2011.pdf

International conventions & guidelines

Convention concerning the protection of the world cultural and natural heritage. UNESCO 1972.
www.unesco.org

Cultural heritage management guidance: Rio Tinto Community relations guidance note. Rio Tinto 2007

www.riotinto.com

Good practice guide: Indigenous peoples and mining, ICMM (International Council on Mining & Metals) 2010

www.icmm.com

Guidance note 8: Cultural heritage. IFC (International Finance Corporation) 2007

www.ifc.org

Procedure for the Management of Indigenous Cultural Heritage Sites. Santos Ltd 2007

www.santos.com

Archaeological resources and links

The Namibia Archaeological Trust

www.archaeologynamibia.com

APPENDIX E – BIODIVERSITY TABLES

Group	Species	Common Name	NCO	CITES	IUCN	IUCN LINK
Mammal	*Acinonyx jubatus*	Cheetah	Schedule 4: Protected Game	Appendix I	Vulnerable	https://www.iucnredlist.org/species/219/50649567
Mammal	*Caracal caracal*	Caracal		Appendix II	Least Concern	https://www.iucnredlist.org/species/3847/102424310
Mammal	*Equus zebra*	Mountain Zebra	Schedule 3: Specially Protected Game	Appendix II	Vulnerable	https://www.iucnredlist.org/species/7960/160755590
Mammal	*Felis silvestris*	African Wild Cat		Appendix II	Least Concern	https://www.iucnredlist.org/species/60354712/50652361
Mammal	*Giraffa camelopardalis*	Giraffe	Schedule 3: Specially Protected Game	Appendix II	Vulnerable	https://www.iucnredlist.org/species/9194/136266699
Mammal	*Loxodonta africana*	Elephant	Schedule 3: Specially Protected Game	Appendix II	Endangered	https://www.iucnredlist.org/species/181008073/181022663
Mammal	*Madoqua kirkii*	Kirk's dik-dik	Schedule 4: Protected Game		Least Concern	https://www.iucnredlist.org/species/12670/50190709
Mammal	*Mellivora capensis*	Honey Badger	Schedule 4: Protected Game		Least Concern	https://www.iucnredlist.org/species/41629/45210107
Mammal	*Oreotragus oreotragus*	Klipspringer	Schedule 3: Specially Protected Game		Least Concern	https://www.iucnredlist.org/species/15485/50191264
Mammal	*Orycteropus afer*	Antbear	Schedule 4: Protected Game		Least Concern	https://www.iucnredlist.org/species/41504/21286437
Mammal	*Otocyon megalotis*	Bat-eared fox	Schedule 4: Protected Game		Least Concern	https://www.iucnredlist.org/species/15642/46123809
Mammal	*Panthera leo*	Lion		Appendix II	Vulnerable	https://www.iucnredlist.org/species/15951/115130419
Mammal	*Panthera pardus*	Leopard	Schedule 4: Protected Game	Appendix I	Vulnerable	https://www.iucnredlist.org/species/15954/163991139

Group	Species	Common Name	NCO	CITES	IUCN	IUCN LINK
Mammal	*Proteles cristata*	Aardwolf	Schedule 4: Protected Game		Least Concern	https://www.iucnredlist.org/species/18372/45195681
Mammal	*Raphicerus campestris*	Steenbok	Schedule 4: Protected Game		Least Concern	https://www.iucnredlist.org/species/19308/50193533
Mammal	*Sylvicapra grimmia*	Common Duiker	Schedule 4: Protected Game		Least Concern	https://www.iucnredlist.org/species/21203/50194717
Mammal	*Parahyaena brunnea*	Brown Hyaena			Near Threatened	https://www.iucnredlist.org/species/10276/82344448
Mammal	*Diceros bicornis*	Black Rhino	Schedule 3: Specially Protected Game	Appendix I	Critically Endangered	https://www.iucnredlist.org/species/6557/152728945

Group	Species	Common Name	NCO	MRA	CITES	IUCN	IUCN LINK
Bird	*Amaurornis flavirostris*	Black Crake	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22692643/93362623
Bird	*Aquila rapax*	Tawny Eagle	Schedule 4: Protected Game		Appendix II	Vulnerable	https://www.iucnredlist.org/species/22696033/131671001
Bird	*Aquila verreauxii*	Verreauxs' Eagle	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22696067/95221980
Bird	*Aquila spilogaster*	African Hawk-Eagle	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22696084/93543538
Bird	*Ardeotis kori*	Kori Bustard	Schedule 4: Protected Game		Appendix II	Near Threatened	https://www.iucnredlist.org/species/22691928/93329549
Bird	*Bubo africanus*	Spotted Eagle-owl	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/61741628/155475138
Bird	*Bubo capensis*	Cape Eagle-owl	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22688944/93212047
Bird	*Buteo augur*	Augur Buzzard	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22732019/95040751
Bird	*Actitis hypoleucos*	Common Sandpiper	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22693264/86678952
Bird	*Elanus caeruleus*	Black-shouldered Kite	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22695028/152521997
Bird	*Eupodotis rueppellii*	Rüppell's Korhaan	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22691980/93331758
Bird	*Falco biarmicus*	Lanner Falcon	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22696487/93567240
Bird	*Falco naumanni*	Lesser Kestrel	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22696357/131938109
Bird	*Falco peregrinus*	Peregrine Falcon	Schedule 4: Protected Game		Appendix I	Least Concern	https://www.iucnredlist.org/species/45354964/155500538

Group	Species	Common Name	NCO	MRA	CITES	IUCN	IUCN LINK
Bird	*Falco rupicoloides*	Greater Kestrel	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22696398/93559628
Bird	*Falco vespertinus*	Red-footed Falcon	Schedule 4: Protected Game		Appendix II	Near Threatened	https://www.iucnredlist.org/species/22696432/131939286
Bird	*Melierax canorus*	Pale Chanting Goshawk	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22695438/93509749
Bird	*Melierax gabar*	Gabar Goshawk	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22695445/93509960
Bird	*Neotis ludwigii*	Ludwig's Bustard	Schedule 4: Protected Game		Appendix II	Endangered	https://www.iucnredlist.org/species/22691910/129456278
Bird	*Pandion haliaetus*	Osprey	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22694938/155519951
Bird	*Glaucidium perlatum*	Pearl-spotted Owlet	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22689203/93222668
Bird	*Polemaetus bellicosus*	Martial Eagle	Schedule 4: Protected Game		Appendix II	Endangered	https://www.iucnredlist.org/species/22696116/172287822
Bird	*Circus maurus*	Black Harrier	Schedule 4: Protected Game		Appendix II	Endangered	https://www.iucnredlist.org/species/22695379/118433168
Bird	*Circus macrourus*	Pallid Harrier	Schedule 4: Protected Game		Appendix II	Near Threatened	https://www.iucnredlist.org/species/22695396/132304131
Bird	*Ptilopsis granti*	Southern White-faced Scops-Owl	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/61781923/95180220
Bird	*Sagittarius serpentarius*	Secretarybird	Schedule 4: Protected Game		Appendix II	Endangered	https://www.iucnredlist.org/species/22696221/173647556
Bird	*Torgos tracheliotos*	Lappet-faced Vulture	Schedule 4: Protected Game		Appendix II	Endangered	https://www.iucnredlist.org/species/22695238/155542069
Bird	*Gyps africanus*	White-backed Vulture	Schedule 4: Protected Game		Appendix II	Critically Endangered	https://www.iucnredlist.org/species/22695189/126667006

Group	Species	Common Name	NCO	MRA	CITES	IUCN	IUCN LINK
Bird	*Tringa glareola*	Wood Sandpiper	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22693247/86689640
Bird	*Pelecanus onocrotalus*	Great White Pelican	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22697590/132595920
Bird	*Tachybaptus ruficollis*	Dabchick	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22696545/155540155
Bird	*Fulica cristata*	Red-knobbed Coot	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22692907/89656879
Bird	*Gallinula chloropus*	Common Moorhen	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/62120190/155506651
Bird	*Tadorna cana*	South African Shelduck	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22680007/92838539
Bird	*Netta erythrophthalma*	Southern Pochard	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22680354/92857172
Bird	*Oxyura maccoa*	Maccoa Duck	Schedule 4: Protected Game	Protected Species		Vulnerable	https://www.iucnredlist.org/species/22679820/119397766
Bird	*Sternula balaenarum*	Damara Tern	Schedule 4: Protected Game	Protected Species		Vulnerable	https://www.iucnredlist.org/species/22694699/132568552
Bird	*Anas capensis*	Cape Teal		Protected Species		Least Concern	https://www.iucnredlist.org/species/22680145/92846056
Bird	*Anas erythrorhyncha*	Red-billed Teal	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22680290/92854310
Bird	*Anas hottentota*	Hottentot Teal		Protected Species		Least Concern	https://www.iucnredlist.org/species/22680332/92856138
Bird	*Ardea cinerea*	Grey Heron	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22696993/154525233
Bird	*Ardea melanocephala*	Black-headed Heron	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22697008/93598165

Group	Species	Common Name	NCO	MRA	CITES	IUCN	IUCN LINK
Bird	*Egretta garzetta*	Little Egret	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/62774969/86473701
Bird	*Bubulcus ibis*	Cattle Egret	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22697109/155477521
Bird	*Ardeola ralloides*	Squacco Heron	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22697123/131940696
Bird	*Scopus umbretta*	Hamerkop	Schedule 4: Protected Game			Least Concern	https://www.iucnredlist.org/species/22697356/93610351
Bird	*Limosa lapponica*	Bar-tailed Godwit	Schedule 4: Protected Game	Protected Species		Near Threatened	https://www.iucnredlist.org/species/22693158/111221714
Bird	*Ciconia nigra*	Black Stork	Schedule 4: Protected Game		Appendix II	Least Concern	https://www.iucnredlist.org/species/22697669/111747857
Bird	*Ciconia abdimii*	Abdim's Stork	Schedule 4: Protected Game			Least Concern	https://www.iucnredlist.org/species/22697673/93629659
Bird	*Phoenicopterus minor*	Lesser Flamingo	Schedule 4: Protected Game	Protected Species		Near Threatened	https://www.iucnredlist.org/species/22697369/129912906
Bird	*Phoenicopterus ruber*	Greater Flamingo	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22697360/155527405
Bird	*Himantopus himantopus*	Black-winged Stilt	Schedule 4: Protected Game	Protected Species		Least Concern	https://www.iucnredlist.org/species/22727969/155440465
Bird	*Struthio camelus*	Common Ostrich	Schedule 4: Protected Game			Least Concern	https://www.iucnredlist.org/species/45020636/132189458

Group	Species	Common Name	NCO	FA	CITES	IUCN	Biodiversity.org.na
Plant	*Adenia pechuelii*	Elephants-foot		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=2144
Plant	*Cyphostemma currorii*	Kobas	Schedule 9: Protected Plants.	Protected Plant Species			http://biodiversity.org.na/taxondisplay.php?nr=4579
Plant	*Euphorbia virosa*	Candelabra Euphorbia			Appendix II		http://biodiversity.org.na/taxondisplay.php?nr=4197
Plant	*Euphorbia damarana*	Damara Euphorbia			Appendix II		http://biodiversity.org.na/taxondisplay.php?nr=4189
Plant	*Acacia erioloba*	Camel thorn		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=3016
Plant	*Moringa ovalifolia*	phantom tree	Schedule 9: Protected Plants.	Protected Plant Species			http://biodiversity.org.na/taxondisplay.php?nr=2815
Plant	*Boscia albitrunca*	Shepherd's Tree		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=2528
Plant	*Ficus sycomorus*	Sycamore Fig		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=2473
Plant	*Aloidendron dichotomum*	Quiver tree	Schedule 9: Protected Plants.	Protected Plant Species	Appendix II		http://biodiversity.org.na/taxondisplay.php?nr=15947
Plant	*Welwitschia mirabilis*	Welwitschia	Schedule 9: Protected Plants.	Protected Plant Species	Appendix II		http://biodiversity.org.na/taxondisplay.php?nr=2427
Plant	*Acacia Montis-usti*	Brandberg acacia		Protected Plant Species		Near Threatened	http://biodiversity.org.na/taxondisplay.php?nr=2141
Plant	*Faidherbia albida*	ana tree		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=3010
Plant	*Colophospermum mopane*	mopane		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=3112

Group	Species	Common Name	NCO	FA	CITES	IUCN	Biodiversity.org.na
Plant	*Tamarix usneoides*	Wild Tamarisk		Protected Plant Species			http://biodiversity.org.na/taxondisplay.php?nr=4221
Plant	*Parkinsonia africana*	green-hair tree		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=3023
Plant	*Euphorbia guerichiana*	paper-bark euphorbia			Appendix II	Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=4193
Plant	*Ozoroa crassinervia*	Namibian resin-tree		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=4206
Plant	*Sterculia africana*	African star-chestnut		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=4705
Plant	*Sterculia quinqueloba*	Large-leaved sterculia		Protected Plant Species			http://biodiversity.org.na/taxondisplay.php?nr=5617
Plant	*Maerua schinzii*	Ringwood Tree		Protected Plant Species		Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=2809
Plant	*Genus Aloe*						http://biodiversity.org.na/taxondisplay.php?nr=2152
Plant	*Aloe littoralis*	Windhoek Aloe	Schedule 9: Protected Plants.		Appendix II	Least Concern	http://biodiversity.org.na/taxondisplay.php?nr=2169

REFERENCES (USED FOR THE DEVELOPMENT OF THE TABLES):

IUCN 2021. The IUCN Red List of Threatened Species. Version 2021-1. https://www.iucnredlist.org. Downloaded on [20 05 2021].

