

APP-002241
PROPOSED WLOTZKASBAKEN TOWNSHIP DEVELOPMENT,
ERONGO REGION, NAMIBIA

ENVIRONMENTAL ASSESSMENT
SCOPING REPORT




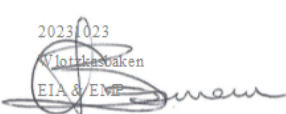
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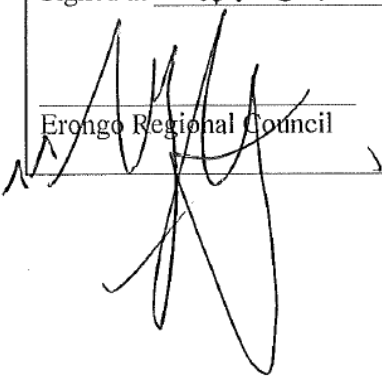
September 2023

Project:	PROPOSED WLOTZKASBAKEN TOWNSHIP DEVELOPMENT, ERONGO REGION, NAMIBIA, ENVIRONMENTAL ASSESSMENT SCOPING REPORT	
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Report Approval	 André Faul Environmental Assessment Practitioner	 Quzette Bosman Environmental Assessment Practitioner

Client Declaration

I Louis Esterhuysen acting as a representative of Erongo Regional Council hereby confirm that the project description contained in this report is a true reflection of the information which the Proponent provided to Geo Pollution Technologies. All material information in the possession of the proponent that reasonably has or may have the potential of influencing any decision or the objectivity of this assessment is fairly represented in this report and the report is hereby approved.

Signed at Windhoek on the 23RD day of OCTOBER 2023.


Erongo Regional Council

EXECUTIVE SUMMARY

The Erongo Regional Council requested Geo Pollution Technologies (Pty) Ltd to undertake an environmental assessment for the proposed Wlotzkasbaken Township Development Extension 1 and 2. Spatial planning is required for the intended development of the township and includes consideration of biophysical features, social structure and economic opportunities. The establishment of the township is an ongoing process facilitated by Winplan Town and Regional Planning Consultants. The environmental assessment will take into consideration 1) the location and footprint of the proposed township; 2) construction activities pertaining to the provision of services such as water and electricity supply and roads; and an operational phase which entails the management and periodic maintenance and repairs required on services infrastructure and the management and disposal of waste and sewage (i.e. municipal/town council services).

The project will entail the provision of approximately 522 erven of varying land use and zoning. The proposed layout will include a new central business district, residential areas, institutional areas and public open spaces. The layout makes provision for two extensions, Extension 1 and Extension 2. The local authority aims to create a spatial layout that will ultimately provide a variety of choice for future inhabitants.

Due to the nature and location of the proposed establishment, impacts can be expected on the surrounding environment. The project area is surrounded by undeveloped townlands and the Dorob National Park, with the existing Wlotzkasbaken Township nearby. During the construction and operational phases of the township, it is recommended that environmental performance be monitored regularly to ensure regulatory compliance and that corrective measures be taken if necessary.

The major concerns related to the township development is changes to the sense of place, security risks and habitat loss. Adherence to relevant Namibian legislation and the recommendations of the management measures proposed in this report is therefore important. Health and safety regulations of the Labour Act of Namibia should be adhered to, to protect all workers who will be present on site. Workers must also be adequately trained to perform their respective duties and be issued with appropriate personal protective equipment. Waste should be regularly collected and disposed of at registered waste disposal facilities. Noise should meet the minimum requirements of the Labour Act's Health and Safety Regulations and/or World Health Organisation guidelines on community noise. Workers who will be present on site must be educated about the importance of biodiversity and access to ecologically sensitive areas, such as the dolerite ridge, must be restricted. By appointing local contractors and employees and implementing educational programs, the positive socio-economic impacts can be maximised while mitigating any negative impacts.

The environmental management plan included in section 10 of this document should be used as an on-site reference document during all phases (planning, construction, operations and decommissioning) of the project. All monitoring and records kept should be included in a report to ensure compliance with the environmental management plan. Parties responsible for transgression of the environmental management plan should be held responsible for any rehabilitation that may need to be undertaken. A health, safety, environment and quality policy, or similar, could be used in conjunction with the environmental management plan. Workers and responsible personnel must be taught the contents of these documents. National regulations and guidelines must be adhered to and monitored regularly as outlined in the environmental management plan.

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List of Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
CITES	Convention on International Trade in Endangered Species
DEA	Department of Environmental Affairs
DEA	Directorate of Environmental Affairs
EA	Environmental Assessment
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act, 2007 (Act no. 7 of 2007)
EMP	Environmental Management Plan
EMS	Environmental Management System
EPL	Exclusive Prospecting Licence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPT	Geo Pollution Technologies (Pty) Ltd
HDPE	High Density Polyethylene
HIV	Human Immunodeficiency Virus
HMV	Heavy Motor Vehicle
IAP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resource Management
Km	Kilometre
kV	Kilovolt
M	Meter
m/s	Meter per second
m³	Cubic meter
MAWLR	Ministry of Agriculture, Water and Land Reform
mbs	Meters below surface
MEFT	Ministry of Environment, Forestry and Tourism
mm/a	Millimetres per annum
MSDS	Material Safety Data Sheet
NGO	Non-Government Organisation
°C	Degrees Celsius
PPE	Personal Protective Equipment
SANS	South African National Standard
SEA	Strategic Environmental Assessment
uPVC	Unplasticized Polyvinyl Chloride
WHO	World Health Organization

Glossary of Terms

Alternatives - A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The “no-go” alternative constitutes the ‘without project’ option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Assessment - The process of collecting, organising, analysing, interpreting and communicating information relevant to decision making.

Biodiversity - The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part.

Competent Authority - means a body or person empowered under the Local Authorities Act or Environmental Management Act to enforce the rule of law.

Cumulative Impacts - in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Environment - As defined in the Environmental Assessment Policy and Environmental Management Act - “land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, palaeontological or social values”.

Environmental Assessment (EA) – Namibian terminology for a process of assessing the effects on the environment through either a scoping assessment or a combination of a scoping- and detailed assessment.

Environmental Management Plan (EMP) - A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.

Environmental Management System (EMS) - An Environment Management System, or EMS, is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of business management. An EMS ensures environmental considerations are a priority, along with other concerns such as costs, product quality, investments, and strategic planning. An EMS generally makes a positive impact on a company’s bottom line. It increases efficiency and focuses on customer needs and marketplace conditions, improving both the company’s financial and environmental performance. By using an EMS to convert environmental problems into commercial opportunities, companies usually become more competitive.

Evaluation – means the process of ascertaining the relative importance or significance of information, the light of people’s values, preference and judgements in order to make a decision.

Hazard - Anything that has the potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was present.

Interested and Affected Party (IAP) - any person, group of persons or organisation interested in, or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.

Mitigate - The implementation of practical measures to reduce adverse impacts.

Proponent (Applicant) - Any person who has submitted or intends to submit an application for an authorisation, as legislated by the Environmental Management Act no. 7 of 2007, to undertake an activity or activities identified as a listed activity or listed activities; or in any other notice published by the Minister or Ministry of Environment & Tourism.

Public - Citizens who have diverse cultural, educational, political and socio-economic characteristics. The public is not a homogeneous and unified group of people with a set of agreed common interests and aims. There is no single public. There are a number of publics, some of whom may emerge at any time during the process depending on their particular concerns and the issues involved.

Scoping Process - process of identifying: issues that will be relevant for consideration of the application; the potential environmental impacts of the proposed activity; and alternatives to the proposed activity that are feasible and reasonable.

Significant Effect/Impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment

Stakeholder Engagement - The process of engagement between stakeholders (the proponent, authorities and IAPs) during the planning, assessment, implementation and/or management of proposals or activities. The level of stakeholder engagement varies depending on the nature of the proposal or activity as well as the level of commitment by stakeholders to the process. Stakeholder engagement can therefore be described by a spectrum or continuum of increasing levels of engagement in the decision-making process. The term is considered to be more appropriate than the term “public participation”.

Stakeholders - A sub-group of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term therefore includes the proponent, authorities (both the lead authority and other authorities) and all interested and affected parties (IAPs). The principle that environmental consultants and stakeholder engagement practitioners should be independent and unbiased excludes these groups from being considered stakeholders.

1 BACKGROUND & INTRODUCTION

Geo Pollution Technologies (Pty) Ltd (GPT) was appointed by the Erongo Regional Council (the Proponent) to undertake an environmental assessment for the proposed Wlotzkasbaken Township Development Extension 1 and 2. Figure 1-1 presents the proposed township development in relation to the existing Wlotzkasbaken Township (Wlotzkasbaken Proper). Spatial planning required for the intended development of the township includes consideration of biophysical features, social structures and economic opportunities. The establishment of the township is an ongoing process facilitated by WinPlan Town and Regional Planning Consultants. The environmental assessment will take into consideration 1) the location and footprint of the proposed township; 2) construction activities pertaining to the provision of services such as water and electricity supply and roads; and 3) an operational phase which entails the management and periodic maintenance and repairs required on services infrastructure and the management and disposal of waste and sewage (i.e. municipal/town council services).

In terms of the Environmental Management Act, Act No 7 of 2007, the proposed township development requires an environmental clearance certificate (ECC). A scoping environmental assessment report and a draft environmental management plan (EMP), to accompany an application for the ECC, have therefore been commissioned. The purpose thereof is to determine the impacts the proposed township development will have on the environment. The environmental assessment scoping report and EMP will be submitted to the Ministry of Environment, Forestry and Tourism's (MEFT) Directorate of Environmental Affairs (DEA).

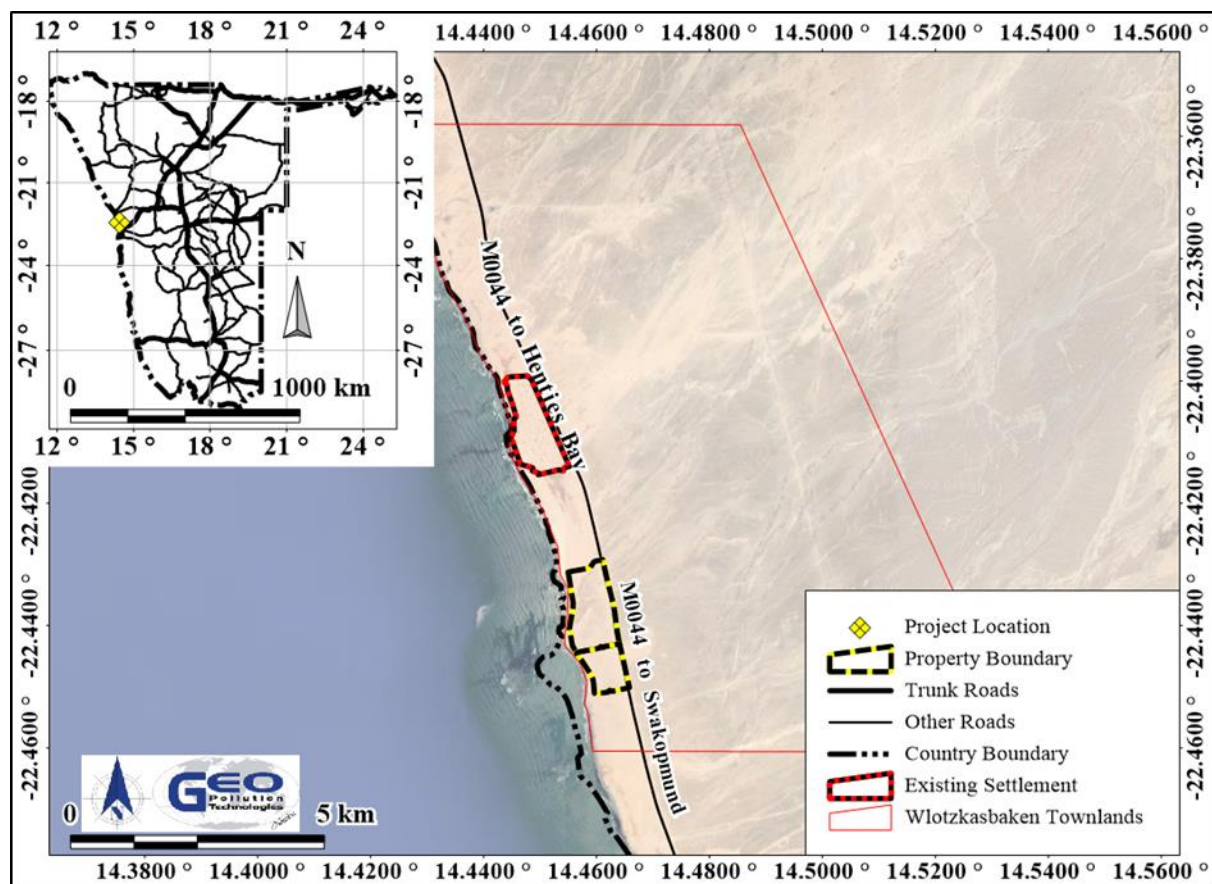


Figure 1-1 Project location

A detailed project description is provided in section 5. The potential impacts of the project on the environment, resulting from the construction and operational phases and possible decommissioning activities, were determined through the risk assessment as presented in this report.

The environment being defined in the Environmental Management Act as “land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, paleontological or social values”. The environmental assessment was conducted to apply for an ECC in compliance with Namibia’s Environmental Management Act (Act No 7 of 2007) (EMA).

Project Justification – Wlotzkasbaken, initially founded as a holiday angling area during the 1930’s, developed into mainly a holiday settlement over the last 90 years. The settlement is unique in character for Namibia and the world. With no electricity supply, connected water or sewerage, Wlotzkasbaken is the only coastal settlement in Namibia with no such formal services. Water is carted to individual houses upon request and pumped into elevated water tanks. These water tank structures are one of the unique and visually defining characteristics of the settlement. However, recent developments have seen a formalisation of the property titles and an increase of erven made available in the settlement by the Proponent, as well as the installation of a water pipeline to individual erven. Biophysical limitations around the existing settlement have mostly limited establishment of additional erven. Therefore, the Proponent has investigated township expansion south of the existing settlement. Various specialist investigations and considerations to coastal change processes informed the current and proposed development which aims at satisfying coastal property demand, especially since significantly large portions of Namibia’s coast are restricted from development by conservation initiatives.

Benefits of the project include:

- ◆ Additional residential and investment properties along the coast of Namibia,
- ◆ Creating commercial and service sector opportunities within Wlotzkasbaken,
- ◆ Employment opportunities during the construction period and operational phases,
- ◆ Maximising the use of existing proclaimed land in relation to National available coastline,
- ◆ Generation of income contributing to the regional and national treasury,
- ◆ Diversification of economic drivers in the region.

2 SCOPE

The purpose of this environmental assessment is to consider the impacts that the township development will have on the environment. Once determined, possible enhancement measures will be listed for those positive impacts while preventative and mitigation measures will be provided for negative impacts. As per the findings of this scoping report, an EMP was compiled and will be submitted with the scoping report to the DEA. These documents have been compiled in accordance with the requirements of the EMA and its regulations as to afford the DEA an objective view of expected impacts on the environment. Below follows a summarised list of the requirements of a scoping report and EMP:

- ◆ List of project benefits, need and desirability (section 1),
- ◆ Project scope (section 2)
- ◆ List of assumptions and limitations to the project (section 3)
- ◆ Description of the methodology (section 4)
- ◆ Description of project and components (section 5),
- ◆ Description of project alternatives (section 6),
- ◆ List and link of pertinent legislation (section 7),
- ◆ Description of environment and highlight of sensitive features (section 8),
- ◆ Public consultation process (section 9),
 - Proof of press and site notices,
 - Notification record, consultation,
 - Interested and Affected Party (IAP) / stakeholder list,
 - List of issues and concerns as per IAPs,
 - Provide IAPs with an opportunity to comment on SR,
 - Incorporate comments into final SR and draft EMP.
- ◆ Major identified impacts (section 10), and
- ◆ Assessment and management of impacts (section 10).

3 ASSUMPTIONS AND LIMITATIONS

Assumptions and limitations which are pertinent to this environmental assessment include the following:

3.1 ASSUMPTIONS

- ◆ Most services associated with the township development will be provided by the Proponent. These include water supply, sanitation, waste removal, road and related infrastructure maintenance, public open space management, etc. Some of these services will require the establishment of large infrastructure components such as bulk water supply lines and effluent treatment plants. Such infrastructure components will for the most part be located outside of the proposed township footprint and will be subject to separate environmental assessments, which will have to consider component specific aspects in relation to its ultimate location or route. All things remaining equal, such services will be provided as follows:
 - Bulk electricity supply to be provided by Erongo Red as sourced from NamPower (via an overhead power line to a distribution point at the township).
 - Bulk water supply to be provided by NamWater from their existing and planned bulk water supply lines (via a reservoir(s) and bulk supply pipeline up to a distribution point at the township).
 - Wastewater treatment facilities and services by the Proponent (via sewers to an effluent treatment plant via a bulk sewage line).
 - General waste management by the Proponent (collection, transportation and disposal of household waste to a registered landfill site).
- ◆ For services provision within the proposed township footprint itself, the following were proposed and will be included in the environmental assessment:
 - The provision of potable water to each erf via an underground and metered reticulation system.
 - Sewer lines from each erf via an underground sewer system.
 - General waste removal services for domestic waste via a collection system (garbage trucks).
 - The provision of electricity via underground cable systems to each erf.

3.2 LIMITATION

- ◆ No geotechnical report was available for the assessment.
- ◆ No bulk services are included and therefore not all of the impacts the proposed development may have, can be addressed, when considering cumulative aspects. Waste management is of particular concern as well as bulk water lines and power lines which may increase cumulative impacts.

4 METHODOLOGY

Methods employed to investigate and report on potential impacts of the Proponent's proposed construction and operational activities on the social and natural environment include:

1. Detailed proposed infrastructure and operational procedures received from the client are presented in this report.
2. Baseline information about the site and its surroundings was obtained from primary information, existing secondary information as well as from a reconnaissance site visit.
3. As part of the scoping process to determine potential environmental impacts, interested and affected parties (IAPs) were consulted about their views, comments and opinions, all of which are presented in this report.
4. Potential environmental impacts emanating from the construction, operations and decommissioning of the project were determined, and possible enhancement measures were

listed for positive impacts while mitigation / preventative measures were provided for negative impacts.

5. As per the findings of this scoping report, an EMP was incorporated into this report to be submitted to the MEFT.

5 PROJECT DEVELOPMENT AND RELATED ACTIVITIES

As part of the development mandate received from the Erongo Regional Council, the proposed township development will include the provision of approximately 522 erven of varying land use and zoning. The proposed layout of these erven was based on various site visits and township development guidelines which incorporated specialist recommendations. As such, a central business district, residential areas, institutional areas and public open space were tailored within proposed township layout. The layout makes provision for two extensions, Extension 1 and Extension 2, which is the focus of this assessment,

The spatial form of the layout plans was dominated by the desire to establish a local authority area that will ultimately provide a variety of choice for future inhabitants, whilst also focusing on the provision of social services, a defined business area and possibilities for future growth. In addition to this, the layout incorporates known environmental limitations. The dolerite ridge area (known as Black Rocks) was incorporated in the layout under the zoning “conservation”. This implies that no development may take place on the erven as indicated and access to the area must be controlled. As a direct result of known coastal erosion in the coastal areas where the above development is proposed, a coastal degradation study was conducted and consequently a coastal setback line was proposed for the study area. The recommendations of this study was incorporated in the layout proposals for Extension 1 and 2. The township layout components for Extension 1 and 2 are presented in Figure 5-1 and Figure 5-2.



Figure 5-1 Proposed Wlotzkasbaken Extension 1



Figure 5-2 Proposed Wlotzkasbaken Extension 2

5.1 PLANNING PHASE (LAND USE AND PLANNING)

Wlotzkasbaken was proclaimed a village in 1992 but a Government Notice in 1993 converted it back into a settlement area. It thus still remains under the jurisdiction of the Erongo Regional Council. Development of the Extension 1 and 2 is proposed by the Erongo Regional Council which was established as per Article 103 (3) and Article 108 of the Namibian Constitution, and Section 28 of the Regional Council Act, Act No. 22 of 1992, as amended. The Council has a mandate to plan and develop the region, in a sustainable manner for the benefit of the people, by establishing, managing and controlling of settlement areas, focusing on the core services.

The proposed expansion therefore is located in land which has been earmarked for residential and settlement development. The land use will be similar to the Henties Bay settlement and will mimic a ribbon development along the coastal road network while conserving ecologically important habitats through conservation and public open space areas. Such overarching planning is called for as per the Strategic Environmental Assessment (SEA) for the coastal areas of the Erongo and Kunene Regions (2008), which also identifies the well documented ecologically important conservation areas.

In addition to the Wlotzkasbaken Structure Plan being prepared by the Proponent, the specific planning requirements for this project, the establishment of Extension 1 and 2, will entail further partnerships and strategic consultation with main service providing parastatals such as NamWater, NamPower, Roads Authority, etc. Strategies in protecting the environment should be developed in conjunction with the MEFT to ensure the safeguarding of the area's natural and conservation resources. According to the National Policy on Prospecting and Mining in Protected Areas (2018), the Dorob National Park has definite no-mining zones which include any sand or gravel resource extraction for construction purposes.

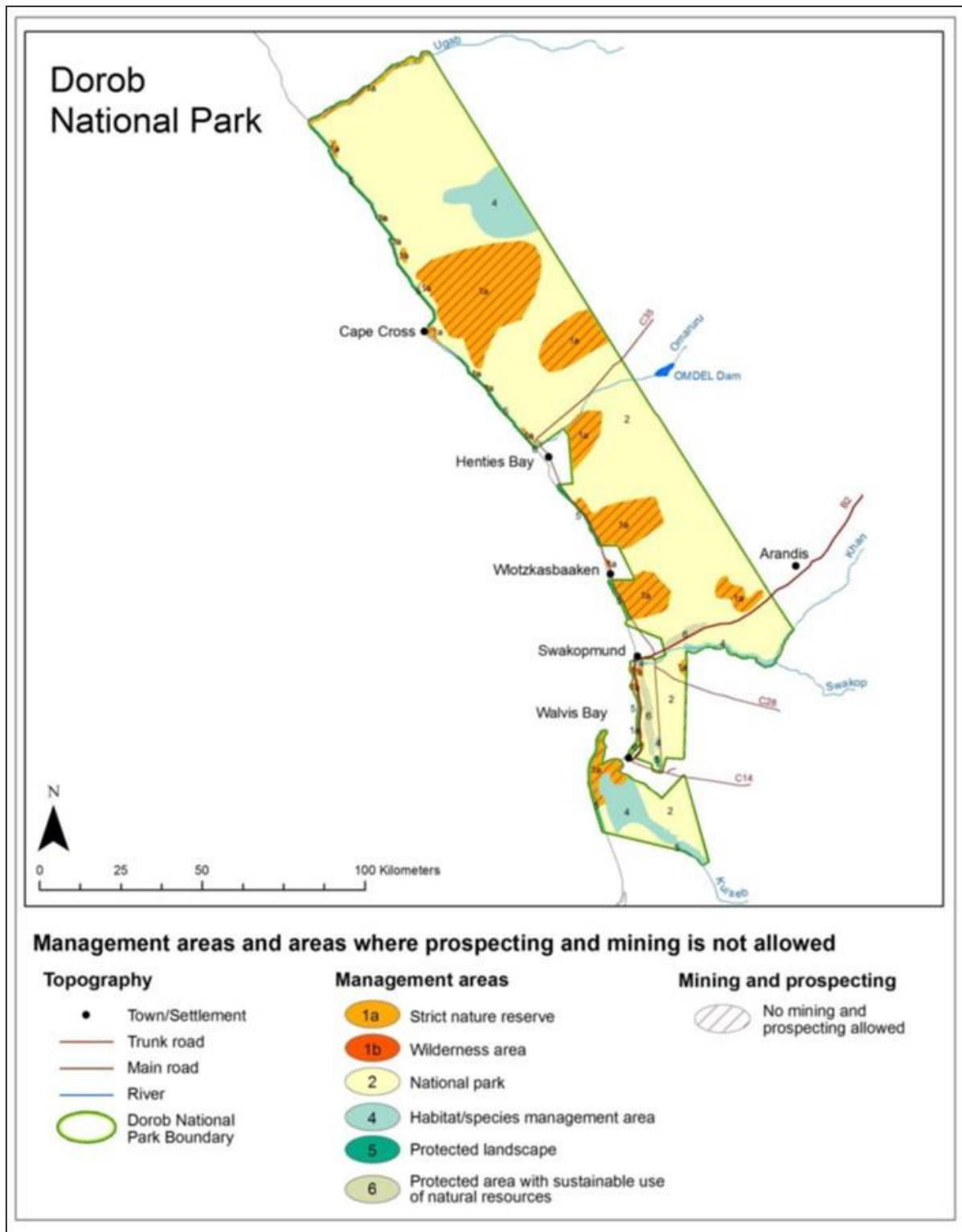


Figure 5-3 Protected areas with specific zones to be excluded from prospecting and mining within the Dorob National Park (MEFT, 2018)

The planning phase includes overall operational planning, but also amenities and permit acquisitions. It includes the setting up of various agreements between contractors, suppliers and state departments, especially during the construction phase. Some of the agreements which may be considered as examples are provided below:

- ◆ Subdivision and rezoning of properties,
- ◆ Property developers and related negotiations,

- ◆ NamPower, NamWater, etc., service and servitude agreements,
- ◆ Roads authority approval,
- ◆ Obtaining consumer installation certificates for construction fuel supply,
- ◆ Setting labour contracts (including tender documentation for contractors), and
- ◆ Obtaining an ECC (as per this process) as well as any other permits as required.

5.2 CONSTRUCTION AND PHASING

The development will proceed in various phases, targeting the establishment of Extension 1 initially, followed by Extension 2. Township features for both extensions are listed in Table 5-1.

Table 5-1 Township features for Extension 1 and 2

	Extension 1	Extension 2
Zoning	Nr of Erven	Nr of Erven
Residential	250	156
General Residential	28	15
Business	26	23
Institutional	2	1
Local Authority	3	0
Government	0	2
Public Open Space	6	8
Conservation	2	0

The order of construction will see the development of the internal road network followed by the establishment of the bulk services. These aspects will require bulk earthworks and may include localised blasting on hard geological formations. The internal services network will include the following:

- ◆ Sewerage reticulation
- ◆ Water supply line
- ◆ Fire hydrant line at business, institutional and authoritative erven
- ◆ Power line

These services will mainly be located next to the internal road network which will be developed with related drainage systems, servitudes and streetlights. Establishment of fibre optic cables are not foreseen during this construction phase.