Irish, J. (2021). Namibia Biodiversity Database. [online] Namibia Biodiversity Database. Available at: http://biodiversity.org.na/index.php [Accessed 20 May 2021].

Mannheimer, C., Curtis, B., Piet Le Roux, M A N Müller and Mick Müller (2009). Le Roux and Müller's field guide to the trees & shrubs of Namibia. Windhoek: Macmillan Education Namibia.

Stuart, C. and Stuart, M. (2015). Stuarts' field guide to mammals of southern Africa, including Angola, Zambia & Malawi. Cape Town: Struik Nature.

Ulrich Oberprieler and Burger Cillié (2008). The bird guide of Southern Africa. Pretoria: Game Parks Publishing.

SPECIES	ENDEMISM	OCCURRENCE	PROTECTED
Petalidium variabile (Engl.) C.B.Clarke var. spectabile Mildbr.	Endemic	Indigenous	Not Protected

SPECIES	PLANTDESC	LOCNOTES	HABITATTXT	QDS
Petalidium variabile (Engl.) C.B.Clarke var. spectabile Mildbr.	Spherical shrubs with white bark, up to 0.50 m high and 0.60-0.70 m in diameter, often small. Leaves silver-grey.	River in red Torro coming from Brandberg, west of Brandberg West Mine.	Growing in dry river/streambed.	2013DD

SPECIES	PLANTDESC	LOCNOTES	HABITATTXT	QDS
Acacia erioloba E.Mey.	Small tree with flowers. Oldish pods and some parasitized leaves present.	Damaraland - Gaias Fountain. Welwitschia.		2014CC
Acacia reficiens Wawra subsp. reficiens	Tree with grey black, smooth bark and spherical crown. Leaves blue-green.	Welwitschia. East of the Brandberg West Mine.	Growing in a riverbed.	2014CC
Acacia reficiens Wawra subsp. reficiens	Many stemmed shrub, 2 m high.	Welwitschia. Track Brandberg. West Gai - as.		2014CC
Acacia reficiens Wawra subsp. reficiens	Tree 5 m high. Lower branches spreading, some to 8 m from main stem, forming dense structure (bush). Capitula pale cream. Pod broad.	Damaraland: Between Ugab and Huab Rivers (Ugab drainage): Klein Gai-as.	Common. Growing in dry, sandstone gully. Full sun.	2014CC
Acrotome fleckii (Gürke) Launert	Annual herbs, 2 - 12 cm high. Flowers white.	Gai-as in dry water run-off.	Occasional.	2014CC
Aizoanthemum galenioides (Fenzl ex Sond.) Friedrich	Small herb, yellow. Flowers present. Leaves rough.	On bare eroded plains near now petrified forest at Gaias.		2014CC
Anticharis ebracteata Schinz	Annual, only 1 or 2 seen.	Between road to Gaias and Huab river, in line with Farm Krone.		2014CC
Anticharis imbricata Schinz	Annual/perennial, erect woody herb, 0.4 m high. Flower dark blue to lilac with black base.	Brandberg West Mine, Brandberg West near the cemetry.	Growing in the dry riverbed.	2014CC
Aristida parvula (Nees) De Winter	Graminoid; Notes: Exposure: full sun. On sandstone outcrop. Etjo Sandstone. Moderate slope. Tufted, small. Common.	Damaraland. Between Ugab and Huab Rivers, north west of Brandberg. Klein Gai-as area.		2014CC
Atriplex suberecta I.Verd.	Creeper; Notes: Perennial creeper. Sand, clay soil. Well-drained, moist/damp riverbank.	Ugab River near Save the Rhino Camp.		2014CC
Atriplex vestita (Thunb.) Aellen var. appendiculata Aellen	1.2 m high. Yellowish flowers going rusty colour when old. Several species making a bush.	Damaraland. In Huab riverbed, nearer the sea than farm Krone.	Not common, only one bush found.	2014CC
Barleria solitaria P.G.Mey.	Cushion-like shrub 0.40 m high, 1 m in diameter. Flowers blue.	Upper-Ugab, on west and north facing slopes of mountains next to river.	Common. Growing on mountain slope.	2014CC
Barleria solitaria P.G.Mey.	Cushion-like shrub 0.40 m high, 1 m in diameter. Flowers blue.	Upper-Ugab, on west and north facing slopes of mountains next to river.	Common.	2014CC
Barleria solitaria P.G.Mey.	Sub-shrub. Stem rounded, rather succulent green, angular, calyx pale straw coloured. Fruits blackish brown.	Road between Rhino camp and Twyfelfontein.	Scattered. Slope of the steep rocky mountain (north facing).	2014CC
Blepharis gigantea Oberm.	Plant up to 1 m high. Fruits sharp, straw-coloured.	Damaraland - in tributary of Goantagab River.	Growing in riverbed. Very dry area only	2014CC

			these few plants with signs of life.	
Boerhavia deserticola Codd	Hairy erect plant. Flowers tiny, sticky and not open yet. Old growth or flower stalks white.	Welwitschia. Brandberg area: Goantagap River north of Brandberg.		2014CC
Boerhavia deserticola Codd	Perennial herbs 0.50 m high. Flowers white.	Welwitschia. Gai-as, in water run-off.		2014CC
Boerhavia deserticola Codd	Perennial plant 0.60-0.80 m high. Leaves plenty, fresh and tiny buds.	Damaraland. East of Nette i.e. south west of farm Krone and north of Brandberg and Ugab river.	Semi-desert. Rocky substrate, well drained moisture regime. Gravel soil. Partially exposed on gentle slope. Undisturbed area, which had recent rain. Few at base of valley near pools full of tadpoles and engravings.	2014CC
Brachiaria glomerata (Hack.) A.Camus	Graminoid; Notes: Annual grass, 2 - 5 cm high.	Sandtone koppies, 6 km south of Gai-as in pure sand.		2014CC
Brachiaria glomerata (Hack.) A.Camus	Graminoid; Notes: Vegetation type: rock desert. Substrate: alluvial soil. Soil: sandy. Exposure: sun and partial shade. Moisture: bank dry watercourse. Lithology: etjo sandstone. Slope: gentle slope. Other: on minifloodplain and in dry wash. Tufted. Common.	Between Ugab and Huab rivers, north-west of Brandberg. Klein Gai-as area (S)		2014CC
Calicorema capitata (Moq.) Hook.f.	Notes: The most common plant in this area. Cushion - shaped.	Damaraland - near Gai-as fountain.		2014CC
Camptoloma rotundifolium Benth.	Woody, perennial, semi-silky plant, 0.30 m high. Flowers cream-white. Fruit capsules with awns.	On the road from Rhino camp, northward.	Occasional, in sandy wash.	2014CC
Chascanum garipense E.Mey.	Notes: White flowers, not sticky but smelly branches.	About west of Gaias in very dry, stony ground.		2014CC
Citrullus ecirrhosus Cogn.	Notes: Perrennial prostrate herbs forming runners up to 1,5 m.	Upper- Ugab, on west and north facing slopes of mountains next to river.		2014CC
Colophospermum mopane (J.Kirk ex Benth.) J.Kirk ex J.Léonard	Tree.	Welwitschia. Between Brandberg W mine and Goantagab. Near very salty fountain.	Growing in riverbed.	2014CC
Commicarpus squarrosus (Heimerl) Standl. var. squarrosus		Welwitschia. Near road to Gaias coming up from Brandberg West Mine. Rocky koppie.		2014CC
Commiphora glandulosa Schinz	Notes: Bark grey, leaves big with sernated edges, grouped at the tips of the branches with very prominent middle vein.	Between Gaias - Doros Road and Guab River, in line with farm Krone.		2014CC
Commiphora kaokoensis Swanepoel	150 cm high; Tree; Notes: Perennial dwarf tree, 150 cm high. Bark pale grey to pinkish grey. Leaves simple, obovate, green. Rare, in full sun, on bare rock of mountain slope, slope 30, in desert.	Northern bank of Ugab River, marble mountains.		2014CC
Commiphora kaokoensis Swanepoel	150 cm high; Tree; Notes: Perennial dwarf tree. Bark brown. Leaves obovate, simple, green. Rare. In full sun, on E aspect of mountain slope. In well-drained rocky soil; desert.	Northern bank of lower Ugab River, marble folded mountains.		2014CC

Commiphora saxicola Engl.	1.2 m high; Shrub; Notes: Low spreading shrub 1.2 metre high, 1.5 metre in diametre. No fruit or flowers.	Gai-as.		2014CC
Cucumis meeusei C.Jeffrey	Notes: Rocky with coarse sand. Procumbent shrub. Leaves and stems scabrid. Corolla yellow with green venation on outside. Ovoid fruit uniformly green, turning yellow, with short spiny tubercles. Flesh extremely bitter. Only 1 plant seen.	Small tributary on northern side of Ugab River about 12 km upstream from Brandberg West.		2014CC
Cyperus laevigatus L.	Notes: Maybe the same as 2988 but very black roots.	Damaraland - Gaias Fountain.		2014CC
Cyperus laevigatus L.	Notes: Rock desert. Substrate: soil (anoxic) Soil: sand + organic material. Exposure: full sun. Moisture: seepage hollow. Slope: level. Other: at edge of oligohaline spring. Salinity (%): 3. Rhizome linear, internodes short. Locally abundant.	Damaraland. Between Ugab and Huab Rivers, north-west of Brandberg. Gai-as Spring.		2014CC
Cyperus marginatus Thunb.	Notes: Up to 10 feet tall. Looking fresh and flourishing.	Damaraland - Gaias fountain.		2014CC
Cyperus marginatus Thunb.	Notes: Vegetation: Rock desert. Soil: Sand and humus. Moisture: Seepage hollow. Exposure: Full sun. Slope: Level. Other: At edge of oligohaline spring. Salinity(3%). Rhizome abbreviated/compacted forming large tufts. Locally abundant.	Damaraland. Between Ugab and Huab Rivers, north-west of Brandberg. Gai-as Spring.		2014CC
Dicoma capensis Less.	Herb; Notes: Vegetation type: rock desert. Substrate: soil. Soil: sandy. Exposure: full sun. Lithology: Etjo sandstone. Other: on sandstone outcrop. Aspect: SE. Slope: moderate. Herb; dried. Common.	Damaraland. Between Ugab and Huab Rivers, north-west of Brandberg. Klein Gai-as area (S).		2014CC
Dicoma cuneneensis Wild	Herb; Notes: Perennial prostrate herbs. Flowers purple.	Sandstone koppies 6 km south of Gai-as.		2014CC
Dicoma cuneneensis Wild	A small herb with woody base, erect, leaves densely tomentose, leave ovate, heads axillary, solitary, bracts recurved.	1 km north of Ugab camp, Rhino trust camp.	Riverine. Left side of road in rock crevices. Occasional.	2014CC
Enneapogon desvauxii P.Beauv.	Graminoid; Notes: Vegetation: Rock desert. Substrate: Soil in rock crevices. Soil: sand plus little humus. Exposure: Sun. Lithology: Sandstone & shale. Slope: Moderate. tufted; sour scent on being crushed. Common.	Khorixas. Between Ugab and Huab Rivers, north-west of Brandberg. Klein Gai-as area.		2014CC
Enneapogon desvauxii P.Beauv.	Graminoid; Notes: Vegetation: Rock desert. Substrate: Min. soil/rocky crevice. Soil: Sand and pebbles. Exposure: Sun. Lithology: Marble in schist. Slope: steep. Tufted; aromatic. Common.	Khorixas district. Between Ugab and Huab Rivers, north-west of Brandberg. 17 km north of Ugab River.		2014CC
Enneapogon scaber Lehm.	15 cm high; Graminoid; Notes: Perennial grass 15 cm high.	Upper-Ugab, on west and north-facing slopes of mountains next to river.		2014CC
Eremiolirion amboense (Schinz) J.C.Manning & C.A.Mannheimer	Notes: Bulb 15 - 20 cm below ground. Only white remains of flowers.	Between Gaias - Doros road and Huab river in line with Krone.		2014CC
Eriospermum mackenii (Hook.f.) Baker subsp. mackenii	Notes: 12-25 cm high. 1 leaf, many without flowers; some flower when only 12cm tall. Corms deeply embedded in sandstone and difficult to get out usually. On top of escarpment, not utilized; in undisturbed, stony-rocky gravel soil on gentle slope in semi-desert. Uncommon in full sun. Recent rain after many years of drought.	Damaraland just east of Nette i.e north of Brandberg but south-west of Krone farm.		2014CC
Euphorbia gariepina Boiss. subsp. balsamea	Succulent; Notes: Succulent perennial with few flowers.	Between Gaias - Doros road and Huab river in line with Krone.		2014CC