Once the initial service infrastructure has been initiated, additional structures, residential and business units may be established. Although the Proponent envisage the construction of some residential units, it may be assumed that a significant portion of the residential units will be constructed by independent property developers or private property owners, after bulk and internal service infrastructure have been established. Similarly, institutional and governmental properties may be developed by the related implementing agencies responsible for the erven.

General construction activities will require construction teams and related construction camps. Construction camps will not only have temporary ablution and security facilities, but will also serve as material laydown areas and may accommodate fuel storage for the use by heavy motor vehicles (HMV) and earth moving equipment. Some hazardous chemicals as used in the construction industry will also be kept in small volumes in construction camps. All water for construction use will be brought to site and kept in temporary tanks until a bulk line to the area is established.

Initial service infrastructure development will be managed by the Proponent which will set all terms for any contracts required for the construction period. Individual property or business developments are expected to employ separate construction teams at such time that construction is required.

General construction related procedures are expected to be required for the establishing of the various internal services including the internal road network development. The majority of areas earmarked for development, will require the stripping of topsoil. Foundations required for buildings, roads and poles, etc., will require further earthworks which may include blasting and compaction. However, no explosives magazine will be present on site.

It is proposed that the internal pipeline be laid approximately 1 m below surface in trenches which will be created through mechanical means in the road reserve. The same trenches may be used for the laying of the sewerage mains. The main water lines will vary from 75 mm to 160 mm diameter uPVC class 9 pipelines with the house connections being 25mm to 32mm HDPE class 10 pipelines as well as 75mm uPVC Class 9 pipelines.

5.3 OPERATIONAL PHASE

The operational phase will not only see the occupation of residential and business units, but will also include the maintenance and servicing of minor infrastructure components which will include aspects such as power supply, sewage management, water supply lines and waste management. Operation of fuel handling and related activities fall outside the scope of this assessment and will be subject to additional environmental assessments. Similarly the operations of the bulk services will be subject to an additional environmental assessment.

General township management aspects will be the same as to that of existing townships which will include, but not be limited to, the reading of water meters, waste management, public open space management, maintenance of roads and public infrastructure. Administrative tasks associated with the provision of services and related billing, will be according to the existing structures and systems employed by the Proponent.

5.4 EMPLOYMENT

The Proponent is a large scale employer who will further employ additional persons to carry out tasks as associated with the operational phase. Various aspects of the project, mainly associated with the construction phase, will be largely outsourced through public procurement processes. .

5.5 DECOMMISSIONING PHASE

Since the project will see the establishment of large residential and related infrastructure aspects, it is not foreseen that there will be any decommissioning phase. However, aspects within the proposed development may be decommissioned during the lifetime of the project. The vision of the Proponent is however to see no decommissioning of critical aspects such as the internal roads and services network.

6 ALTERNATIVES

A draft structure plan was developed through a matrix consideration of bio-physical and conservation constraints, existing amenities such as the water pipelines, and the existing village. Three main options for future township establishment were considered. Known as Option 1, Option 2 and Option 3, the various alternatives were presented to the Erongo Regional Council to consider. Ultimately the Erongo Regional Council resolved that Option 2 deems to be the most favourable option, to not only incorporate the known constraints from an environmental perspective, but this option also offers the opportunity for future growth (which is limited in the areas surrounding Wlotzkasbaken Proper).

Various alternatives related to the project are considered and each of these alternatives is discussed. The alternatives can roughly be grouped into three main groups namely:

- ◆ Location alternatives;
- ◆ Services alternatives;
- ◆ Project planning and design alternatives;
- ◆ No go alternative.

6.1 LOCATION ALTERNATIVES

Extensive public participation, authority and parastatal consideration and planning during the initial town planning applications has resulted in the current location of the project. Any additional discussion regarding the matter will only result in re-work and confusion. A comprehensive file related to the planning and choosing of the current site is vested with the Proponent. The Proponent's project planning has progressed in such a fashion that the location alternatives now mainly focus on the internal aspects of the proposed project. As detailed in the design alternatives, certain locations within the project area have been earmarked for conservation and safety considerations. Specialist studies conducted as part of the environmental assessment further informed the location of project components, such as the coastal set-back line.

6.2 SERVICES ALTERNATIVES

Service provision and requirements for the project vary considerably between the construction and operational phases. Construction services are usually temporary in nature with a higher potential for environmental damage than during operations. The alternatives listed below are not fixed and only provided for the Proponent to consider.

Table 6-1 Construction alternatives considered

Service	Proposed	Alternative
Water supply	Tanked water for domestic and construction purposes.	None.
Worker's accommodation	Off-site with daily transportation from Swakopmund or Walvis Bay to site.	Complete temporary residential units (ablution, recreation and cooking amenities included) strong enough to withstand east-wind conditions at the coast.
Sewerage	Chemical toilet. Recommended as it is easily transportable and have no direct impact on the environment and ecology (if properly disposed).	Ventilated improved pit (VIP) latrine. Not proposed due to the geology and hard rock conditions of the site.
Energy for cooking on site (only if accommodated on site)	Gas stoves.	Electric devices or generators.

Alternatives to internal services may still be considered by the Proponent and include mainly the following services: For some instances, such as with energy for cooking, the alternative may largely be determined on a micro scale. Enforcement of certain aspects, such as use of gas stoves etc, may only be achieved through municipal by-laws to be drafted etc.

Table 6-2 Operational alternatives considered

Service	Proposed	Alternative
Water supply	Water pipeline connection preferred due to supply control and maintenance.	Traditional - truck delivery to households. Not preferred.
Sewerage	Buried sewerage network to be connected to bulk sewerage treatment plant is preferred.	Septic tank and related french drain soak away systems. Not proposed due to the geology and hard rock conditions of the site.
Waste management	Weekly removal of all domestic and general waste by the Proponent or contracted party and disposal thereof to a registered and dedicated landfill site.	None. Not removing general waste should not be an alternative. No other feasible alternative was identified.

Service	Proposed	Alternative
Energy for lightning and heating	Electrical power connected to the national grid is preferred for firm power supply.	Individual solar systems either connected to the geyser and or installed on panels. May be challenging during long periods of fog.

6.3 PROJECT PLANNING AND DESIGN ALTERNATIVES

Initially the layouts for the two extensions were very different with no regard to on-site environmental features. However, significant changes in the layout due to specialist investigations related to the archaeological, fauna, flora, avifauna and coastal processes, have resulted in the protection of the prominent dolerite ridge through zoning the area as a conservation area, which is not open to construction or establishment of any anthropogenic features. As a result of the coastal set-back line and related prudent climate change planning, flora and fauna aspects such as the hummock belt, are also excluded from development areas and zoned as public open space. It should further be noted that the entire project was placed on hold until the execution of the specialist studies could be conducted.

6.4 THE NO-GO ALTERNATIVE

The “No-Go” alternative is the option of not proceeding with the proposed expansion developments and it typically means that the current status quo of the site and surrounds will remain. Should the proposed township establishment not commence, none of the potential impacts (positive and negative) identified would occur. Furthermore, the subject areas will remain to be used for recreational activities. This would also mean that the potential availability of residential erven and other land uses would not be realized, and the possible housing shortage, specifically along the coastal front, not addressed. Finally, revenue generated for Namibia will be reduced. The biophysical attributes of the area allows for limited alternative uses. Not continuing with the project may see the land utilised for significantly less profitable operations.

7 ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS

To protect the environment and achieve sustainable development, all projects, plans and programmes deemed to have adverse impacts on the environment require an ECC. Namibian legislation lists specific activities which are required to apply for an ECC. The proposed township development falls within the ambit of these activities, as per Section 3 of Government Gazette No 4878. Listed activities which require an ECC application (Government Regulation No 29 of 2012) related to this project are listed below. Note that even though they are listed below, only those pertaining to the actual township establishment will be assessed in this report. For the rest, only location suitability for the proposed land use categories are assessed and it will remain the respective erf developers to obtain ECCs for relevant listed activities.

Section 1: Energy Generation, Transmission and Storage Activities

- ◆ (a) The construction of facilities for the generation of electricity. An option to construct a solar plant is being considered for the provision of basic power supply to key service infrastructure.
- ◆ 1(b) The construction of facilities for the transmission and supply of electricity. The Proponent plans to supply electricity to key service infrastructure. Transmission of electricity may either be via a direct line from the NamPower substation at the nearby Orano desalination plant or a solar plant.

Section 2: Waste Management, Treatment, Handling and Disposal Activities

- ◆ 2.1 The construction of facilities for waste sites, treatment of waste and disposal of waste. Facilities will be constructed to allow handling of various waste streams. Sewerage infrastructure will be established for the black- and grey-water components. General and domestic waste will be catered for via means of a landfill site constructed and managed by the Proponent.

Section 3: Mining and Quarrying Activities

- ◆ 3.2 other forms of mining or extraction of any natural resource whether regulated by a law or not: Excavation activities required for the establishment of infrastructure will allow for gravel and soil material to be stripped. Such material may be used again in the construction process. It may be expected that the volumes of such resources will exceed domestic volumes. Therefore such material may be considered as a natural resource being extracted, although not covered by law.

Section 6: Tourism development Activities

- ◆ 6 The construction of resorts, lodges, hotels or other tourism and hospitality facilities. Part of the township development will have a tourism and hospitality component.

Section 9 of Government Notice No. 29 of 2012: Hazardous Substance Treatment, Handling and Storage

- ◆ 9.1 The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974. The establishment of the township area will require fuel for construction activities. It is foreseen that a temporary fuel installation in an aboveground tank will be established. Additional storage tanks may be required.
- ◆ 9.2 Any process or activity which requires a permit, licence or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste: The establishment of the township will require diesel storage in an aboveground tank(s). The proposed landfill site will be required to be formalised and registered.

Section 10: Infrastructure

- ◆ 10.1. (b) The construction of a public road. All the roads in and around the township will be public roads.
- ◆ 10.2. (a) The route determination of road and design of associated physical infrastructure where it is a public road. All the roads and related road determination and infrastructure, in and around the township, will be public roads.

Section 11: Tourism development Activities

- ◆ 11.2 Construction of cemeteries, camping, leisure and recreation sites. The township development may include recreation sites which are associated with the public open spaces.

The legislation and standards provided in Table 7-1 to Table 7-3 speak into the environmental assessment process in Namibia, and are relevant to this assessment.

Table 7-1 Namibian law applicable to the proposed township development

Law	Key Aspects
The Namibian Constitution	<ul style="list-style-type: none"> ◆ Promote the welfare of people ◆ Incorporates a high level of environmental protection ◆ Incorporates international agreements as part of Namibian law
Environmental Management Act Act No. 7 of 2007, Government Notice No. 232 of 2007	<ul style="list-style-type: none"> ◆ Defines the environment ◆ Promotes sustainable management of the environment and the use of natural resources ◆ Provides a process of assessment and control of activities with possible significant effects on the environment
Environmental Management Act Regulations Government Notice No. 28-30 of 2012	<ul style="list-style-type: none"> ◆ Commencement of the Environmental Management Act ◆ Lists activities that requires an environmental clearance certificate ◆ Provides Environmental Impact Assessment Regulations
Water Resources Management Act Act No. 11 of 2013	<ul style="list-style-type: none"> ◆ Provides for management, protection, development, use and conservation of water resources ◆ Prevention of water pollution and assignment of liability

Law	Key Aspects
Forest Regulations: Forest Act, 2001 Government Notice No. 170 of 2015	<ul style="list-style-type: none"> ◆ Declares protected trees or plants ◆ Issuing of permits to remove protected tree and plant species
Soil Conservation Act Act No. 76 of 1969	<ul style="list-style-type: none"> ◆ Law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources in Namibia
Animal Protection Act No 71 of 1962	<ul style="list-style-type: none"> ◆ Law which seeks to regulate the prevention of cruelty to animals and to consolidate and amend the laws relating to the prevention of cruelty to animals
Mountain Catchment Areas Act No 63 of 1970	<ul style="list-style-type: none"> ◆ To provide for the conservation, use, management and control of land situated in mountain catchment areas, and to provide for matters incidental thereto
Petroleum Products and Energy Act Act No. 13 of 1990, Government Notice No. 45 of 1990	<ul style="list-style-type: none"> ◆ Regulates petroleum industry ◆ Makes provision for impact assessment ◆ Petroleum Products Regulations (Government Notice No. 155 of 2000) ◆ Prescribes South African National Standards (SANS) or equivalents for construction, operation and decommissioning of petroleum facilities (refer to Government Notice No. 21 of 2002)
Regional Councils Act, Act No. 22 of 1992 as Amended	<ul style="list-style-type: none"> ◆ The Act makes provision for Regional Councils to plan and develop the region in a sustainable manner for the benefit of the people in establishing, managing and controlling of Settlement areas focusing on the core services
The National Housing Development Act,	<ul style="list-style-type: none"> ◆ Provides for the establishment of the National Housing Advisory Committee, the establishment of housing revolving funds by Regional Councils and Local Authorities, the establishment of decentralized Build Together Committees for Regional Councils, Local Authorities and resettlement areas to provide low cost residential accommodation within their respective areas
Local Authorities Act Act No. 23 of 1992, Government Notice No. 116 of 1992	<ul style="list-style-type: none"> ◆ Defines the powers, duties and functions of local authority councils
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	<ul style="list-style-type: none"> ◆ Provides a framework for a structured more uniform public and environmental health system, and for incidental matters ◆ Deals with Integrated Waste Management including waste collection disposal and recycling, waste generation and storage, and sanitation
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	<ul style="list-style-type: none"> ◆ Provides for Labour Law and the protection and safety of employees ◆ Labour Act, 1992: Regulations relating to the health and safety of employees at work (Government Notice No. 156 of 1997)
Atmospheric Pollution Prevention Ordinance Ordinance No. 11 of 1976	<ul style="list-style-type: none"> ◆ Governs the control of noxious or offensive gases ◆ Prohibits scheduled process without a registration certificate in a controlled area ◆ Requires best practical means for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process
Hazardous Substances Ordinance Ordinance No. 14 of 1974	<ul style="list-style-type: none"> ◆ Applies to the manufacture, sale, use, disposal and dumping of hazardous substances as well as their import and export ◆ Aims to prevent hazardous substances from causing injury, ill-health or the death of human beings

Law	Key Aspects
Pollution Control and Waste Management Bill (draft document)	<ul style="list-style-type: none"> ◆ Not in force yet ◆ Provides for prevention and control of pollution and waste ◆ Provides for procedures to be followed for licence applications

Table 7-2 Relevant multilateral environmental agreements

Agreement	Key Aspects
Stockholm Declaration on the Human Environment, Stockholm 1972.	<ul style="list-style-type: none"> ◆ Recognizes the need for a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment
United Nations Framework Convention on Climate Change (UNFCCC)	<ul style="list-style-type: none"> ◆ The Convention recognises that developing countries should be accorded appropriate assistance to enable them to fulfil the terms of the Convention
Convention on Biological Diversity, Rio de Janeiro, 1992	<ul style="list-style-type: none"> ◆ Under article 14 of The Convention, EIAs must be conducted for projects that may negatively affect biological diversity

Table 7-3 Standards or codes of practise

Standard or Code	Key Aspects
South African National Standards (SANS)	<ul style="list-style-type: none"> ◆ The Petroleum Products and Energy Act prescribes SANS standards for the construction, operations and demolition of petroleum facilities ◆ SANS 10131 (2004) is aimed at above-ground storage tanks for petroleum products <ul style="list-style-type: none"> ○ Provide requirements for spill control infrastructure

Other Planning documents considered in the environmental assessment include the following:

- ◆ Strategic Environmental Assessment (SEA) for the coastal areas of the Erongo and Kunene Regions: Under the auspices of the Proponent, a structure or development plan should be prepared for the Wlotzkasbaken area. This should highlight both development options (residential, recreational, aquaculture, etc.) and the zoning of future land uses. A draft structure plan was established and according to the draft structure plan, the proposed township development may be developed.
- ◆ National Housing Policy (Cabinet Approved July 1991 and Reviewed July 2009): The policy promotes the concept of sustainable human settlements characterized by integrated housing development designs and liveable built environment.
- ◆ Fifth National Development Plan of Namibian: Alignment to Goal 11 indicator which is to make cities and human settlements inclusive, safe, resilient and sustainable.
- ◆ Erongo Regional Council Strategic Plan 2017/18 – 2021/22: Special consideration awarded to Social Progression – Residential Land Delivery, Housing and Sanitation with the key performance indicator being the number of erven surveyed and serviced. The strategy further stated that it is vital for Erongo Regional Council to develop and maintain strong relationships with their key stakeholders as it improves the chances that relationships will continue and facilitate the realisation of the vision of the Council.

8 ENVIRONMENTAL CHARACTERISTICS

This section lists pertinent environmental characteristics of the study area and provides a statement on the potential environmental impacts on each.

8.1 LOCALITY AND SURROUNDING LAND USE

The proposed township site is located approximately 2 km south of the existing settlement of Wlotzkasbaken and 28 km north of Swakopmund. It is west of the C34 (M0044) road, on the west coast of Namibia in the Erongo Region (22.44316 °S 14.460637°E) (Figure 1 1). Although the proposed township falls within the boundaries of the Dorob National Park, the proclaimed townlands within which it is located, is excluded from the park. Ecologically sensitive areas located in the townlands as well as in the Park, close to the project, are documented and discussed in section 8.6. Primary zoning in the settlement caters for residential use with some erven zoned for business, regional authority and public open spaces. The proposed township will have a mixtures of land use zonings to accommodate a holistic urban development.

The Orano Desalination Plant also forms part of the Wlotzkasbaken townlands and is situated approximately 6 km north of the proposed township. The Omdel-Swakopmund Bulk Water Pipeline, which also receives water from this plant, runs in a north-south direction 4 km west of the proposed township area. An underground 11.000 kV Cathodic Protection Line is located next to the Omdel-Swakopmund Bulk Water Pipeline.

The coastal areas between Swakopmund, Wlotzkasbaken and Henties Bay are commonly used as fishing areas by local and foreign fishermen. It includes areas such as the Mile 8, Mile 14, Mile 30 and Jakalsputz fishing areas.

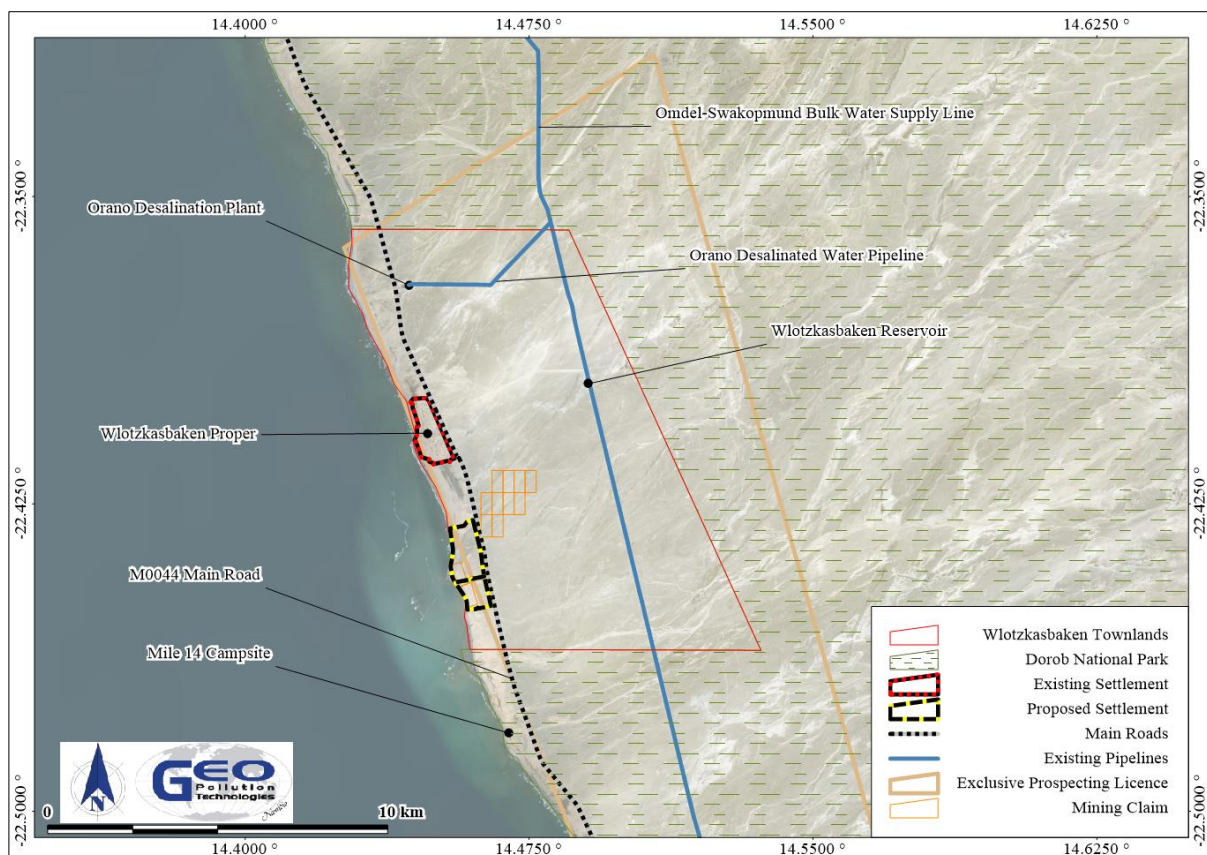


Figure 8-1 Surrounding land use

An exclusive prospecting licence (EPL) EPL 4185, for industrial minerals, is located partly over the proposed township extending east. According to the Namibian Mining Cadastre, the EPL will expire 06/06/2024, should no renewal application be submitted. Pending mining claims for

dimension stone are located north-east of the settlement while Semi-precious stone mining claim applications are located south of the proposed development area.

Implications and Impacts

Although primarily earmarked for residential development, no development has previously been initiated on the site identified for expansion of Wlotzkasbaken. Implementation of the project will increase housing and service provision in the area. Infrastructure components will be established and operated within townlands.

The proposed development will contribute to development initiatives such as infrastructure development into this coastal region of the Erongo Region. Information sharing will impact planning and development initiatives of the Region in relation to protected areas.

8.2 CLIMATE

The SASSCAL WeatherNet platform details that a weather station (Station ID: 31200) was installed for Wlotzkasbaken in June 2011. This station is however located 10 km north of Wlotzkasbaken, nevertheless significantly closer than the weather stations located in Swakopmund. For this report, data obtained from this weather station was compared to modelled (Funk et al., 2015) and Atlas (Atlas of Namibia Project, 2002) weather data for the area.

Namibia is situated within an anti-cyclone belt of the Southern Hemisphere. Winds generated from the high-pressure cell over the West Coast Ocean blow from a southerly direction when they reach the Namibian coastline. As the Namibian interior is warm (particularly in summer), localised low-pressure systems are created which draws the cold southerly winds towards the inland desert areas. These winds manifest themselves in the form of strong prevailing south-westerly winds, which range from an average of 20 knots (37 km/h) during winter months to as high as 60 knots (110 km/h) during the summer. The occurrence of such extremely strong winds at the site, is infrequent. Winds near Wlotzkasbaken display two main trends; high velocity and frequency south to south-westerly winds in summer and high velocity, low frequency east to north-easterly winds during winter. During winter, the east winds generated over the hot Namib Desert have a strong effect on temperature resulting in temperature in the upper 30's degrees Celsius and tend to transport plenty of sand.

The arid conditions at Wlotzkasbaken and the coastal zone are a result of dry descending air and upwelling of the cold Benguela Current which also forms the major source of water for the succulent and lichen flora in the Namib Desert. The settlement is known to have frequent occurrences of thick fog or low stratus clouds during later afternoons though to early mornings.



Photo 8-1 Fog encountered close to the existing Wlotzkasbaken turn-off



Photo 8-2 Fog along the coastal area

According to the Köppen-Geiger Climate Classification system the project is located in a hot desert climate (BWh) (Kottek et al., 2006). This means that the area receives precipitation well

below potential evapotranspiration and no more than 200 mm of precipitation annually, with a mean annual temperature of at least 18 °C.

Climatic data for the project is summarised in Table 7 1. The project area is renowned for its arid conditions with 8 to 9 hours daylight in the summer. On average, the area receives typically more than 8 hours of daily sunlight per annum. Although the average maximum temperature ranges between 22 °C and 24 °C, extreme heat conditions may occur in the winter months during east-wind conditions. Average minimum temperatures range between 10 °C and 12 °C. The average rainfall varies from approximately 0 to 50 mm/a with the highest likelihood of rainfall during January to April. Evaporation for the project area ranges approximately 2,600 to 2,800 mm/a. For this location the evaporation losses are more than 20 times the average annual rainfall.

Long term precipitation data was obtained from the CHIRPS-2 database (Funk et al., 2015). The CHIRPS-2 dataset (Climate Hazards Group Infra-Red Precipitation with Station data version 2) consists of long term precipitation data (1981 to near-present) obtained from satellite imagery and in-situ station data and therefore represents more recent data. Data is averaged over an area of roughly 5 km by 5 km. This averaging effect should be kept in mind during data analyses as high precipitation from single thunder storm cells would be averaged out, thereby providing a reduced daily maximum precipitation value. The average annual precipitation (inclusive of regular heavy fog) for the last 40 years was calculated as 134 mm/a, with a coefficient of variance of 21%. Heavier precipitation (single day events) occur between November and April, with a single event of 44.1 mm in December (last 40 years data) being the highest. Daily and seasonal precipitation data (Funk et al., 2015) is presented in Table 7 2 and in Figure 7 2. Seasonal (July to June) total precipitation, centered on the average line for the last 40 years, is presented, with the daily total precipitation and the seasonal cumulative precipitation. From the figure it is clear that 9 out of the last 10 seasons were below the average.