(Welw. ex Hiern) L.C.Leach				
Euphorbia glanduligera Pax	20 cm high; Herb; Notes: Annual herb, 20 cm high.	Upper Ugab, on west and north-facing slopes of mountains next to river.		2014CC
Euphorbia glanduligera Pax	Herb; Notes: Vegetation type: rock desert. Substrate: alluvial soil. Moisture: dry watercourse. Soil: sand. Lithology: Etjo sandstone. Exposure: sun + partial shade. Aspect: South. Slope: gentle. Other: on mini floodplain and in dry wash. Herb, annual, erect, bushy, about 40 cm tall. Common.	Damaraland. Between Ugab and Huab Rivers, north-west of Brandberg. Klein Gai-as area (S).		2014CC
Euphorbia inaequilatera Sond. var. inaequilatera	Herb; Notes: Vegetation: rock desert. Substrate: soil. Soil: sand and grit + humus. Lithology: Etjo sandstone. Exposure: sun and partial shade. Aspect: SE. Slope: steep. Other: on sandstone outcrop. Herb, annual, very small. Common.	Damaraland. Between Ugab and Huab Rivers, north-west of Brandberg. Klein Gai-as area (S).		2014CC
Euphorbia lignosa Marloth	Notes: Cushion shaped. With flowers. Locally clumped.	Damaraland: north of Ugab River and Brandberg but SW of Krone Farm. Granite outcrop with few of these plants on top.		2014CC
Felicia clavipilosa Grau subsp. clavipilosa	8 cm high; Notes: Perennial herbs 8 cm high. Flowers blue. Not common.	Gai-as, in water runn-off.		2014CC
Forsskaolea candida L.f.	Notes: Rock desert. Soil. Sand and granite and humus. Sun and partial shade. On sandstone outcrop. Etjo sandstone. Steep slope. Herb; leaves glutinous. Common.	Damaraland. Between Ugab and Huab Rivers, north west of Brandberg. Klein Gai-as area.		2014CC
Forsskaolea viridis Ehrenb. ex Webb	Notes: Annual herbs.	Uis. Upper-Ugab, on west and north-facing slopes of mountains next to river.		2014CC
Galenia africana L.	Notes: White woody root stock, leaves green on white stalks. Only plant in the area and conened in flowers.	Damaraland; in the middle of grey stony river.		2014CC
Geigeria alata (Hochst. & Steud.) Benth & Hook.f. ex Oliv. & Hiern	Herb; Notes: Vegetation: Rock desert. Lithology: Etjo Sandstone. Exposure: Full sun. Slope: Moderate. Other: Low open vegetation on sandstone outcrop. Herb, erect; stems stiff (and drying stiff), alate. Common.	Damaraland: Between Ugab and Huab Rivers, north-west of Brandberg. Klein Gai-as area. (S).		2014CC
Glinus lotoides L. var. lotoides		Polster in riversand. Brandberg Reserve, Omaruru district. Ungab River.		2014CC
Grewia flavescens Juss.	110 cm high; Shrub; Notes: Perennial shrub, 110cm high. Flower/Inflorescence: none. Leaves: oblanceolate to obovate, 7x3cm, light green, more hairs on under surface which is rough to touch, apex tapering, base rounded to lobed, margin irregular, very toothed, petiole to 5mm long, hairy. Fruit and seed: absent. Occurrence: fairly common. Vegetation: open woodland; thornbush savanna. Substrate: stony/rocky soil. Soil type: sandy loam; gravel. Habitat: dry bed of river. Slope: 4-8. Relev: PP320R.	2km River plot Grootberg Spring - Persianer post 3.		2014CC
Helichrysum roseo-niveum Marloth & O.Hoffm.	Herb; Notes: Vegetation type: rock desert. Substrate: soil. Soil: sand and git + humus. Lithology: Etjo sandstone. Exposure: full sun. Other: on sandstone outcrop. Aspect: S. Slope: moderate. Herb; heads pink (or white) becoming white. Common.	Damaraland. Between Ugab and Huab Rivrs, NW of Brandberg. Klein Gai-as area (S).		2014CC

Helichrysum tomentosulum (Klatt) Merxm. subsp. tomentosulum	Notes: Vegetation type: rock desert. Substrate: soil. Soil: sand + little humus. Lithology: Etjo sandstone. Exposure: sun. Other: amongst rocks of sandstone exposure. Aspect: E. Slope: moderate. Suffrutex, low, much branched; strongly aromatic. Common.	Damaraland: between Ugab and Huab Rivers, NW of Brandberg. Klein Gai-as area.		2014CC
Heliotropium tubulosum E.Mey. ex DC.	Erect hemicryptophyte, 0.18 m high. Perennial, herbaceous. Plant forms cushions. Flowers white, with yellow base. Woody roots.	Brandberg west, mine (new cemetery).	Occasional. Growing in sandy, gravel soil in dry river bed on level slope. Full sun.	2014CC
Hermannia amabilis Marloth ex K.Schum.	60 cm high; Notes: Growing between large rocks. Rare and very scattered. Seems to bear one stem of flowers only. 60 cm high.	Along Doros - Gai-as road, 8 km east of Gai-as next to road.		2014CC
Hermannia amabilis Marloth ex K.Schum.	Herb; Notes: Vegetation: rock desert. Substrate: soil. Soil: sand + little humus. Lithology: Etjo sandstone. Exposure: sun. Aspect: E. Slope: moderate. Other: amongst rocks of sandstone exposure. Herb, slender, erect; flowers white and pink. Common.	Damaraland: between Ugab and Huab Rivers, north-west of Brandberg. Klein Gai-as area.		2014CC
Hermannia amabilis Marloth ex K.Schum.	9 cm high; Herb; Notes: Erect. Annual. Herbaceous. Frequent. Flower white with dark purple radiating from dark purple centre. Long flowering period. Sandy - gravelly soil.	Brandberg West Mine - near cemetary.		2014CC
Hermannia modesta (Ehrenb.) Mast.	Notes: Annuals.	Between road to Gaias and Huab River, almost in line with Farm Krone.		2014CC
Hermbstaedtia argenteiformis Schinz	Notes: Few annuals in rocky slope.	Between road to Gai-As and Huab River in line with farm Krone.		2014CC
Hermbstaedtia spathulifolia (Engl.) Baker	Herb; Notes: White flowered small herb.	At Gai - As petrified forest.		2014CC
Hoodia currorii (Hook.) Decne. subsp. currorii	Plant was covered in flowers.	Welwitschia. Between Brandberg West crossing of Ugab and the Gaias-Doros road.		2014CC
Hypertelis salsoloides (Burch.) Adamson var. salsoloides	Notes: Few annuals on rocky slope.	Welwitschia. Between road to Gaias and Huab river in line with Farm Krone.		2014CC
Indigofera heterotricha DC. subsp. pechuelii (Kuntze) Schrire	80 cm high; Notes: Plant about 80 cm high.	Outjo district. north-west of waterhole Geias.		2014CC
Indigofera heterotricha DC. subsp. pechuelii (Kuntze) Schrire	40 cm high; Dwarf shrub; Notes: Shrublets 40 cm high. Flowers bright red.	Welwitschia. Gai-as.		2014CC
Jamesbrittenia barbata Hilliard	0.5 m high; Herb; Notes: Colophospermum mopane, Terminalia prunioides. Along dry watercourse. Soil: coarse sand. Moisture: dry watercourse. Slope: level. Biotic effect: wildlife grazing. Perennial herb, many branched, grey-green appearance, 0.5 m high. Stems covered in white bloom, giving them a grey-green appearance, 2 cm x 1 cm. Leaves simple, oval, apex and base tapering, covered in white bloom/short white hairs, often arising in pairs. Flowers and calyx pentamerous, petals pale yellow, tubular corolla. Fairly frequent.	Dry watercourse near Doros Crater (west side).		2014CC

Jamesbrittenia fruticosa (Benth.) Hilliard	40 cm high; Notes: Perennial, 40 cm high - roots thickened; erect stem up to 40 cm, flowers mauvy-blue. Leaves: green and very hairy when young, white when older. Other: recent rain, gentle slope, shade exposure, not utilized. Rare.	Damaraland: North of Ugab River and Brandberg Mountain but SW of farm Krone.		2014CC
Juncus rigidus Desf.	Herb; Rhizome, linear herb. Internodes short.	Damaraland: Ugab River Valley: Lekkerwater (just N of Zebraputz).	Locally common. Desert. Growing in shallow, sal-encrusted soil, on rock, on margin of spring. Schist. Full sun.	2014CC
Kleinia longiflora DC.	Notes: Younger stems ridged with reddish brown colour. No leaves.	Damaraland: in extremely arid rocky region.		2014CC
Kleinia longiflora DC.	1.2 m high; Herb; Notes: Succulent stemmed, perennial herbs, 1.2 m high. Flowers white.	Track between Ugab - Huab rivers.		2014CC
Lasiopogon muscoides (Desf.) DC.	Notes: Prostrate, woolly annual. Growing in calcareous soil at edge of pan.Quoted in:Prodomus einer Flora von Sdwestafrica 139:108 (1967) as Lasiopogon muscoides (Desf.) DC. by H.Merxmller.	Farm Lekkerwater, 32 miles east of Aranos.		2014CC
Leobordea bracteosa (B.- E. van Wyk) B-E. Van Wyk & Boatwr.	5 cm high; Herb; Notes: Annual, prostrate herbs, 5 cm high. Flowers yellow.	Gai-as, in water run-off.		2014CC
Lophiocarpus polystachyus Turcz.	Notes: Herb 40 cm high. Common.	Welwitschia. Gai-as in water run-off.		2014CC
Lycium eenii S.Moore	Shrub; Notes: Shrubs 80 cm high. Leaves semi-succulent. Flowers pink. Berries red.	Sandstone koppies, 6 km south of Gai-as.		2014CC
Lycium eenii S.Moore	Shrub; Notes: Few bush looking shrubs with flowers, 60 cm x 60 cm high.	Between Brandberg West crossing of Ugab and the road to Gaias.		2014CC
Monechma cleomoides (S.Moore) C.B.Clarke	Shrub 0.25 m high. Flowers blue.	Welwitschia: Gai-as, in water run-off.	Growing in dry riverbed. Heavily grazed.	2014CC
Monechma desertorum (Engl.) C.B.Clarke	Annual herbs, 2-4 cm high. Flowers white.	Sandstone koppies, 6 km south of Gai-as in pure sand.	Growing on sandstone hill.	2014CC
Monechma genistifolium (Engl.) C.B.Clarke subsp. australe (P.G.Mey.) Munday	Sub-shrub, much branched. Stems white, corolla white with pink nectar guides on the lower lip, anthers pink.	About 16 km North of Ugab camp.	Common.	2014CC
Monechma genistifolium (Engl.) C.B.Clarke subsp. genistifolium	Shrublet. Flowers white to pale blue.	Damaraland: Between Ugab and Huab Rivers, NW of Brandberg. Klein Gai-as area.	Common. Desert. Growing in rocky, sandy soil on sandstone outcrop.	2014CC
Namibithamnus obionifolius (O.Hoffm.) H.Rob., Skvarla & V.A.Funk	Herb; Notes: A tall, slender herb which grows up to 4 feet. high. The leaves are grey and the flowers are a purple colour. This herb is locally rare.	2 miles south of the Ugab river bridge. Welwitchia - Brandberg road. Rocky koppie, western slopes.		2014CC
Ophioglossum polyphyllum A.Braun	Notes: Few on rocky slope.	Welwetschia. Between road to Gaias and Huab river in live with Farm Krone.		2014CC