Table 8-1 Summary of climate data for Wlotzkasbaken (Atlas of Namibia)

Classification of climate	Desert
Average annual precipitation (mm/a)	0-50
Approximate number of days of fog per year	75 - 100
Variation in annual rainfall (%)	> 100
Average annual evaporation (mm/a)	2,600-2,800
Water deficit (mm/a)	1,901–2,100
Temperature °C	16-17
Average solar radiation (kWh/m ² /day)	5.4-5.6

Table 8-2 Precipitation data based on remote sensing (Funk et al. 2015)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (mm/m)	7.95	7.59	5.39	8.24	0.00	0.00	0.00	0.00	0.00	7.85	11.59	12.15
Maximum (mm/m)	45.99	69.74	40.59	54.85	15.38	1.68	0.13	0.42	1.71	20.46	43.27	55.56
Average (mm/m)	17.7	22.9	12.9	16.7	2.4	0.1	0.0	0.0	0.1	13.9	22.9	23.2
Variability (%)	45.0	54.0	60.0	59.0	141.0	286.0	402.0	624.0	298.0	19.0	29.0	38.0
Daily maximum (mm)	22.8	27.5	22.5	41.1	5.9	1.7	0.1	0.2	1.2	17.1	29.4	44.1
Average rain days	3	3	2	2	1	0	0	0	0	3	3	3
Season July - June average: 135 mm						Season coefficient of variation: 21 %						
Data range	1981-Jul-01 to			2021-Jun-30			Lat: 22.3958°S Long: 14.4903°E					

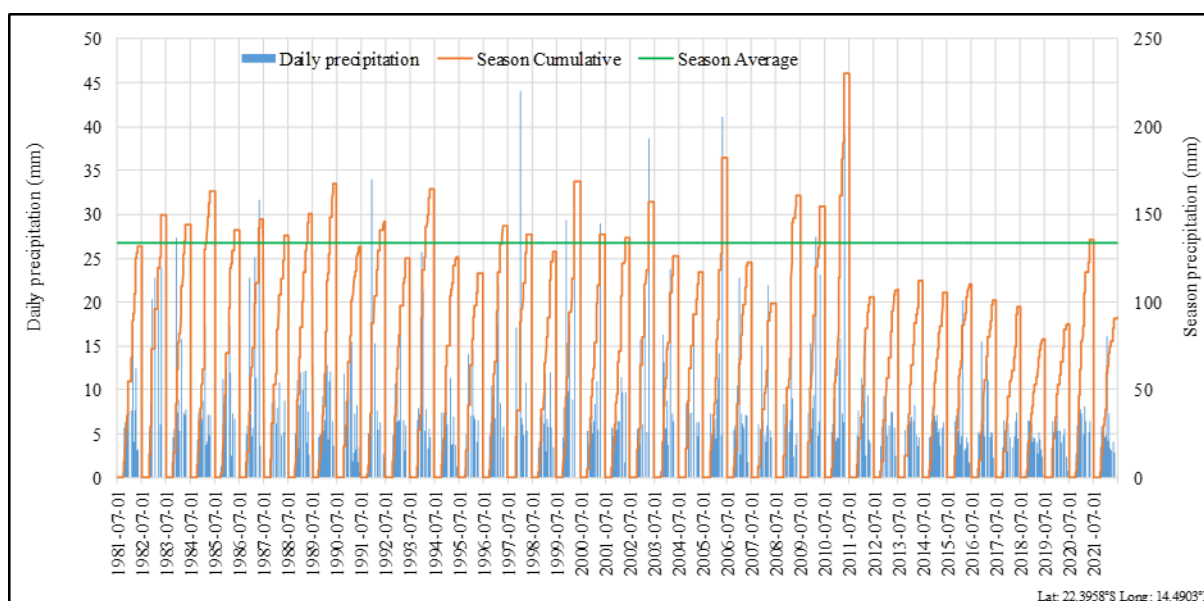


Figure 8-2 Daily, cumulative and average precipitation data based on remote sensing (Funk et al. 2015)

The corrosive environment of Wlotzkasbaken can be closely related to that of Walvis Bay. The corrosive environment, which may be attributed to the frequent salt-laden fog, periodic winds and abundance of aggressive salts (dominantly NaCl and sulphates) in the soil. The periodic release of hydrogen sulphide (H₂S) from the ocean is expected to contribute to corrosion.

Implications and Impacts

Wlotzkasbaken receives very low rainfall. Occasional thunderstorms do occur and can result in flooding, which can in turn damage infrastructure. Fog affects visibility when it occurs, while strong wind conditions (east-wind condition) transport sand and dust particles which in turn accumulate around structures and anthropogenic features on site.

The combination of high moisture and salt content of the surface soil can lead to rapid deterioration of subsurface metal (e.g. pipelines) and concrete structures. Chemical weathering of concrete structures due to the abundant salts in the soil is a concern.

8.3 COASTAL PROCESSES

Wlotzkasbaken and townlands forms part of the wide coastal plain associated with the Namib Desert. The coastal zone being defined as that part of the land surface which is influenced by marine processes. It is a unique environment influenced by climate as well as major marine processes such as tides, related wave actions, water temperature and salinity. The Wlotzkasbaken shoreline has experienced significant changes during the last 35 years (and longer) with a visible reduction of the beach areas. According to a specialist investigation, wave direction and longshore transport of sediment are the main driving forces for sand erosion and accumulation. Active erosion of hummocks are visible along the coastline of the Wlotzkasbaken townlands.

Winds are the main wave determining factor, but can also transport sand and sediment to and from the shore. Tides on the other hand, are produced by the gravitational pull of the moon and sun. The major impact of tides is to shift the shoreline between high and low tide, and to generate tidal currents either parallel to the coast, or at tidal inlets and estuaries. According to the Coastal Profile of Namibia, tides along the Namibian coast are semi-diurnal with a maximum tidal range of 2 m. Tides, waves and wind are the main hydrologic powers which influence coastal process within the Wlotzkasbaken townlands. Additional factors include sea level rise, seawater temperature and salinity.



Photo 8-3 Beach erosion of older dune material



Photo 8-4 Beach erosion at Wlotzkasbaken



Photo 8-5 Satellite imagery of the area of 1985



Photo 8-6 Satellite imagery of the area of 2023

Implications and Impacts

Dynamic coastal processes along with possible sea-level rise aspects may impact infrastructure components close to the beach. Project components may be at risk of beach erosion and coastal processes.

8.4 TOPOGRAPHY AND DRAINAGE

The landscape is classified as being in a flat western coastal plain composed of mobile dunes and gravel sandy plains, an area of dissection and erosional cutback. Although the site is not located within a river catchment, a portion of Extension 1 is traversed with sandy washes. The eastern portions of the site have a higher elevation (ranging between 10 and 12 mamsl) than the western portions (ranging between 4 and 6 mamsl). Surface runoff would be in a westerly direction towards the Atlantic Ocean, situated approximately 150 m west of the closest point of the planned

project components. The local landscape, and the site and its immediate surroundings, is generally flat with poorly developed drainage systems.

A prominent dolerite dyke protrudes from the gravel plains located in Extension 1. The feature is elevated above the plains (by approximately 2mamsl) and locally influences the drainage pattern along this portion of the site.

Implications and Impacts

The natural topography of the site allows for the proposed development to be established without significant earthworks for site levelling. Although very flat, the development should include drainage systems along roads at a minimum.

8.5 GEOLOGY AND HYDROGEOLOGY

The dominant surface soil cover in the area is petric Gypsisols. Local geology in the area consists of marble, schist, conglomerate, quartzite, dolerite sills and dykes of the Namibian Age – Damara Sequence. Surface geology at the site consists of shallow coarse brown sand. Groundwater flow would be mainly through primary porosity in the topsoil cover and along fractures, faults and other geological structures (secondary porosity) present within the underlying hard rock formations. No known boreholes are located within a 5 km radius from the site.

Implications and Impacts

Groundwater is not utilised in the area. Pollution of the groundwater is however still prohibited. Shallow groundwater will lead to rapid lateral spreading of hydrocarbon products spilled or leaked during the construction phase. This may further have potential impact on underground utilities and may cause impacts on neighbouring properties. Earthworks and possible blasting will affect the local geology which may also act as a conduit of blasting vibrations and tremors. The geology may necessitate advanced rock breaking methods for foundation establishment, road construction and services such as pipeline construction.

The operational phase is not expected to negatively impact on any aspects related to geology and hydrogeology.

8.6 FAUNA AND FLORA

The site forms part of the Namib Desert which is a 120 to 200 km wide, hyper-arid coastal desert, stretching for the entire length of western Namibia, from the Orange River in the south to well into Namibia's northern neighbour Angola. The Gravel Plains of the Central Namib largely consist of flat and gentle, undulating plains, intersected by ridgelines and outcrops of harder rock types (dolerite, granite and marble) (Photo 8-7 and Photo 8-8). In general the gravel plains are covered by coarse gravel and shallow, poorly developed soil, and mostly with low species richness and abundance. Within the Gravel Plains, the rocky outcrops and inselbergs, and ridge- and drainage- lines support greater plant and animal diversity. This is especially true for the northern portions of the site, as well as sensitive fauna and flora habitats identified by two specialist studies conducted as part of this environmental assessment.

8.6.1 The Dolerite Ridges

The vegetation (flora) study (Manheimer, 2023) identified two sensitive habitats, i.e. the coastal hummock belt and the large dolerite ridge, which may be directly affected by the proposed project. The findings of the report detailed that the protruding dolerite dyke (dolerite ridge) presents a very unique topographical feature hosting a well-developed area with species-diverse vegetation. The numerous microhabitats associated with the ridge is not present elsewhere in the project area (Manheimer, 2023). Although the site hosts some smaller similar ridges, these do not have the same habitat diversity. Therefore the dolerite ridge is listed as a flora habitat of very high sensitivity. A list of some of the plant species associated with the dolerite ridge is presented in Table 8-3.

Table 8-3 Main vegetation species associated with the dolerite ridge

Species Name	Conservation Status
<i>Euphorbia giessii</i>	Endemism: Namibian Endemic, IUCN Conservation status: Not Evaluated, Legal status: CITES Appendix II.
<i>Euphorbia lignosa</i>	Endemism: Namibian Endemic, IUCN Conservation status: Not Evaluated.
<i>Jamesbrittenia maxii</i>	Not protected.
<i>Kleinia longiflora</i>	Endemism: Southern Africa, IUCN Conservation status: Not Evaluated.
<i>Heliotropium oliveranum</i>	Endemism: Namibian Near-endemic (also Southwestern Angola), IUCN Conservation status: Not Evaluated.
<i>Eberlanzia sedoides</i>	Namibian Near-endemic (also Northern Cape) Legal status.
<i>Pelargonium otaviense</i>	Endemism: Namibian Near-endemic. IUCN Conservation status: Not Evaluated.
<i>Sarcocaulon marlothii</i>	Endemism: Namibian Endemic, IUCN Conservation status: Not Evaluated.
<i>Brownanthus kuntzei</i>	Endemism Namibian Near-endemic (also Northern Cape).
<i>Zygophyllum stapffii</i>	Endemism: Namibian Endemic.
<i>Tetragonia reduplicata</i>	Endemism: Southwestern African endemic, IUCN Conservation status: Not Evaluated.
<i>Drosanthemum luederitzii</i>	Endemism: Namibian Near-endemic (also Southwestern South-Africa.
<i>Arthraerua leubnitziae</i>	Endemism: Namibian Endemic. IUCN Conservation status: Not Evaluated.
<i>Hoodia pedicellata</i>	Endemism: Namibian Near-endemic (also Southwestern Angola). IUCN Conservation status: Not Evaluated. Legal status: Nature Conservation Ordinance, Schedule 9, Protected Plant. CITES Appendix II.

According to the Faunal Study conducted as part of this environmental assessment (Irish, 2023), the dolerite ridge provides a more mesic habitat than the surrounding plains and function as resource reservoirs. The ridge's dolerite rocks provide shelter (shade), condensation surfaces for fog water, and also trap windblown sand along their sides, creating sandy patches that provide habitat for sand-living taxa that are less common on the surrounding plains (Irish, 2023). This particular ridge is one of only two in the Central Namib and present an extremely range-restricted habitat. Accordingly the habitats are classified as extremely sensitive.



Photo 8-7 Main dolerite ridge and vegetation (Manheimer, 2023)



Photo 8-8 Smaller dolerite ridge

8.6.2 Coastal Hummock Belt

The coastal hummock belt refers to a narrow stretch of area from the high water mark, directly inland from the littoral zone. The habitat hosts the primary vegetation species which are very distinct and dominated by *Arthroerua leubnitziae*, *Zygophyllum clavatum*, *Brownanthus kuntzei* and *Zygophyllum stapffii*. The vegetation assessment noted that in the area of the proposed development, severe degradation of this belt is noted due to anthropogenic activities (Manheimer, 2023). However, patches of pristine habitat remain. A similar trend is noted along the rest of the Namibian coast (which hosts this habitat), as recreational activities and related access roads fragment the habitat, isolating endemic hummock invertebrates, thereby reducing their ranges, interrupting gene flow and diminishing their ability to adapt and survive into the future. The fauna assessment notes that this habitat, as a whole, should be considered very sensitive and very vulnerable.