Parkinsonia africana Sond.	Shrub; Notes: Soil: coarse sand and gravel. Exposure: full sun. Moisture: dry gully. Lithology: ex Etjo sandstone. Slope: level. Plant features: shrub or small tree, up to 3.5 m tall; flowers yellow. Common. Leaves browsed.	Damaraland: Between Ugab and Huab Rivers (Ugab drainage): Klein Gai-as.		2014CC
Parkinsonia africana Sond.	Shrub or small tree, up to 3.5 m tall. Flowers yellow. Leaves browsed.	Damaraland. Between Ughab & Huab River (Ughab drainage). Klein Gai-as.	Common.	2014CC
Parkinsonia africana Sond.	Shrub or small tree, height up to 3.5 m tall. Flowers yellow.		Common.	2014CC
Pechuel-loeschea leubnitziae (Kuntze) O.Hoffm.	1.5 m high; Herb; Notes: Perennial herbs, 1,5m high. They are woody at the base, the flowers are purple and the plant is common.	Upper-Ugab, on the west and north-facing slopes of the mountains next to the river.		2014CC
Petalidium canescens (Engl.) C.B.Clarke	Herb. Flowers purple.	Damaraland: between Ugab and Huab Rivers, north-west of Brandberg. Klein Gai-as area (S).	Common. Rocky desert. Growing in sandy soil on Etjo sandstone with a moderate slope and SE aspect. Full sun.	2014CC
Petalidium canescens (Engl.) C.B.Clarke	Dwarf shrub, root woody, brittle; stem base woody; leaves glaucous. Flowers: purplish red, bracts become woody later.	Ugab River: Zebraputs.	Growing in open shrubland, in shallow soil on rock with moderate slope in full sun, on river bank (upper) within reach of high floods. Common.	2014CC
Petalidium crispum A.Meeuse ex P.G.Mey.	Shrub, white base,very smelly. Flowers crimson.	Just north of Brandberg West Mine in riverbed coming from Doros.	Growing on river bank.	2014CC
Petalidium crispum A.Meeuse ex P.G.Mey.	Plant 1.5 m high. Flowers crimson-orange.	Doros River on the last turn before it runs into the Gorantagab. Damaraland.	Common. Growing in dry river/streambed.	2014CC
Petalidium giessii P.G.Mey.	Much-branched shrublets, up to 1.2 m high. Flowers yellow.	Gai-as. Welwitschia.		2014CC
Petalidium giessii P.G.Mey.	Shrub 0.50 m high, 0.75 m in diameter. No flowers only fruit.	On flats at Gai-as. Welwitschia.	Growing on plain.	2014CC
Petalidium giessii P.G.Mey.	Some bushes have flowers.	Between Doros and Ugab River (Brandberg West Mine area).	Growing in stony/rocky soil in riverbed.	2014CC
Petalidium giessii P.G.Mey.	Small shrub, about 1 m high, older stem grey fissured, leaves semi-succulent lush green. Calyx with 5 equal lobes, stigma lobes 2, inflorescence bracts, pungent flowers sweet jasmine smell, bracts pale yellow inflated, corollas yellow throughout with yellow-brownish nector guides. All 4 anthers spurred.	About 16 km North of Ugab Camp.	Abundant. Growing in wash. Full sun.	2014CC
Petalidium variabile (Engl.) C.B.Clarke	Small sub-shrub. Stems white, fissured. Sterile.	On the road between Rhino camp and Twyfelfontein.	Common. Growing on margins of wash, along the track.	2014CC
Phragmites australis (Cav.) Steud.	Graminoid; Notes: Perennial herbs with creeping rhizomes. Stems erect, simple, terminated by dense cylindrical flower spikes.	Upper-Ugab, on west and north-facing slopes of mountains next to river.		2014CC
Phyllanthus dinteri Pax	10 cm high; Herb; Notes: Perennial herbs, 10 cm high. With fruit.	Khorixas district. At Gai-as waterhole.		2014CC

Phyllanthus maderaspatensis L.	10 cm high; Herb; Notes: Perennial herbs 10 cm high. With fruit.	Khorixas district. At Gai-as waterhole.		2014CC
Polygala leptophylla Burch. var. leptophylla	20 cm high; Herb; Notes: Annual herb, 20 cm high.	Upper Ugab, on west and north-facing slopes of mountains next to river.		2014CC
Psilocaulon salicornioides (Pax) Schwantes	Succulent; Suffrutex; Notes: Exposure: sun. Slope: moderate. Substrate: soil shallow on rock. Soil: silt. Other: within reach of high floods. Plant features: suffrutex, procumbent, succulent, base strong; 'petals' white. Common. Eaten by cattle. Altitude about 200m.	Omaruru District. Ugab River: Zebraputs.		2014CC
Ruellia marlothii Engl.	Shub 0.70 m high. Old flower remains under surrounding trees.	Damaraland - in tributary of Goantagab River.	Growing in dry river/streambed.	2014CC
Ruellia marlothii Engl.	Shrub, 0.75 m high. Old inflorescences only. Stems short, pubescent. Leaves ovate to rounded, pubescent, venation prominent on under surface.	On the road between Rhino camp and Twyfelfontein.	Occasional. Growing at base and steep ravine, slate.	2014CC
Salvadora persica L. var. persica	2 m high; Shrub; Notes: Many-stemmed, much-branched shrub, 2 m high. Common.	Welwitschia: Upper-Ugab, on west and north-facing slopes mountains next to river.		2014CC
Salvadora persica L. var. persica	4.8 m high; Shrub; Notes: Vegetation type: desert (rock). Exposure: full sun. Moisture: dry gully. Lithology: ex Etjo sandstone. Slope: gentle. Plant features: shrub, 4.8 m tall; stems several, branched, twisted, central stem more or less erect. Common. Twigs and leaves much eaten	Damaraland: Between Ugab and Huab Rivers (Ugab drainage); Klein Gai-as.		2014CC
Sesamum capense Burm.f.	5 cm high; Notes: Full sun. Level slope. Erect. Perennial. Woody. Flowers pinkish - reddish with deep red base. Outside the same. Seeds with 3 wings. Rare.	Brandberg West Mine, near cemetary.		2014CC
Solanum burchellii Dunal	Herb; Notes: Vegetation type: rock desert. Substrate: alluvial soil. Soil: sand. Moisture: dry watercourse. Lithology: Etjo sandstone. Exposure: sun and partial shade. Aspect: S. Slope: gentle. Other: at edge of dry wash at base of small cliff. Herb, erect, branched, branches slender. Fruit green, striped at first, becoming orange when ripe. Common.	Damaraland: between Ugab and Huab Rivers, NW of Brandberg. Klein Gai-as area.		2014CC
Sporobolus consimilis Fresen.	Graminoid; Notes: Vegetation type: desert (rock). Substrate: shallow soil on rock. Soil: salt-encrushed, sandy. Exposure: full sun (in canyon). Other: at edge of partially dried spring. Moisture: saline spring. Lithology: schist. Slope: gentle. Plant features: rhizome compacted; culms up to 1.8 m tall. Locally very common.	Khorixas. Damaraland: Ugab River Valley: Lekkerwater (just N of Zebraputz).		2014CC
Sporobolus consimilis Fresen.	Rhizome compacted, culms up to 1.8 m tall.		Locally common.	2014CC
Sporobolus consimilis Fresen.	Rhyzomes compacted, culms up to 1.8 m tall.		Locally common.	2014CC
Stipagrostis ciliata (Desf.) De Winter var. capensis (Trin. & Rupr.) De Winter	Graminoid; Notes: Rock desert. Minimum soil/rock crevice. Sand and pebbles. Lithology: Marble in schist. Exposure: sun. Steep slope. Tufted. Common.	Between Ugab and Huab Rivers, north-west of Brandberg. 17 km N of Ugab River.		2014CC
Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. patula (Hack.) De Winter	Graminoid; Notes: Rock desert. Minimum soil/rock crevice. Sand and pebbles. Exposure: sun. Marble in schist. Slope steep. Tufted. Common.	Khorixas district. Damaraland. Between Ugab and Huab Rivers, north-west of Brandberg, 17 km north of Ugab River.		2014CC

Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. pearsonii (Henrard) De Winter	Graminoid; Notes: Common all over previously barren plains.	Welwitschia.		2014CC
Stipagrostis uniplumis (Licht.) De Winter var. intermedia (Schweick.) De Winter	Graminoid; Notes: Rocky. Min. soil/rock crevice. Sand and pebbles. Sun. Marble in schist. Steep slope. Tufted; small. Common.	Khorixas district. Damaraland. Between Ugab and Huab Rivers, north-west of Brandberg. 17 km north of Ugab River.		2014CC
Trichodesma africanum (L.) Lehm.	Herb, erect, up to about 70 cm tall; corolla throat green, lobes white.	Damaraland. Between Ugab and Huab rivers, north west of Brandberg. Klein Gai-as area.	Rock desert, growing on alluvial sand at the edge of dry wash at base of small cliff in sun and partial shade. Lithology: Etjo sandstone. Aspect: s. Slope: gentle. Common.	2014CC

SPECIES
Acacia erioloba E.Mey.
Acacia reficiens Wawra subsp. reficiens
Acrotome fleckii (Gürke) Launert
Aizoanthemum galenioides (Fenzl ex Sond.) Friedrich
Anticharis ebracteata Schinz
Anticharis imbricata Schinz
Aristida parvula (Nees) De Winter
Atriplex suberecta I.Verd.
Atriplex vestita (Thunb.) Aellen var. appendiculata Aellen
Barleria solitaria P.G.Mey.
Blepharis gigantea Oberm.
Boerhavia deserticola Codd
Brachiaria glomerata (Hack.) A.Camus
Calicorema capitata (Moq.) Hook.f.
Camptoloma rotundifolium Benth.
Chascanum garipense E.Mey.
Citrullus ecirrhosus Cogn.
Colophospermum mopane (J.Kirk ex Benth.) J.Kirk ex J.Léonard
Commicarpus squarrosus (Heimerl) Standl. var. squarrosus
Commiphora glandulosa Schinz
Commiphora kaokoensis Swanepoel
Commiphora saxicola Engl.

Cucumis meeusei C.Jeffrey
Cyperus laevigatus L.
Cyperus marginatus Thunb.
Dicoma capensis Less.
Dicoma cuneneensis Wild
Enneapogon desvauxii P.Beauv.
Enneapogon scaber Lehm.
Eremiolirion amboense (Schinz) J.C.Manning & C.A.Mannheimer
Eriospermum mackenii (Hook.f.) Baker subsp. mackenii
Euphorbia gariepina Boiss. subsp. balsamea (Welw. ex Hiern) L.C.Leach
Euphorbia glanduligera Pax
Euphorbia inaequilatera Sond. var. inaequilatera
Euphorbia lignosa Marloth
Felicia clavipilosa Grau subsp. clavipilosa
Forsskaolea candida L.f.
Forsskaolea viridis Ehrenb. ex Webb
Galenia africana L.
Geigeria alata (Hochst. & Steud.) Benth & Hook.f. ex Oliv. & Hiern
Glinus lotoides L. var. lotoides
Grewia flavescens Juss.
Helichrysum roseo-niveum Marloth & O.Hoffm.
Helichrysum tomentosulum (Klatt) Merxm. subsp. tomentosulum
Heliotropium tubulosum E.Mey. ex DC.
Hermannia amabilis Marloth ex K.Schum.
Hermannia modesta (Ehrenb.) Mast.
Hermbstaedtia argenteiformis Schinz
Hermbstaedtia spathulifolia (Engl.) Baker
Hoodia currorii (Hook.) Decne. subsp. currorii
Hypertelis salsoloides (Burch.) Adamson var. salsoloides
Indigofera heterotricha DC. subsp. pechuelii (Kuntze) Schrire
Jamesbrittenia barbata Hilliard
Jamesbrittenia fruticosa (Benth.) Hilliard
Juncus rigidus Desf.
Kleinia longiflora DC.
Lasiopogon muscoides (Desf.) DC.
Leobordea bracteosa (B.- E. van Wyk) B-E. Van Wyk & Boatwr.
Lophiocarpus polystachyus Turcz.
Lycium eenii S.Moore
Monechma cleomoides (S.Moore) C.B.Clarke
Monechma desertorum (Engl.) C.B.Clarke
Monechma genistifolium (Engl.) C.B.Clarke subsp. australe (P.G.Mey.) Munday
Monechma genistifolium (Engl.) C.B.Clarke subsp. genistifolium
Namibithamnus obionifolius (O.Hoffm.) H.Rob., Skvarla & V.A.Funk

Ophioglossum polyphyllum A.Braun
Parkinsonia africana Sond.
Pechuel-loeschea leubnitziae (Kuntze) O.Hoffm.
Petalidium canescens (Engl.) C.B.Clarke
Petalidium crispum A.Meeuse ex P.G.Mey.
Petalidium giessii P.G.Mey.
Petalidium variabile (Engl.) C.B.Clarke
Phragmites australis (Cav.) Steud.
Phyllanthus dinteri Pax
Phyllanthus maderaspatensis L.
Polygala leptophylla Burch. var. leptophylla
Psilocaulon salicornioides (Pax) Schwantes
Ruellia marlothii Engl.
Salvadora persica L. var. persica
Sesamum capense Burm.f.
Solanum burchellii Dunal
Sporobolus consimilis Fresen.
Stipagrostis ciliata (Desf.) De Winter var. capensis (Trin. & Rupr.) De Winter
Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. patula (Hack.) De Winter
Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. pearsonii (Henrard) De Winter
Stipagrostis uniplumis (Licht.) De Winter var. intermedia (Schweick.) De Winter
Trichodesma africanum (L.) Lehm.

SPECIES	ENDEMISM	OCCURRENCE	POISONOUS	PROTECTED	IUCN2
Acacia reficiens Wawra subsp. reficiens		Indigenous			
Acrotome fleckii (Gürke) Launert	Endemic	Indigenous			
Aizoanthemum galenioides (Fenzl ex Sond.) Friedrich	Endemic	Indigenous			
Anticharis ebracteata Schinz	Endemic	Indigenous			
Anticharis imbricata Schinz	Endemic	Indigenous			
Aristida parvula (Nees) De Winter		Indigenous			
Atriplex suberecta I.Verd.		Indigenous			
Atriplex vestita (Thunb.) Aellen var. appendiculata Aellen		Indigenous			
Barleria solitaria P.G.Mey.	Endemic	Indigenous			
Blepharis gigantea Oberm.	Endemic	Indigenous			
Boerhavia deserticola Codd	Endemic	Indigenous			
Brachiaria glomerata (Hack.) A.Camus		Indigenous			
Calicorema capitata (Moq.) Hook.f.		Indigenous			
Camptoloma rotundifolium Benth.		Indigenous			
Chascanum garipense E.Mey.		Indigenous			

Citrullus ecirrhosus Cogn.	Near Endemic	Indigenous			
Colophospermum mopane (J.Kirk ex Benth.) J.Kirk ex J.Léonard		Indigenous		Forestry Protected	
Commicarpus squarrosus (Heimerl) Standl. var. squarrosus	Endemic	Indigenous			
Commiphora glandulosa Schinz		Indigenous			
Commiphora kaokoensis Swanepoel	Endemic	Indigenous			
Commiphora saxicola Engl.	Endemic	Indigenous			
Cucumis meeusei C.Jeffrey		Indigenous			
Cyperus laevigatus L.		Indigenous			
Cyperus marginatus Thunb.		Indigenous			
Dicoma capensis Less.		Indigenous			
Dicoma cuneneensis Wild		Indigenous			
Enneapogon desvauxii P.Beauv.		Indigenous			
Enneapogon scaber Lehm.		Indigenous			
Eremiolirion amboense (Schinz) J.C.Manning & C.A.Mannheimer	Endemic	Indigenous			Near Threatened
Euphorbia gariepina Boiss. subsp. balsamea (Welw. ex Hiern) L.C.Leach		Indigenous			
Euphorbia glanduligera Pax		Indigenous			
Euphorbia inaequilatera Sond. var. inaequilatera		Indigenous			
Euphorbia lignosa Marloth	Near Endemic	Indigenous			
Felicia clavipilosa Grau subsp. clavipilosa		Indigenous			
Forsskaolea candida L.f.		Indigenous			
Forsskaolea viridis Ehrenb. ex Webb		Indigenous			
Galenia africana L.		Indigenous	poisonous		
Geigeria alata (Hochst. & Steud.) Benth & Hook.f. ex Oliv. & Hiern		Indigenous			
Glinus lotoides L. var. lotoides		Non-indig - naturalised			
Grewia flavescens Juss.		Indigenous			
Helichrysum roseo-niveum Marloth & O.Hoffm.		Indigenous			
Helichrysum tomentosulum (Klatt) Merxm. subsp. tomentosulum		Indigenous			
Heliotropium tubulosum E.Mey. ex DC.		Indigenous			
Hermannia amabilis Marloth ex K.Schum.	Endemic	Indigenous			
Hermannia modesta (Ehrenb.) Mast.		Indigenous			
Hermbstaedtia argenteiformis Schinz		Indigenous			
Hermbstaedtia spathulifolia (Engl.) Baker	Endemic	Indigenous			
Hoodia currorii (Hook.) Decne. subsp. currorii		Indigenous		Protected	
Hypertelis salsoloides (Burch.) Adamson var. salsoloides		Indigenous			
Indigofera heterotricha DC. subsp. pechuelii (Kuntze) Schrire		Indigenous			
Jamesbrittenia barbata Hilliard	Endemic	Indigenous			
Jamesbrittenia fruticosa (Benth.) Hilliard		Indigenous			
Juncus rigidus Desf.		Indigenous			
Kleinia longiflora DC.		Indigenous			
Lasiopogon muscoides (Desf.) DC.		Indigenous			

Leobordea bracteosa (B.- E. van Wyk) B-E. Van Wyk & Boatwr.	Endemic	Indigenous			
Lophiocarpus polystachyus Turcz.		Indigenous			
Lycium eenii S.Moore		Indigenous			
Monechma cleomoides (S.Moore) C.B.Clarke		Indigenous			
Monechma desertorum (Engl.) C.B.Clarke	Endemic	Indigenous			
Monechma genistifolium (Engl.) C.B.Clarke subsp. australe (P.G.Mey.) Munday		Indigenous			
Monechma genistifolium (Engl.) C.B.Clarke subsp. genistifolium	Endemic	Indigenous			
Namibithamnus obionifolius (O.Hoffm.) H.Rob., Skvarla & V.A.Funk	Endemic	Indigenous			
Ophioglossum polyphyllum A.Braun		Indigenous			
Parkinsonia africana Sond.		Indigenous		Forestry Protected	
Pechuel-loeschea leubnitziae (Kuntze) O.Hoffm.		Indigenous			
Petalidium canescens (Engl.) C.B.Clarke	Endemic	Indigenous			
Petalidium crispum A.Meeuse ex P.G.Mey.	Endemic	Indigenous			
Petalidium giessii P.G.Mey.	Endemic	Indigenous			
Phragmites australis (Cav.) Steud.		Indigenous			
Phyllanthus dinteri Pax	Endemic	Indigenous			
Phyllanthus maderaspatensis L.		Indigenous			
Polygala leptophylla Burch. var. leptophylla		Indigenous			
Psilocaulon salicornioides (Pax) Schwantes	Near Endemic	Indigenous			
Ruellia marlothii Engl.		Indigenous			
Salvadora persica L. var. persica		Indigenous			
Sesamum capense Burm.f.		Indigenous			
Solanum burchellii Dunal		Indigenous			
Sporobolus consimilis Fresen.		Indigenous			
Stipagrostis ciliata (Desf.) De Winter var. capensis (Trin. & Rupr.) De Winter		Indigenous			
Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. patula (Hack.) De Winter		Indigenous			
Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. pearsonii (Henrard) De Winter		Indigenous			
Stipagrostis uniplumis (Licht.) De Winter var. intermedia (Schweick.) De Winter		Indigenous			
Trichodesma africanum (L.) Lehm.		Indigenous			

SPECIES	PLANTDESC	LOCNOTES	HABITATTXT	QDS
Acacia reficiens Wawra subsp. reficiens	Many stemmed shrub, 2 m high.	Uis. Track Brandberg West - Gai-as.		2114AA
Acrotome fleckii (Gürke) Launert		OM: Brandberg vicinity; track Brandberg West Mine - Uis Mine road. Some 20 km from Uis mine road.	Growing on gravel area on koppie. Small koppie, isolated on the gravel - stone flat. (Koppie with many small water pools with crustaceous fauna.	2114AA

Adenolobus pechuelii (Kuntze) Torre & Hillc. subsp. mossamedensis (Torre & Hillc.) Brummitt & J.H.R	Low, partly strong determined, dwarf shrub, up to 45 cm high. Bark of twigs red-brown.	On road to Brandberg West Mine. Beneath small koppie in shallow rivulet.		2114AA
Aloe asperifolia A.Berger	Upright plant. The flowers are also upright. Inflorescence consist of 4 densely flowered branches. The flowers bright coral-red. The bracts are up to 3.5 cm in length.	13 km south-east of Brandberg-West Mine. (Uis QDS).	Growing amongst rocks.	2114AA
Aloe asperifolia A.Berger		About 11 km SE of the Brandberg - West Mine, on the road to Uis.	Found on a rocky hill.	2114AA
Amphiasma merenskyanum Bremek.	Woody herb. Flowers white. Leaves more or less succulent, green.	Uis. Brandberg Mountain.	Common.	2114AA
Anthephora pubescens Nees	Perennial grass. Forms clumps.	Brandberg Mountain.	Uncommon. Growing on rocky outcrop.	2114AA
Anticharis ebracteata Schinz	Annual, only one seen.	Damaraland - just south of Brandberg.		2114AA
Anticharis imbricata Schinz	Shrub; Notes: More or less upright shrub with deep violet blue flowers.	20 miles south of Brandberg West Mine along road.		2114AA
Anticharis imbricata Schinz	0.5 m high; Shrub; Notes: Small shrub. Flowers: dark blue, 2 - 3 cm. Leaves: elliptic, cream, hairy. Stems: hairy.	South of Ugab, near Brandberg West Mine.		2114AA
Aponogeton desertorum Zeyh. ex A.Spreng.	Flowers yellow.	Uis. Brandberg vicinity, south of the mountain, along the track to the Brandberg West Mine, 13 miles from the Uis Mine road.	Small isolated koppje on the stone, gravel plain. With water ponds.	2114AA
Aristida parvula (Nees) De Winter	Graminoid; Notes: Annual grass.	Damaraland - just south of Brandberg west road near Brandberg Mine.		2114AA
Barleria grootbergensis I.Darbysh. & E.A. Tripp	Woody/subshrub about 0.40 m high, white to purple flowers. Fruit, capsules.	West of Brandberg Mountain, 62.7 km from the turn off to Uis or Henties Bay on D 2342 road.	Growing on the escarpment, in the gorge, igneous rock. Associated with Petalidium, Monechma and Euphorbia. Common.	2114AA
Barleria merxmuelleri P.G.Mey.	Little herb, very prickly. Flowers large, pale blue.	Brandberg mountain.	Uncommon.	2114AA
Barleria merxmuelleri P.G.Mey.	Perennial herbs 0.35 m high, spiny.	Brandberg west, 38,4 km west of Uis on the Uis-Brandberg west road. Oritsaub, OSO side of Brandberg.		2114AA
Barleria solitaria P.G.Mey.		Brandberg vicinity. South-west of the mountain, along the track from Brandberg west mine.	Growing in stony, gravel fields.	2114AA
Berkheya spinosissima (Thunb.) Willd. subsp. spinosissima	Shrub; Notes: Few seen near 1691, new growth is bush.	Bloedkoppie.		2114AA

Boerhavia deserticola Codd	Perennial herb, 45 cm high. Sticky appearance as result of glands. Flowers white.	Brandberg; Numas Gorge, in sandy riverbed.		2114AA
Boerhavia deserticola Codd	Sticky herb up to 0.45 m high. Flowers pure white.	Brandberg. Numas gorge.	Growing in river sand.	2114AA
Boerhavia hereroensis Heimerl	Herb. Flower tiny, mauve. Leaves furry, sticky & lighter green underneath.	Uis. Brandberg Mountain.	Common.	2114AA
Brachiaria glomerata (Hack.) A.Camus	Graminoid; Notes: Small annual grass 8 inches tall. Leaves furry underneath. Quite common.	Brandberg Mountain.		2114AA
Cadaba schroeppelii Suess. ex Suess. & Merxm.	2 m high; Shrub; Notes: Many-stemmed shrub, 2 m high. With fruit. Eaten by rhinos.	On the track Brandberg West Mine to Gai-as.		2114AA
Cardiospermum pechuelii Kuntze	Shrub; Notes: Twining shrub forming a dense thicket. Flowers minute, white. Fruits.	Brandberg West; Stony Koppie 38.4 km West of Uis on the Uis-Brandberg west road. Oritsaub, East South East side of Brandberg.		2114AA
Cardiospermum pechuelii Kuntze	Creeper; Notes: White flowered creeper - type plant with bloated, 3-angled fruits	Brandberg Mountain.		2114AA
Centropodia mossamedensis (Rendle) Cope	1.5 m high; Graminoid; Notes: Perennial grass, 1.5 m high.	4 km from the turn-off Brandberg-West road to Gai-as, in riverbed.		2114AA
Centropodia mossamedensis (Rendle) Cope	1.2 m high; Graminoid; Notes: Grass 1.2 m tall, perennial, forming thick clusters. Leaf blades broad at the base. Inflorescence up to 30 cm long.	Brandberg; Numas gorge, in sandy riverbed.		2114AA
Cheilanthes dinteri Brause	Fern.	Uis: Brandberg mountain.	Common.	2114AA
Cleome foliosa Hook.f. var. lutea (Sond.) Codd & Kers	Herb; Notes: Perennial herbs, 1.2 m high, woody at the base. Plants as a whole are sticky. Flowers yellow. In sandy riverbed.	Omaruru district. Brandberg West.		2114AA
Cleome foliosa Hook.f. var. lutea (Sond.) Codd & Kers	Graminoid; Notes: Broad sandy river with Acacia reficiens.	Omaruru district. Brandberg vicinity, west of the mountain, along the track from Brandberg West Mine. Welwitschia.		2114AA
Cleome paxii (Schinz) Gilg & Gilg-Ben.	Notes: Small kopje, isolated on the gravel - stone flat. (Koppje with many small water pools with Aponogeton	Brandberg vicinity: track Brandberg West Mine - Uis Mine road. 13 miles from Uis Mine road.		2114AA