Photo 8-9 Coastal hummock belt



Photo 8-10 Hummock vegetation harbouring faunal activity

8.6.3 Gravel / Lichen plains

The Gravel Plains of the Central Namib largely consist of flat and gentle, undulating plains, intersected by ridgelines and outcrops of harder rock types (dolerite, granite and marble) (Photo 8-7). The gravel plains are covered by coarse gravel and shallow, poorly developed soil, and mostly with low species richness and abundance. Within the Gravel Plains, the rocky outcrops and inselbergs, and ridge- and drainage- lines support greater plant and animal diversity. The gravel / lichen plains are a well-documented and known habitat which is nationally protected. This habitat also makes up the largest portion of the proposed development. However, the plains related to the project areas is climatologically and faunistically distinct (Irish, 2023). According to the flora assessment the plains are dominated by *Arthroerua leubnitziae*, an endemic but common and relatively widespread succulent shrub. The plains have a much lower plant diversity hosting no flora species of high concern. Nonetheless, the habitat is very sensitive to habitat disturbance and hosts numerous lichen species. In addition, the plains provide habitat for the protected Damara Tern. Indiscriminate off-road driving and recreational activities have damaged the significant portions of the gravel plains. Important lichen fields were mapped in relation to the project area in Figure 8-3 (Schultz, 2006).

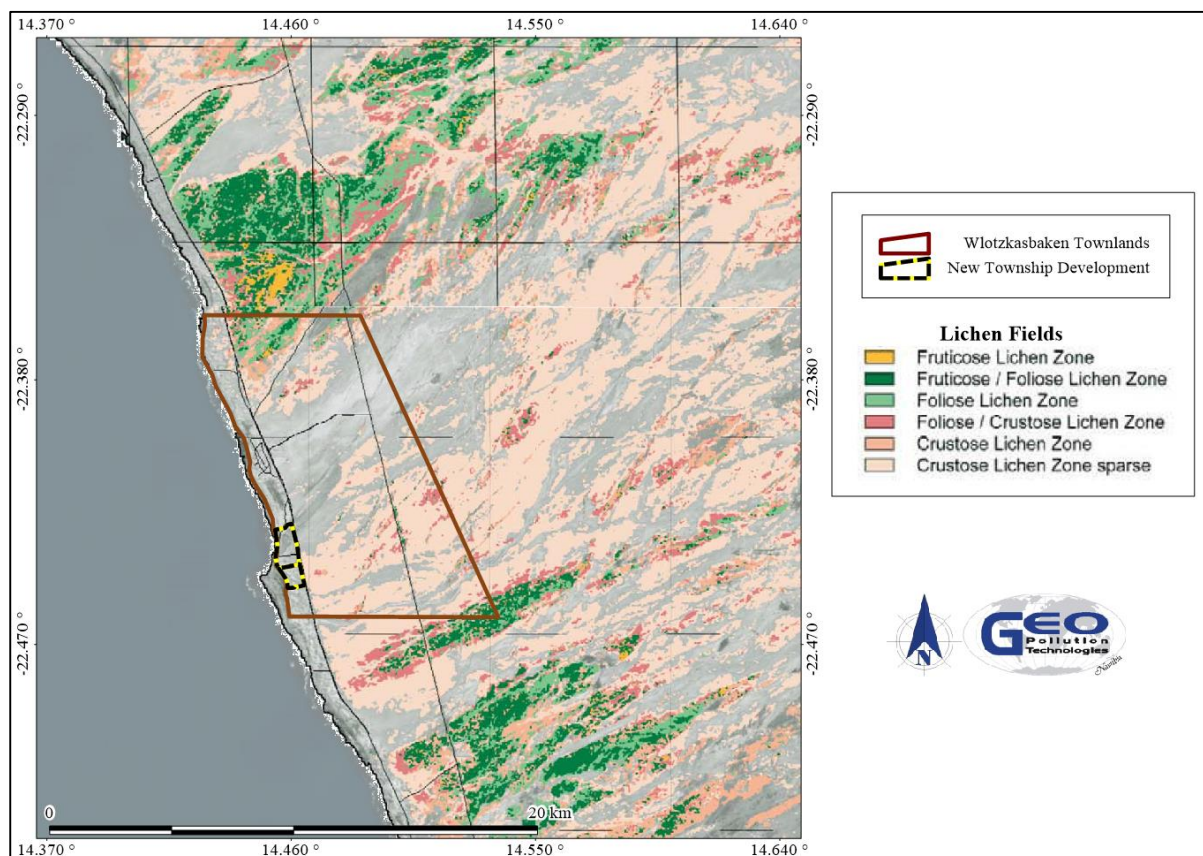


Figure 8-3 Lichen fields as determined by remote sensing in relation to the proposed development (adapted from Schultz, 2006)

The dry and barren gravel plains only support large mammals that are adapted to the harsh conditions. Larger mammals are mostly limited to springbok (*Antidorcas marsupialis*), brown hyena (*Hyaena brunnea*) and black backed jackal (*Canis mesomelas*), while suricates (*Suricata suricatta*), Cape hare (*Lepus capensis*) and a variety of mice, rats and gerbils comprise smaller mammals. Both springbok and jackal are at times seen in the Wlotzkasbaken townland, while brown hyenas are also infrequently encountered. Eight mammal species of potential concern have been noted to may, at times, be present on the site, these are:

- ◆ Springbok (*Antidorcas marsupialis*): IUCN Conservation status: Least Concern. Legal status: Nature Conservation Ordinance, Schedule 5, Hunttable Game.
- ◆ Brown hyena (*Hyaena brunnea*): IUCN Conservation status: Near Threatened.
- ◆ Namibian (Angolan) Wing-gland Bat (*Cistugo seabrai*): IUCN Conservation status: Least Concern.
- ◆ Namib Long-eared Bat (*Laephotis namibensis*): IUCN Conservation status: Least Concern.
- ◆ Namibian Pygmy Rock Mouse (*Petromyscus collinus*): UCN Conservation status: Least Concern.
- ◆ Bush-tailed Gerbil (*Desmodillus auricularis*): IUCN Conservation status: Least Concern.
- ◆ Solitarily Whistling Rat (*Parotomys littedalei*): IUCN Conservation status: Least Concern.
- ◆ Namib Round-eared Elephant Shrew (*Macroscelides flavicaudatus*): IUCN Conservation status: Least Concern.

Birds are the most species rich vertebrate taxa in the area and has the most IUCN II listed species occurring on the gravel plains. A few breeding pairs of Damara tern (*Sternula balaenarum*), a breeding resident of Namibia, South Africa and Angola, used to be present south of the existing Wlotzkasbaken settlement. It is however, suspected that they are no longer present, most likely

as a result of human activity in the area. The Damara tern has an IUCN Red List status of Least Concern, but with a decreasing population (BirdLife International. 2021a). Other birds in the area with IUCN status (other than least concern) are mostly associated with the marine environment and include:

- ◆ Curlew Sandpiper (*Calidris ferruginea*) – Near Threatened with numbers decreasing (BirdLife International. 2017)
- ◆ Cape Gannet (*Morus capensis*) – Endangered with population decreasing (BirdLife International, 2018a)
- ◆ Cape Cormorant (*Phalacrocorax capensis*) – Endangered with population decreasing (BirdLife International, 2018b)
- ◆ African penguin (*Spheniscus demersus*) – Not common at Wlotzkasbaken. Endangered with population decreasing (BirdLife International, 2020). Green status assessment of Largely Depleted (Hagen et al., 2021)
- ◆ Chestnut-banded Plover (*Charadrius pallidus*) now Least Concern with stable population, but previously (2016) listed as Near Threatened (BirdLife International, 2021b).

A large percentage of reptiles occurring on the Gravel Plains are endemic to Namibia. A number of lizards and geckos occur here, many of which are closely associated with the dolerite outcrops and ridges occurring to the east and south of Wlotzkasbaken. A frequently encountered reptile is the Namaqua Chameleon (*Chamaeleo namaquensis*) which is often associated with the hummocks' vegetation. Other interesting species frequently encountered are the black hairy thick-tailed scorpion (*Parabuthus villosus*), the dancing white lady spider (*Leucorchestris arenicola*) and tenebrionid beetles (toktokkies).

The Wlotzkasbaken Townlands lies in the Dorob National Park (previously the West Coast Recreation Area) (Figure 7 1). It thus receives some level of protection against human disturbance, although not as much as other protected areas in Namibia. Access to the Dorob National Park is free, but with a permit from the MEFT. Vehicle access is restricted to existing roads and tracks and off-road driving is discouraged due to the sensitive lichen fields and biological crust of the Gravel Plains. Sensitive habitats are mapped in Figure 5-3. These habitats are largely accommodated by the project layout.



Photo 8-11 Pencil bush on small hummock with animal burrow

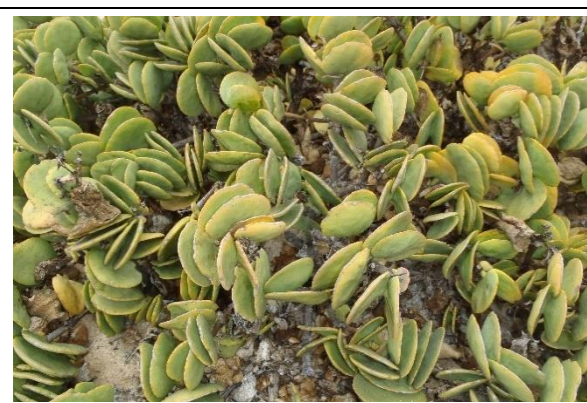


Photo 8-12 Dollar bush

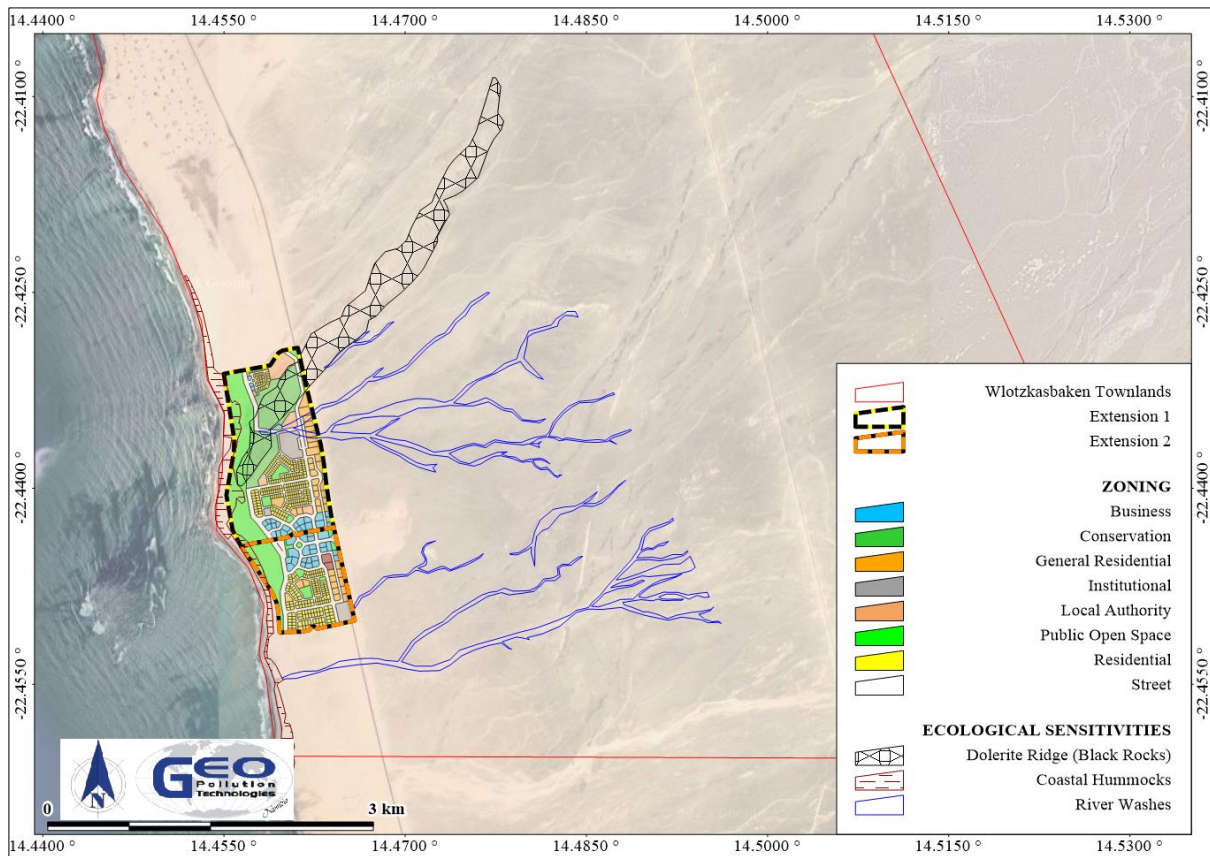


Figure 8-4 Sensitive habitats in relation to the proposed layout (Adapted from Irish, 2023)



Photo 8-13 Pencil bush with animal burrow



Photo 8-14 Springbok in the Wlotzkasbaken township with some hummocks

Implications and Impacts

Development of the project will result in habitat degradation. Construction activities especially are disruptive and detrimental to habitats which it will also fragment. Apart from the physical activities such as earthmoving and possible blasting, anthropogenic activities may further disturb and destroy habitats. Indiscriminate material storage, hydrocarbon handling and waste management coupled with unauthorised recreational and or deviant behaviour (such as off-road driving, etc.) will all negatively affect habitats. The proposed construction activities are irreversible which will have a long term effect on the flora and fauna.

Changes in the layout of the township extension have already aimed at protecting the sensitive habitats. The preferred layout as presented in this report is the most accommodating towards conservation and preservation of endemic species and habitats.