	dinteri, Marsilia species and crustaceous fauna. Gravel sand along the water pools.			
Cleome semitetrandra Sond.	Notes: Broad sand river with Danthonia mossamedense. Common. Annual plant.	Brandberg vicinity track: Brandberg West Mine-Uis mine road, 13 miles from the Uis Mine road.		2114AA
Cleome semitetrandra Sond.	Notes: Young plants common high up valley. Greyish annual with yellow and red flowers.	Omaruru district. Brandberg Mountain.		2114AA
Commiphora kraeuseliana Heine	Notes: - Merxmller & Giess 1661.	Brandberg.		2114AA
Commiphora kraeuseliana Heine	Notes: Flowers - minute, straw coloured.	Brandberg - base of mountain between Nuvuarib & Sonuseb.		2114AA
Commiphora saxicola Engl.	Shrub; Notes: Shrub up to 0,50 metre high. Small hills with rocky slopes.	12 Kilometres south of Brandberg West Mine on way to Cape Cross.		2114AA
Commiphora wildii Merxm.	1.5 m high; Shrub; Notes: Thick branching stem above ground. Bark of twigs ochre coloured. Upper side of stem whitish, loer surface some-what peeling. Aril yellow-orange.	12 Kilometres east of Brandberg West Mine on way to Cape Cross.		2114AA
Commiphora wildii Merxm.	1.5 m high; Shrub; Notes: Shrub 1.5 metre high, that branch directly obove ground surface out of a thick stem. Branches copper-brown, bark slightly white at upper ends, lower side slightly peels off. Pseudo-aryllis yellow-orange.	7 Miles east from Brandberg West Mine on road to Uis.		2114AA
Corchorus merxmuelleri Wild	Shrub; Notes: Woody shrub up to 1 meter. Flowers - yellow. Not common, grazed.	Uis District: Brandberg - Pager Plain near 'Whale Rock'.		2114AA
Cordia sinensis Lam.	Small tree, almost forming a thicket. No flowers or fruit.	Uis. Bloedkoppie.		2114AA
Cordia sp. C	Small single tree, many stemmed. Bark grey.	Uis. Brandberg West Mine road near Brandberg Mountain.	In small river bed.	2114AA
Cotyledon orbiculata L. var. orbiculata		Uis. Brandberg, Numas valley, 16700.		2114AA
Crotalaria platysepala Harv.	Notes: Usually 1 foot high, but sometimes 2 - 3 feet high. Leaves green.	Omaruru District. Area -Brandberg Mountains to Doros to Gaias.		2114AA

	Flowers yellow. Pods blown-up.			
Cyperus laevigatus L.		Ugab River, Brandberg mountains.	Dominant. Growing in riverbed in wet areas.	2114AA
Dicoma capensis Less.		Brandberg vicinity. Near Brandberg West Mine.		2114AA
Dicoma cuneneensis Wild	Notes: Plant depressed, filthy white. Only seen here. Low plateau hills, sedimetary rocks, yellow with iron. On rocky ground, gravel pockets.	Road Cape Cross - Branberg West Mine, about half the way. At a Welwitschia locality.		2114AA
Dicoma cuneneensis Wild	Herb; Notes: Perennial herb, growing upright. Heads sessile, terminal.	Brandberg West: stony koppie 38.4 km west of Uis on the Uis-Brandberg West road. Oritsaub, east-south-eastern side of Brandberg.		2114AA
Diospyros acocksii (De Winter) De Winter	1.35 m high; Shrub; Notes: Densely much-branched shrub, 1.35 m high. Flowers white. Fruits green.	Uis. Oritsaub, OSO side of Brandberg.		2114AA
Dipcadi platyphyllum Baker	Notes: Vley - like sandy plain. Quoted in:Prodromus einer Flora von Sdwestafrika 147:42 (1970).	Omaruru: (Namib) : Brandberg. Oritgaub.(Southern side).		2114AA
Engleria africana O.Hoffm.	40 cm high; Herb; Notes: Perennial herbs, 40 cm high. Flowers yellow.	Uis. Brandberg West, stony koppie 38.4 km of Uis on the Uis-Brandberg west road. Oritsaub, ESE side of Brandberg.		2114AA
Enneapogon scaber Lehm.	5 cm high; Graminoid; Notes: On dwarf ephemeral grass only 5 cm tall, in flower 2 - 3 weeks often light shower of rain on red andersite lava rubble flats.	30 km south-west of Brandberg West Mine.		2114AA
Enneapogon scaber Lehm.	15 cm high; Graminoid; Notes: Perennial grass 15 cm high.	On the track Brandberg West Mine to Gai-as.		2114AA
Enneapogon scoparius Stapf	Graminoid; Notes: Rocky ground.	Brandberg vicinity.		2114AA
Enneapogon scoparius Stapf	Graminoid; Notes: Perennial grass. Leaves 5 cm long, inflorescence up to 15 cm long.	On the track Brandberg West Mine to Gai-as.		2114AA
Eragrostis nindensis Ficalho & Hiern	Graminoid; Notes: Perennial grass in clumps, internodes enlarged and yellow.	Brandberg Mountain.		2114AA

Eremiolirion amboense (Schinz) J.C.Manning & C.A.Mannheimer	Notes: Flat, white bulb. Leaves two. Only found fruiting. In depression with coarse sand below slope.	Uis. Omaruru. 16 miles east of Brandberg West Mine on road to Uis.		2114AA
Eriospermum rautanenii Schinz	Geophyte; Notes: Plant with corm. Growing on granite grave.	Omaruru district. Uis. 45 miles from Brandberg West Mine on road to Uis.		2114AA
Euphorbia glanduligera Pax	Notes: Annual, very common.	Brandberg Mountain. Found at base of Brandberg and on mountain sides.		2114AA
Euphorbia glanduligera Pax	Notes: Annual plant, gravel pockets on rocky ground.	Brandberg West mine vicinity, at the parting of the roads: Brandberg West Mine - Brandberg (on the road from Cape Cross) Welwitschia locality.		2114AA
Euphorbia guerichiana Pax	Notes: Gravel pockets, crevices.	Brandberg West Mine vicinity, at the parting of the roads: Brandberg West Mine - Brandberg (on the road from Cape Cross) Welwitschia locality.		2114AA
Euphorbia guerichiana Pax	Tree; Notes: Small tree with milky latex; peeling bark. Light green, clustered leaves. Not common.	Omaruru district. Brandberg Mountain.		2114AA
Euphorbia prostrata Aiton	Notes: Shaded by granite boulders. Annual, prostrate, with green fruits. Only 2 seen.	Omaruru district. Amis - western side arm of Brandberg.		2114AA
Felicia clavipilosa Grau subsp. clavipilosa	Dwarf shrub; Notes: Dwarfshrub, rayflorets light blue, disc florets yellow. Quoted in: Mitt. Bot. Mnchen 9: 366 (4: 1973) do 11: 359 (12, 1974) by J. Grau.	Upper Numas valley.		2114AA
Gomphocarpus filiformis (E.Mey.) Dietr.	Shrub; Notes: Upright, fasciculate shrub, silver grey hairy.	Uis. Almost bare mountains about 62 miles from Cape Cross on road to Brandberg West Mine.		2114AA
Gossypium anomalum Wawra ex Wawra & Peyr. subsp. anomalum	2 m high; Shrub; Notes: Many-stemmed shrubs, 2 m high, much-branched. Flowers pink-red.	4 km from the turn-off Brandberg West road to Gai-as, in riverbed.		2114AA
Grewia flava DC.	Notes: Small, bush-like tree, full of flowers. Streaked grey stem. Leaves much lighter below.	Uis. Brandberg Mountain.		2114AA
Helinus integrifolius (Lam.) Kuntze	Creeper; Notes: Creepers over shrubs but also forms big shrubly clumps. Thin streaked brown	Brandberg Mountain.		2114AA

	stems with tiny flowers.			
Hermannia amabilis Marloth ex K.Schum.	Herb; Notes: Up to 80cm high. Forb. Flowers white, hanging on horizontally protruding peduncle	Uis. River road to Brandberg West Mine. Coarse sand.		2114AA
Hermannia amabilis Marloth ex K.Schum.	80 cm high; Herb; Notes: Perennial herbs, 80 cm high, woody at the base. Flowers in inflorescence alternate. Flowers pure white with reddish centre.	Brandberg West, in sandy riverbed.		2114AA
Hermannia amabilis Marloth ex K.Schum.	Notes: On eastern aspect, left side. About 100 m from the road. Less rocky.	Brandberg: about 2 km behind intersection 2342 and 2303 on 2342.		2114AA
Hermannia helianthemum K.Schum.	Notes: With dark purple flowers and green calyx. Erect perennial. Sandy ground between rocks, not common.	Brandberg Mountain.		2114AA
Hermannia helianthemum K.Schum.	Notes: Among cliffs at the water pools, gravel, pockets.	Omaruru District. Brandberg vicinity, track: Brandberg West Mine - Us Mine road, 13 miles from the Uis Mine road.		2114AA
Hermannia modesta (Ehrenb.) Mast.	Notes: Small koppie, isolated on the gravel - stone flat.	Brandberg vicinity. Track: Brandberg West Mine road, 13 miles from the Uis Mine road.		2114AA
Hermbstaedtia spathulifolia (Engl.) Baker	15 cm high; Herb; Notes: Perennial. Flowers with pink stamens.	On the track Brandberg West Mine to Gai - as.		2114AA
Hibiscus caesius Garcke var. caesius	Notes: Growing in the shelter of Acacias. Leaves palmate, big, showy yellow flowers with dark red base. Exterior calyx with long, narrow star-shaped rays. Buds red.	Otjimbingwe.		2114AA
Hibiscus castroi Baker f. & Exell var. castroi	Shrub; Notes: Shrub, up to 80 cm. Flowers white, with epicalyx. Stems grey, young ones paler - green.	Sonuseb - Bandberg.		2114AA
Hoodia currorii (Hook.) Decne. subsp. currorii	Flowers flesh coloured and extremely hairy.	Road to Brandberg West Mine. About 119 km north of Henties Bay on road to Brandberg West Mine.	Growing on basalt ridge.	2114AA
Indigofera auricoma E.Mey.	Notes: Growing in Welwitschia location.	Uis. Brandberg West Mine. West of the mountain. Below cliffs.		2114AA

Indigofera heterotricha DC. subsp. heterotricha	Notes: Low bush. Stems grey, woody. All new growth green, sticky and smelly. Flowers many, rose-coloured. Young pods green, hairy and sticky.	Uis. Brandberg Mountain.		2114AA
Indigofera heterotricha DC. subsp. pechuelii (Kuntze) Schrire	70 cm high; Shrub; Notes: Perennial, much branched shrub, 70 cm high. Flowers red.	Uis. Brandberg West, in sandy riverbed.		2114AA
Jamesbrittenia hereroensis (Engl.) Hilliard	Notes: Annual, under rock, sandy ground. Flowers lilac with dark part around tube and almost yellow centre.	Brandberg.		2114AA
Kalanchoe lanceolata (Forssk.) Pers.	Notes: Flowers yellow.	Upper Numas valley, Brandberg.		2114AA
Lapeirousia littoralis Baker subsp. littoralis	Notes: In sand on the rocky ground. Flowers yellow-white. Rather common here.	Brandberg vicinity, track Brandberg West Mine - Uis Mine road.		2114AA
Lipocarpha rehmannii (Ridl.) Goetgh.		Brandberg, between Knigstein and upper Tsisab.	Growing in damp, sandy patches in stony, steep watercourse.	2114AA
Lycium bosciifolium Schinz	Shrub; Notes: Big clump of shrubs, woody grey, flowers tubular dried.	Damaraland - just south of Brandberg - west road near Brandberg Mine.		2114AA
Lycium eenii S.Moore	Shrub; Notes: Decumbent and upright shrubs, up to 1.20 m tall. Flowers white with violet stigma, up to 2.5 cm long tube.	Brandberg, Numas gorge. At mountain.		2114AA
Maerua schinzii Pax	Tree; Notes: Trees with grey-black, smooth bark and spherical crown. Leaves: blue-green. In riverbed.	OM, Nb. Somewhat east of Brandberg West Mine.		2114AA
Maerua schinzii Pax	Tree; Notes: Trees with dark grey, smooth bark, up to 4 m high. Fruits pearl thread-like. Fruit flesh sweet, sticky. Occasional, with A. reficiens (in flower).	OM. Nb. River at Brandberg West Mine.		2114AA
Marcelliopsis splendens (Schinz) Schinz	45 cm high; Herb; Notes: Upright growing. Inflorescences a spike with dark red flowers.	Brandberg West; Stony koppie 38,4 kilometres west of Uis on the Ui-Brandberg road. Oritsaub, east - south - east of Brandberg.		2114AA