Operational phase activities may further affect the habitat which has been preserved, mainly though deviant human activities and disorderly conduct such as littering, trampling, off-road driving, etc.

8.7 DEMOGRAPHIC AND CULTURAL CHARACTERISTICS

Wlotzkasbaken falls within the Arandis Constituency. According to the results of the 2011 Population and Housing Census (National Planning Commission, 2012), Arandis Constituency has 10,093 people. Economic activities relate mostly to mining, tourism and businesses within the constituency. However, the Wlotzkasbaken Townlands are wholly located in the Dorop National Park and the settlement itself is renowned as a holiday destination, especially in December months, however there has been an increase in the number of permanent residents in the area, mostly retired. No known businesses have been registered in the settlement and there are no retail facilities with extremely limited institutional establishments. All of the features being in stark contrast to the closest settlement areas like Swakopmund and Henties Bay, within the Erongo Region. The settlement is historically significant with many of the houses and structure as old as 50 years or older. The unique architecture of the town has historically been linked to the raised water towers of each dwelling. Many of the structures are retained even though some may not be functional anymore. However, various dwelling upgrades and new houses have seen the removal or omission of the landmark structures and an overall reduction in uniformity of the signature architectural feature.

Table 8-4 Demographic characteristics of Arandis Constituency, the Erongo Region and nationally (Namibia Statistics Agency, 2011)

	Arandis Constituency	Erongo Region	Namibia
Population (Males)	5,241	79,823	1,021,912
Population (Females)	4,852	70,986	1,091,165
Population (Total)	10,093	150,809	2,113,077
Unemployment (15+ years)	1,415	22.6%	33.8%
Literacy (15+ years)	97.6%	96.7%	87.7%
Education at secondary level (15+ years)	N/A	71.8%	51.2%
Households considered poor	N/A	5.1%	19.5%

Implications and Impacts

Establishment of the proposed extension areas will not only serve the existing township with much needed amenities, but will also establish economic driving activities through business and institutional establishments. The provision of a variety of housing units will serve to alleviate the demand for sea-front and coastal properties within Namibia. The proposed development will result in a definite change in the demographic profile and structure of the local constituency.

8.8 ARCHAEOLOGICAL, HERITAGE AND CULTURAL CONSIDERATIONS

Although the surrounding area is historically very significant, there are no related building or features in close proximity to the site. The strong heritage of recreational fishing along the coastline is still of significance to the tourism sector today, as many folk-lore and legacies are associated with the surrounding coastline. The area sees a significant influx of people during the holiday season, a large portion only spending the day along the coast.

However, the area in general is also a host to evidence of much older human activities with numerous sites of archaeological importance having been documented in the area. These sites are

depicted in an Archaeological Specialist Report (Kinahan, 2023) conducted for the site. The related specialist investigation established a further seven archaeological sites, the majority of which occur on the northern portions of the site. All of the sites documents are considered to be isolated minor finds with the majority having a vulnerability rating of low or indirect threat. Two sites have a high likelihood of disturbance (Kinahan, 2023).

Implications and Impacts

Although the area harbours archaeological resources and the site itself was identified to have seven such sites, these sites are of low significance and do not require further investigation of documentation. However, in light of the existing and surrounding resources, the project should adopt the precautionary principle during excavations.

9 PUBLIC CONSULTATION

Consultation with the public forms an integral component of an environmental assessment investigation and enables interested and affected parties (IAPs) e.g. neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with the project and to identify additional issues which they feel should be addressed in the environmental assessment.

Public participation notices were advertised in two national newspapers for two consecutive weeks. Notices appeared in The Namibian Sun and Die Republikein on 5th of April 2023 and the 12th of April 2023 respectively. A site notice was placed on site and notification letters sent to landowners. A database of homeowners was established and a large component of the database contacted individually to facilitate communication regarding the project. In addition, notification about the project was sent to the home owners' association which distributed the information via their networking platform. The Swakopmund Municipality and National Heritage Council of Namibia were also notified. Following the notification period, comments were received to consider during the environmental assessment. The majority of the concerns related to the bulk services required for the project and related planning. All comments have been included in the issues and responses table and were shared with the responsible contractor. Proof of consultation, including the comments and responses report, is attached in Appendix A.

10 ASSESSMENT OF IMPACTS

The purpose of this section is to assess and identify the most pertinent environmental impacts that are expected from the construction, operational and potential decommissioning activities of the proposed project. An EMP based on these identified impacts are also incorporated into this section.

For each impact an environmental classification was determined based on an adapted version of the Rapid Impact Assessment Method (Pastakia, 1998). Impacts are assessed according to the following categories: Importance of condition (A1); Magnitude of Change (A2); Permanence (B1); Reversibility (B2); and Cumulative Nature (B3) (see Table 10-1)

Ranking formulas are then calculated as follow:

$$\text{Environmental Classification} = A1 \times A2 \times (B1 + B2 + B3)$$

The environmental classification of impacts is provided in Table 10-2.

The probability ranking refers to the probability that a specific impact will happen following a risk event. These can be improbable (low likelihood); probable (distinct possibility); highly probable (most likely); and definite (impact will occur regardless of prevention measures).

Table 10-1 Assessment criteria

Criteria	Score
Importance of condition (A1) – assessed against the spatial boundaries of human interest it will affect	
Importance to national/international interest	4
Important to regional/national interest	3
Important to areas immediately outside the local condition	2
Important only to the local condition	1
No importance	0
Magnitude of change/effect (A2) – measure of scale in terms of benefit / disbenefit of an impact or condition	
Major positive benefit	3
Significant improvement in status quo	2
Improvement in status quo	1
No change in status quo	0
Negative change in status quo	-1
Significant negative disbenefit or change	-2
Major disbenefit or change	-3
Permanence (B1) – defines whether the condition is permanent or temporary	
No change/Not applicable	1
Temporary	2
Permanent	3
Reversibility (B2) – defines whether the condition can be changed and is a measure of the control over the condition	
No change/Not applicable	1
Reversible	2
Irreversible	3
Cumulative (B3) – reflects whether the effect will be a single direct impact or will include cumulative impacts over time, or synergistic effect with other conditions. It is a means of judging the sustainability of the condition – not to be confused with the permanence criterion.	
Light or No Cumulative Character/Not applicable	1
Moderate Cumulative Character	2
Strong Cumulative Character	3

Table 10-2 Environmental classification (Pastakia 1998)

Environmental Classification	Class Value	Description of Class
72 to 108	5	Extremely positive impact
36 to 71	4	Significantly positive impact
19 to 35	3	Moderately positive impact
10 to 18	2	Less positive impact
1 to 9	1	Reduced positive impact
0	-0	No alteration
-1 to -9	-1	Reduced negative impact
-10 to -18	-2	Less negative impact
-19 to -35	-3	Moderately negative impact
-36 to -71	-4	Significantly negative impact
-72 to -108	-5	Extremely Negative Impact

10.1 RISK ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

The EMP provides management options to ensure impacts of the project are minimised. An EMP is a tool used to take pro-active 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 environmental management measures are provided in the tables and descriptions below. These management measures should be adhered to during the various phases of the operation of the project. This section of the report can act as a stand-alone document. All personnel taking part in the operations of the project should be made aware of the contents in this section, so as to plan the project accordingly and in an environmentally sound manner.

The objectives of the EMP are:

- ◆ to include all components of construction activities (including future upgrades, maintenance, etc.) 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 construction and operational personnel in applying such controls; and
- ◆ to ensure that appropriate environmental training is provided to responsible construction and operational personnel.

Various potential and definite impacts will emanate from the construction, operational and decommissioning phases. The majority of these impacts can be mitigated or prevented. The impacts, risk rating of impacts as well as prevention and mitigation measures are listed below.

As depicted in the tables below, impacts related to the operational phase are expected to mostly be of medium to low significance and can mostly be mitigated to have a low significance. The extent of impacts are mostly site specific to local and are not of a permanent nature. Due to the nature of the surrounding areas, cumulative impacts are possible.

10.1.1 Planning

During the phases of planning for construction, operations and decommissioning of the proposed project, it is the responsibility of the Proponent to ensure they are and remain compliant with all legal requirements. The Proponent must also ensure that all required management measures are in place prior to and during all phases, to ensure potential impacts and risks are minimised. The following actions are recommended for the planning phase and should continue during various other phases of the project:

- ◆ Ensure that all necessary permits from the various ministries, local authorities and any other bodies that governs the construction activities and operations of the project are in place and remains valid. This includes fuel permits where needed.
- ◆ Ensure that design parameters, where required, is approved by relevant authorities prior to construction.
- ◆ Ensure all appointed contractors and employees enter into an agreement which includes the EMP. Ensure that the contents of the EMP are understood by the contractors, sub-contractors, employees and all personnel present or who will be present on site.
- ◆ Make provisions to have a health, safety and environmental (HSE) coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site. Provision should be made for monthly environmental performance audits and reports.
- ◆ Have the following emergency plans, equipment and personnel on site where reasonable to deal with all potential emergencies:
 - Risk management / mitigation / EMP/ emergency response plan and HSE manuals
 - Adequate protection and indemnity insurance cover for incidents;
 - Comply with the provisions of all relevant safety standards;
 - Procedures, equipment and materials required for emergencies.

- ◆ Establish and maintain a fund for future ecological restoration of the project site should project activities cease (partially or in full) and the site is decommissioned and environmental restoration or pollution remediation is required.
- ◆ Establish and / or maintain a reporting system to report on aspects of construction activities, operations and decommissioning as outlined in the EMP.
- ◆ Submit bi-annual reports to the MEFT to allow for environmental clearance certificate renewal after three years, if required. This is a requirement by MEFT.
- ◆ Appoint a specialist environmental consultant to update the EA and EMP and apply for renewal of the environmental clearance certificate prior to expiry, if required

10.1.2 National Development Goals

The proposed project pins down key development goals and challenges which were identified as part of the Namibian development goals. It may be considered as a coastal development project aiming to provide serviced housing, amenities and institutional support to communities. In addition, the project is located in line with the regional planning initiatives which identified the location as an area for coastal development. The project is unique in being one of only a handful urban developments along the coast of Namibia. The project is considered a long term project.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Information sharing about proposed expansion and related possible environmental constraints	2	2	2	2	3	28	3	Probable
Daily Operations	Information sharing related to maintenance schedules and repairs	2	1	2	2	2	12	2	Probable

Desired Outcome: Continued sharing of activity plans with IAPs and governing agencies. Maintaining an open door policy with neighbours/home owners' association and employees.

Actions

Mitigation:

- ◆ Information sharing about the project's progress should be made available to governmental agencies, interested and affected parties and the home owners' association. The Proponent and affected parties should use the information generated during the environmental assessment to realistically plan for future growth and optimisation of conservation efforts. Open communication regarding future development should be maintained.
- ◆ Provision of bulk services and related environmental assessments should be conducted prior to the commencement of construction of the proposed development.
- ◆ The Proponent should consider partnering with NGO's and other governmental agencies in establishing partnerships for project component development, conservation and social upliftment.
- ◆ The Proponent must employ local Namibians where possible. Deviations from this practise should be justified appropriately.
- ◆ A community liaison officer should be appointed during the construction phase, especially to facilitate community grievances and concerns.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Progress reports on implementation kept.

10.1.3 Ideals and Aspiration

During the environmental assessment, public consultation was conducted with Wlotzkasbaken residents, neighbours and interested and or affected parties. Concern about the continued growth and operations within the Wlotzkasbaken Townlands were raised. Information about the project and surrounding environmental features was also shared with institutions which have vested interests in the new development. Aspirations for business development and growth are impacted by updated information related to possible environmental constraints and challenges. Perceived growth in the sector is associated with additional pressure which may be exerted onto governmental agencies for service delivery. The overall consideration is that a large portion of the Wlotzkasbaken landowners' concerns relates to the loss of the settlements character (sense of place), habitat and the lack of service delivery from government authorities that may further affect the proposed additional township (extensions) development.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Information sharing about proposed expansion and related possible environmental constraints	2	2	2	2	3	28	3	Probable
Daily Operations	Information sharing related to maintenance schedules and repairs	2	1	2	2	2	12	2	Probable

Desired Outcome: Continued sharing of activity plans with IAPs and governing agencies. Maintaining an open door policy with neighbours and employees.

Actions

Mitigation:

- ◆ Information sharing about the project's progress should be made available to governmental agencies, interested and affected parties and the IAPs, The Proponent and affected parties should use the information generated during the environmental assessment to realistically plan for future growth and optimisation of the distribution system. Open communication regarding future development should be maintained.
- ◆ Employees / contractors to be informed about parameters and requirements for references upon employment.
- ◆ Contractor's tenders to include best practise requirements for construction safety, security and environmental management. Pollution, poaching and unauthorised habitat construction to carry contractual penalties.
- ◆ The Proponent must employ Namibians where possible. Deviations from this practise should be justified appropriately.
- ◆ A community liaison officer should be appointed during the construction phase especially to facilitate community grievances and concerns.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Records kept of all information shared with authorities, neighbours and employees,

10.1.4 Revenue Generation and Employment

The construction phase will require a large workforce which will mostly be contracted by the Proponent. Semiskilled and unskilled labour will make up the largest segment of the labour force. Such labour may easily be sourced from the nearby urban centres through contractors. Through the remuneration of professional services as well as the general labour force, revenue streams related to the construction industry will be boosted. The duration of the project will however negate economic resilience aspects. However, during the operations phase employment will be created in the form of domestic work, maintenance, etc., while businesses, retail facilities and institutional establishments will serve to diversify revenue streams and contribute to the gross domestic product (GDP).