Marcelliopsis splendens (Schinz) Schinz		Sonuseb, near top.		2114AA
Mentha longifolia (L.) Huds. subsp. wissii (Launert) Codd	Notes: Only green plant found on mountain, growing at the base of Cyphostemma, getting moisture from pulpy dead base. Very distinctive odour. Bothalia 14,2: 170 (1983).	Brandberg.		2114AA
Merremia guerichii A.Meeuse	Notes: Spreading, prostrate, up to 1.5 m in diameter. Young shoots procumbent, later again decumbent. Flowers funnel-shaped, deep cream-coloured with dark wine-red base. Occasional.	24 km south-west of Brandberg West Mine. On otherwise bare Karoo schist plains.		2114AA
Monandrus squarrosus (l.) vorster s		Brandberg vicinity.	Growing in dried-up water pools on rocky ground with sand and gravel.	2114AA
Monechma cleomoides (S.Moore) C.B.Clarke	Dwarf shrub, more-or-less spherical, 0.45 m in diameter. Flowers blue with fish-bone pattern on pale area on lower lip.	Some 45 km east of coast, north of Omaruru River, in small watercourse.	Growing on quartz-gravel plain.	2114AA
Monechma cleomoides (S.Moore) C.B.Clarke	Shrub 0.60 m high. Bark white, densely hairy.	Brandberg West.	Common. Growing on slopes of Numas ravine.	2114AA
Monechma cleomoides (S.Moore) C.B.Clarke	Spherical shrubs, densely hairy, 0.45 m high and 50 cm in diameter. Flowers purple-blue with dark venation and yellowish throat.	Mountain pass, 35 km east of Torra Bay, in mountain.	Growing on mountains.	2114AA
Monechma desertorum (Engl.) C.B.Clarke	Flowers white.	Some 63 km north east of Henties Bay on road to Uis - sand plains.	Growing on plain.	2114AA
Monechma genistifolium (Engl.) C.B.Clarke subsp. genistifolium	Flowers blue.	Some 63 km north east of Henties Bay on road to Uis, sandy plains.		2114AA
Moringa ovalifolia Dinter & A.Berger	Tree 3 m high, single stemmed. Flowers white, in clusters.	Brandberg; Numas Gorge; on Southfacing slope.		2114AA
Myxopappus hereroensis (O.Hoffm.) Källersjö	Notes: Annual, flowers - yellow, few, under rock c 1694.	Brandberg - base of mountain between Nuwuarib and Sonuseb.		2114AA
Nemesia fruticans (Thunb.) Benth.	Notes: Altitude 1800-1900m. Quoted in: Prodromus einer Flora von Sdwestafrika 126:36 (1967) as	Brandberg. At Numas river.		2114AA

	N.fruticans (Thunb.) Benth.			
Oncocalyx welwitschii (Engl.) Polhill & Wiens	Parasite; Notes: Parasite on Boscia foetida. Flowers yellow.	Uis. Brandberg west, in sandy riverbed.		2114AA
Ozoroa crassinervia (Engl.) R.Fern. & A.Fern.	Tree; Notes: Single stemmed tree, 3.5 m high. Leaves smooth and leathery. Stony koppie.	Omaruru district. Brandberg west; 38.4 km west of Uis on the Uis-Brandberg west road. Oritsaub, east-south-east side of Brandberg.		2114AA
Pavonia rehmannii Szyszyl.	Notes: Light yellow flowers on quartz vein.	Omaruru District: 54 miles from Brandberg West Mine on Uis road.		2114AA
Pavonia senegalensis (Cav.) Leistner		Uis: Brandberg West: Stony koppie 38,4 km W of Uis on the Uis-Brandberg west road. Oritsaub, OSO side of Brandberg.		2114AA
Petalidium canescens (Engl.) C.B.Clarke		Brandberg: about 2 km behind intersection 2342 and 2303 on 2342. On eastern aspect, left side. About 100 m from the road.	Abundant. Growing on mica schist surface, with an aspect 2½ - 10½ NE. Full sun.	2114AA
Petalidium variabile (Engl.) C.B.Clarke var. spectabile Mildbr.	Shrubs 0.25 m high. Flowers pink-red.	On the track Brandberg West Mine to Gai-as.		2114AA
Petalidium variabile (Engl.) C.B.Clarke var. spectabile Mildbr.	Sometimes the leaves in one area vary considerably in colour.	Damaraland, all over West Brandberg area and dry parts of Twyfelfontein.	Very common in patches.	2114AA
Philyrophyllum brandbergense P.P.J.Herman	Notes: Heads yellow. Few. Up to 40 cm tall.	Brandberg - Amis.		2114AA
Philyrophyllum schinzii O.Hoffm.	subshrub; Notes: shrub, tainy stems. Flowers yellow, smelly.	Brandberg. Pager Plain near 'Whale Rock'.		2114AA
Phyllanthus maderaspatensis L.	Herb; Notes: Erect herb with whitish stems, common, between the rocks, near the base of mountain. Tiny, green fruits.	Omaruru district. Brandberg Mountain.		2114AA
Phyllanthus pentandrus Schumach. & Thonn.	35 cm high; Herb; Notes: Annual herb, 35 cm high. With fruits.	Brandberg West; stony koppie 38.4 km west of Uis on the Uis - Brandberg west road. Oritsaub, east-south-east of Brandberg.		2114AA
Rhynchosia minima (L.) DC. var. minima	Notes: Perennial, low densely spreading. 1 m wide and 60 cm tall. Sticky leaves.	On top of the Tsisab Spitze amongst boulders. Brandberg.		2114AA
Ruellia marlothii Engl.	A perennial sub-shrub, about 0.60 m high. Flowers white to purple.	Brandberg west.	Common.	2114AA
Salvadora persica L. var. persica	bush; Notes: Spreading bush 10 feet. Common.	In valley of Brandberg.		2114AA

Salvadora persica L. var. persica	Tree; Notes: Small tree 10 to 12 feet high, light green succulent leaves; flowers yellow-green; spherical pearly berries 1/8 inch in diameter.	About 5 miles on road to Uis from turn-off on road to Brandberg West Mine.		2114AA
Sarcocaulon marlothii Engl.	Notes: Like 1690 but without thorns. Only few tiny ones at tips of branches. Bark very waxy, out of the gulley, like 1690. Leaves more sparse and smaller.	Bloedkoppie.		2114AA
Sarcocaulon marlothii Engl.	Notes: Thorns straight, white, plentiful. Flowers pink, large shrub, on western side.	Bloedkoppie.		2114AA
Sericocoma heterochiton Lopr.	Herb; Notes: Furry spikes with brown bases on green stems. Main stems grey & woody. Erect herb up to 2 feet. Not common.	Brandberg Mountain.		2114AA
Sesamum capense Burm.f.	Notes: Upright forb, up to 1,3 m high, blue-green. Flowers hairy on the outside, light purple with dark carmine violet throat and lower lobe and somewhat yellowish edge of the dark part.	Riverentrance to the Brandberg West Mine. Coarse sand.		2114AA
Sesamum sp.	50 cm high; Herb; Notes: Semi-erect perennial herb, 50 cm high, woody a the base. Flowers pink.	Brandberg-west, in sandy riverbed.		2114AA
Setaria verticillata (L.) P.Beauv.	Graminoid; Notes: Fairly common. Found only in very dry, sandy soil.	In Ugab River 2 km east of Brandberg West Mine.		2114AA
Stipagrostis giessii Kers	Graminoid; Notes: Below cliffs in sand.	Brandberg West Mine vicinity, at the parting of the roads: B.W. Mine-Brandberg (on the road from Cape Cross). Welwitschia locality.		2114AA
Stipagrostis giessii Kers	Graminoid; Notes: Braod sandy river with Acacia trees.	Omaruru. Brandberg vicinity, along the road: Uis Mine-Hentiesbay. Near Uis Mine. Native huts.		2114AA
Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. pearsonii (Henrard) De Winter	45 cm high; Graminoid; Notes: Perennial grass 45 cm high.	On the track Brandberg West Mine to Gai-as.		2114AA
Stipagrostis hochstetteriana (Beck ex Hack.) De Winter var. secalina (Henrard) De Winter	45 cm high; Graminoid; Notes: Perennial grass, 45 cm high. Heavily grazed.	On the track Brandberg West Mine to Gai -as.		2114AA

Stipagrostis hochstetteriana (Beck ex Hack.) De Winter var. secalina (Henrard) De Winter	Graminoid;	Uis - Brandberg (west), Welwithschia location.		2114AA
Stipagrostis hochstetteriana (Beck ex Hack.) De Winter var. secalina (Henrard) De Winter	45 cm high; Graminoid; Notes: Perennial grass, 45 cm high, heavily grazed.	On the track Brandberg West Mine to Gai-as.		2114AA
Stipagrostis namaquensis (Nees) De Winter	1.2 m high; Graminoid; Notes: Perennial grass, 1.2 m high.	4 km from the turn-off Brandberg-West road to Gai-as, in riverbed.		2114AA
Stipagrostis obtusa (Delile) Nees	Graminoid; Notes: Caespitose annual. Abundant on gravel.	Matchesless Tin Mine. (Namib).		2114AA
Stipagrostis subacaulis (Nees) De Winter	Graminoid;	Short grass on plains north of Cape Cross on road to Brandberg West Mine.		2114AA
Stipagrostis uniplumis (Licht.) De Winter var. uniplumis	Graminoid;	Brandberg West Mine vicinity. Towards Brandberg.		2114AA
Syncolostemon floccosus (Launert) D.F. Otieno		Brandberg. Between Sonuseb and Nuwarib, near base of mountain.		2114AA
Tephrosia dregeana E.Mey. var. capillipes (Welw. ex Baker) Torre	Notes: Broad sandy river with Acacia reficiens.	Brandberg vicinity, west of the mountain, along the track from Brandberg West Mine. Welwitschia location.		2114AA
Tinnea rhodesiana S.Moore	Shrub; Notes: Tall shrub or shrub with dark pea-like flowers - brouny red with 2 yellow marks. Inflated, soft, green fruits. Brouny stems up to 6 feet tall, woody.	Brandberg mountain.		2114AA
Tinnea rhodesiana S.Moore		Higher Sonuseb.		2114AA
Tribulus zeyheri Sond. subsp. zeyheri	Notes: Base of mountain in rocky ground. Ver common.	Brandberg mountain.		2114AA
Triraphis ramosissima Hack.	Graminoid; Notes: Broad sandy river with Acacia trees.	Brandberg vicinity, along the road: Uis Mine - Henties Bay. Near Uis Mine. Native Huts.		2114AA
Typha capensis (Rohrb.) N.E.Br.		Brandberg. Obeus Numastal.		2114AA
Welwitschia mirabilis Hook.f.		South of Brandberg on road to Uis.		2114AA
Welwitschia mirabilis Hook.f.	Large and small plants 2 leaves from a woody base. Female plant.	On road to Brandberg West from Cape Cross, about 5 miles from the Atlantic Ocean.	Very common. Growing in sand and gravel.	2114AA
Welwitschia mirabilis Hook.f.	Female plant.	On road from Brandberg West to Uis.	Growing on barren gravel and in shallow dry river beds in sand, very dry with only an occasional Acacia tree, and a few dry grasses.	2114AA
Welwitschia mirabilis Hook.f.	Male plant.	Uis. South of Brandberg on road from Brandberg West to Uis.	Growing on barren gravel and in shallow dry riverbeds in sand, very dry with only an Acacia tree and a few dry grasses.	2114AA

Welwitschia mirabilis Hook.f.	Leaves 1 m long. Female cones.	Uis. Brandberg West, in sandy riverbed.		2114AA
Welwitschia mirabilis Hook.f.	Large and small plants with2 leaves from a woody base. Male plant.	On road to Brandberg West from Cape Cross, about 8 km from the Atlantic Ocean.	Very common in this coastal region. Growing in sand and gravel.	2114AA
Xerophyta squarrosa Baker	Notes: Dry remains lonly, plentiful, c 1691, hald way up mountains.	Uis. Brandberg.		2114AA

SPECIES	QDS
Acacia reficiens Wawra subsp. reficiens	2114AA
Acrotome fleckii (Gürke) Launert	2114AA
Adenolobus pechuelii (Kuntze) Torre & Hillc. subsp. mossamedensis (Torre & Hillc.) Brummitt & J.H.R	2114AA
Aloe asperifolia A.Berger	2114AA
Amphiasma merenskyanum Bremek.	2114AA
Anthephora pubescens Nees	2114AA
Anticharis ebracteata Schinz	2114AA
Anticharis imbricata Schinz	2114AA
Aponogeton desertorum Zeyh. ex A.Spreng.	2114AA
Aristida parvula (Nees) De Winter	2114AA
Barleria grootbergensis I.Darbysh. & E.A. Tripp	2114AA
Barleria merxmuelleri P.G.Mey.	2114AA
Barleria solitaria P.G.Mey.	2114AA
Berkheya spinosissima (Thunb.) Willd. subsp. spinosissima	2114AA
Boerhavia deserticola Codd	2114AA
Boerhavia hereroensis Heimerl	2114AA
Brachiaria glomerata (Hack.) A.Camus	2114AA
Cadaba schroeppelii Suess. ex Suess. & Merxm.	2114AA
Cardiospermum pechuelii Kuntze	2114AA
Centropodia mossamedensis (Rendle) Cope	2114AA
Cheilanthes dinteri Brause	2114AA
Cleome foliosa Hook.f. var. lutea (Sond.) Codd & Kers	2114AA
Cleome paxii (Schinz) Gilg & Gilg-Ben.	2114AA
Cleome semitetrandra Sond.	2114AA
Commiphora kraeuseliana Heine	2114AA
Commiphora saxicola Engl.	2114AA
Commiphora wildii Merxm.	2114AA
Corchorus merxmuelleri Wild	2114AA
Cordia sinensis Lam.	2114AA
Cordia sp. C	2114AA
Cotyledon orbiculata L. var. orbiculata	2114AA
Crotalaria platysepala Harv.	2114AA
Cyperus laevigatus L.	2114AA
Dicoma capensis Less.	2114AA

Dicoma cuneneensis Wild	2114AA
Diospyros acocksii (De Winter) De Winter	2114AA
Dipcadi platyphyllum Baker	2114AA
Engleria africana O.Hoffm.	2114AA
Enneapogon scaber Lehm.	2114AA
Enneapogon scoparius Stapf	2114AA
Eragrostis nindensis Ficalho & Hiern	2114AA
Eremiolirion amboense (Schinz) J.C.Manning & C.A.Mannheimer	2114AA
Eriospermum rautanenii Schinz	2114AA
Euphorbia glanduligera Pax	2114AA
Euphorbia guerichiana Pax	2114AA
Euphorbia prostrata Aiton	2114AA
Felicia clavipilosa Grau subsp. clavipilosa	2114AA
Gomphocarpus filiformis (E.Mey.) Dietr.	2114AA
Gossypium anomalum Wawra ex Wawra & Peyr. subsp. anomalum	2114AA
Grewia flava DC.	2114AA
Helinus integrifolius (Lam.) Kuntze	2114AA
Hermannia amabilis Marloth ex K.Schum.	2114AA
Hermannia helianthemum K.Schum.	2114AA
Hermannia modesta (Ehrenb.) Mast.	2114AA
Hermbstaedtia spathulifolia (Engl.) Baker	2114AA
Hibiscus caesius Garcke var. caesius	2114AA
Hibiscus castroi Baker f. & Exell var. castroi	2114AA
Hoodia currorii (Hook.) Decne. subsp. currorii	2114AA
Indigofera auricoma E.Mey.	2114AA
Indigofera heterotricha DC. subsp. heterotricha	2114AA
Indigofera heterotricha DC. subsp. pechuelii (Kuntze) Schrire	2114AA
Jamesbrittenia hereroensis (Engl.) Hilliard	2114AA
Kalanchoe lanceolata (Forssk.) Pers.	2114AA
Lapeirousia littoralis Baker subsp. littoralis	2114AA
Lipocarpha rehmannii (Ridl.) Goetgh.	2114AA
Lycium bosciifolium Schinz	2114AA
Lycium eenii S.Moore	2114AA
Maerua schinzii Pax	2114AA
Marcelliopsis splendens (Schinz) Schinz	2114AA
Mentha longifolia (L.) Huds. subsp. wissii (Launert) Codd	2114AA
Merremia guerichii A.Meeuse	2114AA
Monandrus squarrosus (l.) vorster s	2114AA
Monechma cleomoides (S.Moore) C.B.Clarke	2114AA
Monechma desertorum (Engl.) C.B.Clarke	2114AA
Monechma genistifolium (Engl.) C.B.Clarke subsp. genistifolium	2114AA
Moringa ovalifolia Dinter & A.Berger	2114AA
Myxopappus hereroensis (O.Hoffm.) Källersjö	2114AA

Nemesia fruticans (Thunb.) Benth.	2114AA
Oncocalyx welwitschii (Engl.) Polhill & Wiens	2114AA
Ozoroa crassinervia (Engl.) R.Fern. & A.Fern.	2114AA
Pavonia rehmannii Szyszyl.	2114AA
Pavonia senegalensis (Cav.) Leistner	2114AA
Petalidium canescens (Engl.) C.B.Clarke	2114AA
Petalidium variabile (Engl.) C.B.Clarke var. spectabile Mildbr.	2114AA
Philyrophyllum brandbergense P.P.J.Herman	2114AA
Philyrophyllum schinzii O.Hoffm.	2114AA
Phyllanthus maderaspatensis L.	2114AA
Phyllanthus pentandrus Schumach. & Thonn.	2114AA
Rhynchosia minima (L.) DC. var. minima	2114AA
Ruellia marlothii Engl.	2114AA
Salvadora persica L. var. persica	2114AA
Sarcocaulon marlothii Engl.	2114AA
Sericocoma heterochiton Lopr.	2114AA
Sesamum capense Burm.f.	2114AA
Sesamum sp.	2114AA
Setaria verticillata (L.) P.Beauv.	2114AA
Stipagrostis giessii Kers	2114AA
Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. pearsonii (Henrard) De Winter	2114AA
Stipagrostis hochstetteriana (Beck ex Hack.) De Winter var. secalina (Henrard) De Winter	2114AA
Stipagrostis namaquensis (Nees) De Winter	2114AA
Stipagrostis obtusa (Delile) Nees	2114AA
Stipagrostis subacaulis (Nees) De Winter	2114AA
Stipagrostis uniplumis (Licht.) De Winter var. uniplumis	2114AA
Syncolostemon floccosus (Launert) D.F. Otieno	2114AA
Tephrosia dregeana E.Mey. var. capillipes (Welw. ex Baker) Torre	2114AA
Tinnea rhodesiana S.Moore	2114AA
Tribulus zeyheri Sond. subsp. zeyheri	2114AA
Triraphis ramosissima Hack.	2114AA
Typha capensis (Rohrb.) N.E.Br.	2114AA
Welwitschia mirabilis Hook.f.	2114AA
Xerophyta squarrosa Baker	2114AA

SPECIES	ENDEMISM	POISONOUS	PROTECTED	IUCN2
Acacia reficiens Wawra subsp. reficiens				
Acrotome fleckii (Gürke) Launert	Endemic			
Adenolobus pechuelii (Kuntze) Torre & Hillc. subsp. mossamedensis (Torre & Hillc.) Brummitt & J.H.R			Protected	
Aloe asperifolia A.Berger	Endemic		Protected	
Amphiasma merenskyanum Bremek.	Near Endemic			
Anthephora pubescens Nees				

Anticharis ebracteata Schinz	Endemic			
Anticharis imbricata Schinz	Endemic			
Aponogeton desertorum Zeyh. ex A.Spreng.				
Aristida parvula (Nees) De Winter				
Barleria grootbergensis I.Darbysh. & E.A. Tripp				
Barleria merxmuelleri P.G.Mey.	Endemic			
Barleria solitaria P.G.Mey.	Endemic			
Berkheya spinosissima (Thunb.) Willd. subsp. spinosissima				
Boerhavia deserticola Codd	Endemic			
Boerhavia hereroensis Heimerl				
Brachiaria glomerata (Hack.) A.Camus				
Cadaba schroeppelii Suess. ex Suess. & Merxm.				
Cardiospermum pechuelii Kuntze				
Centropodia mossamedensis (Rendle) Cope				
Cheilanthes dinteri Brause				
Cleome foliosa Hook.f. var. lutea (Sond.) Codd & Kers				
Cleome paxii (Schinz) Gilg & Gilg-Ben.				
Cleome semitetrandra Sond.				
Commiphora kraeuseliana Heine	Endemic			
Commiphora saxicola Engl.	Endemic			
Commiphora wildii Merxm.				
Corchorus merxmuelleri Wild	Endemic			
Cordia sinensis Lam.				
Cordia sp. C				
Cotyledon orbiculata L. var. orbiculata		poisonous		
Crotalaria platysepala Harv.				
Cyperus laevigatus L.				
Dicoma capensis Less.				
Dicoma cuneneensis Wild				
Diospyros acocksii (De Winter) De Winter				
Dipcadi platyphyllum Baker				
Engleria africana O.Hoffm.				
Enneapogon scaber Lehm.				
Enneapogon scoparius Stapf				
Eragrostis nindensis Ficalho & Hiern				
Eremiolirion amboense (Schinz) J.C.Manning & C.A.Mannheimer	Endemic			Near Threatened
Eriospermum rautanenii Schinz				
Euphorbia glanduligera Pax				
Euphorbia guerichiana Pax				
Euphorbia prostrata Aiton				
Felicia clavipilosa Grau subsp. clavipilosa				
Gomphocarpus filiformis (E.Mey.) Dietr.				

Gossypium anomalum Wawra ex Wawra & Peyr. subsp. anomalum				
Grewia flava DC.				
Helinus integrifolius (Lam.) Kuntze				
Hermannia amabilis Marloth ex K.Schum.	Endemic			
Hermannia helianthemum K.Schum.				
Hermannia modesta (Ehrenb.) Mast.				
Hermbstaedtia spathulifolia (Engl.) Baker	Endemic			
Hibiscus caesius Garcke var. caesius				
Hibiscus castroi Baker f. & Exell var. castroi				
Hoodia currorii (Hook.) Decne. subsp. currorii			Protected	
Indigofera auricoma E.Mey.				
Indigofera heterotricha DC. subsp. heterotricha				
Indigofera heterotricha DC. subsp. pechuelii (Kuntze) Schrire				
Jamesbrittenia hereroensis (Engl.) Hilliard	Endemic			
Kalanchoe lanceolata (Forssk.) Pers.		poisonous		
Lapeirousia littoralis Baker subsp. littoralis				
Lipocarpha rehmannii (Ridl.) Goetgh.				
Lycium bosciifolium Schinz				
Lycium eenii S.Moore				
Maerua schinzii Pax			Forestry Protected	
Marcelliopsis splendens (Schinz) Schinz	Endemic			
Mentha longifolia (L.) Huds. subsp. wissii (Launert) Codd				
Merremia guerichii A.Meeuse	Endemic			
Monechma cleomoides (S.Moore) C.B.Clarke				
Monechma desertorum (Engl.) C.B.Clarke	Endemic			
Monechma genistifolium (Engl.) C.B.Clarke subsp. genistifolium	Endemic			
Moringa ovalifolia Dinter & A.Berger	Near Endemic		Protected	
Myxopappus hereroensis (O.Hoffm.) Källersjö	Endemic			
Oncocalyx welwitschii (Engl.) Polhill & Wiens				
Ozoroa crassinervia (Engl.) R.Fern. & A.Fern.			Protected	
Pavonia rehmannii Szyszyl.	Endemic			
Pavonia senegalensis (Cav.) Leistner				
Petalidium canescens (Engl.) C.B.Clarke	Endemic			
Petalidium variabile (Engl.) C.B.Clarke var. spectabile Mildbr.	Endemic			
Philyrophyllum brandbergense P.P.J.Herman	Endemic			
Philyrophyllum schinzii O.Hoffm.				
Phyllanthus maderaspatensis L.				
Phyllanthus pentandrus Schumach. & Thonn.				
Rhynchosia minima (L.) DC. var. minima				
Ruellia marlothii Engl.				
Salvadora persica L. var. persica				
Sarcocaulon marlothii Engl.	Endemic			

Sericocoma heterochiton Lopr.				
Sesamum capense Burm.f.				
Setaria verticillata (L.) P.Beauv.				
Stipagrostis giessii Kers				
Stipagrostis hirtigluma (Steud. ex Trin. & Rupr.) De Winter subsp. pearsonii (Henrard) De Winter				
Stipagrostis hochstetteriana (Beck ex Hack.) De Winter var. secalina (Henrard) De Winter				
Stipagrostis namaquensis (Nees) De Winter				
Stipagrostis obtusa (Delile) Nees				
Stipagrostis subacaulis (Nees) De Winter				
Stipagrostis uniplumis (Licht.) De Winter var. uniplumis				
Syncolostemon floccosus (Launert) D.F. Otieno	Endemic			Near Threatened
Tinnea rhodesiana S.Moore				
Tribulus zeyheri Sond. subsp. zeyheri				
Triraphis ramosissima Hack.				
Typha capensis (Rohrb.) N.E.Br.				
Welwitschia mirabilis Hook.f.	Near Endemic		Protected	
Xerophyta squarrosa Baker				

APPENDIX F – ECC CVs