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Employment and contribution to local economy	2	2	2	2	2	24	3	Definite
Daily Operations	Employment contribution to local economy	1	1	1	1	1	3	1	Definite

Desired Outcome: Contribution to national treasury and provision of employment to local Namibians.

Actions

Mitigation:

- ◆ The Proponent must employ local Namibians and contractors where possible.
- ◆ If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.
- ◆ Deviations from this practice must be justified.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

Summary report based on employee records

10.1.5 Demographic Profile and Community Health

The project is reliant on labour during the construction and operational phases. An initial and temporary change of the demographic profile during the construction phase will be replaced by a different and more permanent change to the demographic profile of the constituency during the operational phase. Increased access to services, housing and related amenities will result in an in-migration to the area. It is projected that an entire profile will be represented through the migration and not only certain aspects of the demographic profile. It is further expected that the migration will be from existing other urban centres in Namibia, as well as partially from rural communities.

An increase in foreign people in the area (foreign labourers and, potential job seekers) may potentially increase the risk of criminal and socially/culturally deviant behaviour. Differences in ethical and acceptable behaviour may foster feelings of rejection, mistrust and negatively affect the community health. Crime/security risks could have a negative impacts on the surrounding areas and township development. High rates of criminal behaviour would delay construction activities, delay the delivery of public services and community members or tourists leaving the area resulting in economic losses. However, the overall community health of the constituency will be improved through, not only the provision of services and housing, but also the related amenities.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	In-migration of labour force and socially or culturally deviance	2	-1	1	1	2	-8	-1	Probable
Operation	In-migration and increase of population. Perpetual change in demographic profile	3	3	3	3	2	72	5	Probable
Indirect Impacts	The spread of disease and criminal behaviour	2	-1	2	2	2	-12	-2	Probable

Desired Outcome: To prevent the spread of communicable disease and prevent / discourage criminal and or socially deviant and destructive behaviour.

Actions:

Prevention:

- ◆ Construction workers should always be supervised.
- ◆ Workers' conduct should be guided by a code of conduct to be developed by the contractors.
- ◆ The construction areas should be fenced to avoid unauthorized entry.
- ◆ Employ only local people from the area, deviations from this practice should be justified appropriately.
- ◆ Consultations with and involvement of local communities in project planning and implementation.
- ◆ Mandatory and regular training for workers on required lawful conduct and legal consequences for failure to comply with laws.
- ◆ Adopt of develop by-laws relating to environmental health.
- ◆ All provisions of the Labour Act must be adhered to.
- ◆ Construction teams and related workforce to be easily identifiable and distinguishable.
- ◆ All employees to carry company identification tags and a list of employees to be available at the site office.

- ◆ Sufficient provisions to be made available by the contractors for labourers in terms of lunch, tea and bathroom breaks.
- ◆ Educational programmes for employees on HIV/AIDS and general upliftment of employees' social status.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Project inspection sheet for all areas which may present environmental health risks, kept on file.
- ◆ Summary report based on educational programmes and training conducted.
- ◆ Summary report based on any theft related incidents.
- ◆ Employment records kept on file.

10.1.6 Traffic

The construction phase will increase traffic flow to the site as well as during the operational phase. An increase in traffic to and from the site may increase the risk of incidents and accidents and road degradation (movement of construction vehicles and equipment). Construction activities may require sections of internal roads to be closed off during the maintenance of service infrastructure. In addition, the site of the proposed development is not located close to a significant a feasible labour force. It is foreseen that the largest portion of the labour force will be transported to the site daily.

The operational phase will increase the traffic on the main road to and from the project location. This will increase the probability for incidents and accidents. This will be exacerbated during the holiday season, especially during December and January which coincides with the main seasonal fishing period. Internally, the traffic risks will follow a different pattern with daily activities such as schools and businesses dictating the internal flow and peak times.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Laying of distribution lines. Delivery of equipment and building supplies	2	-1	2	2	2	-12	-2	Definite
Indirect Impact	Dust and increased collision risk. Road degradation	2	-1	2	2	2	-12	-2	Definite

Desired Outcome: Minimum impact on traffic and no transport or traffic related incidents.

Actions

Prevention:

- ◆ Sensitive environmental features should be demarcated and no off-road driving should be allowed around these sites. No construction vehicles should be allowed to enter these sites.
- ◆ Where relevant, erect clear signage, regarding parking and access and exit points around construction sites and at the construction camps.
- ◆ Additional provision should be made and agreed upon, with the Roads Authority, should any initial construction be timed during the peak holiday seasons.
- ◆ Preparation and implementation of a traffic management plan to be approved by the supervising engineer. Traffic flow patterns and volumes should be presented while growth and future parking and expected trips should be included in a traffic impact assessment. Such assessment should be conducted to inform safety requirements such as the length of the turning lane from the existing main road. During the planning phase, all connections to national roads must be approved by the Roads Authority.
- ◆ Road safety training to be provided to all construction staff and should be implemented by any contractors used (included in tender documentation).
- ◆ During any maintenance of infrastructure which may necessitate partial or complete road closure of traffic flow disruptions, clear communication should be available to the public and should include timing of maintenance.

Mitigation:

- ◆ Construction vehicles delivering material should not be allowed to obstruct any traffic or entrances / exists of erven without prior arrangement and proper signage where such measures apply.
- ◆ If any traffic impacts are expected, traffic management should be performed to prevent these.

- ◆ Measures should be in place to prevent (or repair) damage to road surfaces during the construction phase, especially during wet conditions.
- ◆ It must be ensured that a backlog of traffic does not develop at access points during peak hours, through the implementation of an efficient and effective access control system.
- ◆ Internal speed limits should be set for the construction and operational phases.
- ◆ Tender documentation to clearly specify the requirements of road worthy vehicles to be used during the construction phase by contractors while also stipulating the requirements for the transport of employees etc.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Any complaints received regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself.
- ◆ A bi-annual report should be compiled of all incidents reported, complaints received, and action taken.

10.1.7 Health, Safety and Security

Activities associated with the construction and operational phases are reliant on human labour. As such, labourers are exposed to health and safety risks. Some activities, especially associated with the operation of heavy equipment, machines and heavy motor vehicles and or hazardous chemicals, poses the main risks to employees. In addition to these expected risks, severe climatic characteristics of the area (e.g. east wind conditions) may contribute to conditions such as sunstroke, fatigue, dehydration and related symptoms. Security breaches are another concern which relates to the development of properties, established properties within the townlands, as well as the construction camps themselves. A construction workforce presents the opportunity of ill-intending persons to pose as project team members for nefarious and criminal reasons. Constructions sites are often targeted by criminal elements and the site will therefore increase the risk of crime within the local area. Theft or damage of construction materials and properties is an important local risk. Safety risks may further be encountered should any part of the project fail. Un-rehabilitated heaps or poorly constructed road crossings present risks to traffic.

In terms of the operational phase, the Proponent has an obligation to ensure that the large infrastructure components, as well as the service infrastructure associated with the project, are constructed to best practice public safety standards. Maintenance of infrastructure components may however be required to ensure continued safe operation of structures. As an example, the Proponent will have a mandate to ensure all general waste is collected to prevent risks of contamination and health impacts. Similarly, any businesses and / or retail premises will be subject to, and will have to comply with, environmental health inspections etc. The details of such a vast aspect are beyond the scope of this assessment. However, should the Proponent fail to ensure safe and secure operational infrastructure, community safety and security may be at risk.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Physical injuries, exposure to chemicals and criminal activities	1	-2	3	3	2	-16	-2	Probable
Daily Operations	Physical injuries or damage to infrastructure or property	1	-2	3	3	2	-16	-2	Probable

Desired Outcome: To prevent injury, health impacts and theft.

Actions

Prevention:

- ◆ All Health and Safety Regulations specified in the Labour Act should be complied with.
- ◆ Clearly label dangerous and restricted areas as well as dangerous equipment and products during the construction phase as well as during maintenance of infrastructure.
- ◆ Equipment that will be locked away on site (during the construction phase) must be placed in a way that does not encourage criminal activities (e.g. theft).
- ◆ Provide all employees with required and adequate personal protective equipment (PPE).
- ◆ Ensure that all personnel receive adequate training on operation of equipment / handling of equipment and/or hazardous substances.
- ◆ Implementation of a maintenance register for all equipment and hazardous substance storage areas.
- ◆ Implement a maintenance schedule for all infrastructure components.
- ◆ Adopt local policies and procedures for dealing with all forms of waste, including possible effluent as well as community health aspects such as noise etc.

Mitigation:

- ◆ In terms of contracted parties, selected personnel should be trained in first aid and a first aid kit must be available on site. The contact details of all emergency services must be readily available.
- ◆ Implement and maintain an integrated health and safety management system for all businesses, to act as a monitoring and mitigating tool, which includes: operational, safe work and medical procedures, permits to work, emergency response plans, housekeeping rules, material safety data sheet (MSDS's) and signage requirements (PPE, flammable etc.).

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Any incidents must be recorded with action taken to prevent future occurrences.
- ◆ A monthly report should be compiled of all incidents reported during the construction phase. The report should contain dates when training were conducted and when safety equipment and structures were inspected and maintained.

10.1.8 Fire

Construction activities may increase the risk of the occurrence of fires. Fires outside of designated areas, especially near laydown and material storage areas, may increase the risk of the occurrence of uncontrolled fires. Chemicals and fuels stored and used for general construction activities may be flammable. Improper waste burning or discarding of cigarette butts around waste areas, or in the vicinity of hazardous chemicals, further increases fire risks. The site is located in a sparsely developed area with no fire brigade or related trained persons, which will increase the difficulty of fighting fires. Although a fire is improbable during the construction phase, the risk remains.

During the operational phase, a significantly increased fire risk will be present as related to homeowners and business. Any member of the public can accidentally, or intentionally, cause a fire. Significant increased risks are associated with the storage of large volumes of flammable chemicals or hydrocarbons, typically as present at a fuel retail facility. However, such and related activities will require a separate environmental assessment. In terms of the Proponent's responsibility, the provision and maintenance of fire hydrants throughout the development as well as the establishment of a fire brigade available to fight fighters, is paramount.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Fire and explosion risk	1	-2	2	2	1	-10	-2	Improbable
Daily Operations	Fire and explosion risk	1	-2	2	2	1	-10	-2	Improbable

Desired Outcome: To prevent property damage, possible injury and impacts caused by uncontrolled fires.

Actions:

Prevention:

- ◆ Prepare a holistic fire protection and prevention plan. This plan must include evacuation plans from the site and signage, an emergency response plan and a firefighting plan as part of construction plans.
- ◆ Personnel training (safe operational procedures, firefighting, fire prevention and responsible housekeeping practices) should form part of all contractor's tender requirements.
- ◆ Establish or adopt by-laws related to the prevention of fires.
- ◆ Establish a maintenance schedule for all fire related infrastructure as constructed and or managed by the Proponent.
- ◆ Ensure all flammable chemicals and fuels are stored according to MSDS and SANS instructions and all spills or leaks are cleaned up immediately.
- ◆ Maintain regular site, mechanical and electrical inspections and maintenance.
- ◆ Ensure the maintenance of firefighting equipment and promote good housekeeping.
- ◆ No open and unattended fires should be allowed.
- ◆ Any LPG gas cylinders should be stored in an enclosed, secure area and serviced regularly with fire extinguishers readily available.
- ◆ The Proponent should liaise with the nearest fire brigade to ensure that all fire requirements are met and that contractors adhere to all requirements related to fuel storage and handling during the construction phase.

Mitigation:

- ◆ Implement the fire protection and firefighting plan in the event of a fire.

- ◆ Quick response time by trained staff will limit the spread and impact of fire.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ A register of all incidents must be maintained. This should include measures taken to ensure that such incidents do not repeat themselves.
- ◆ A bi-annual report should be compiled of all incidents reported. The report should contain dates when fire drills were conducted and when fire equipment was tested and training given.
- ◆ Record when fire drills were conducted and when firefighting equipment were tested and training given.

10.1.9 Dust

Particulate matter is a known health concern related to air quality. Specific parameters were developed by the World Health Organisation (WHO) relating to the safe limits of particulate matter in ambient air. Construction activities will entail earth moving activities as well as possibly localised blasting which may temporarily suspend material in the air. Frequent travelling of HVM over un-surfaced areas may increase soil disturbance resulting in finer particles which are more easily suspended in the air. An increase of dust settling outside the construction area may impact on fauna and flora. However, considering existing east—wind conditions, existing biodiversity are well adapted to deal with dust.

Any construction related dust would most likely be a nuisance factor for residents and businesses, considering cumulative aspects and the windy climate of the area. Since the development is proposed in phases, construction dust may affect the initial, established community. The possible impacts, which may emanate from the project, will be on a local scale. It is not foreseen that the greenhouse gas emissions (GHG) from such activities will have a significant impact on the community health.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Excessive dust generated from construction activities, exposure to airborne particulates	1	-1	2	2	1	-5	-1	Definite

Desired Outcome: To prevent health impacts and minimise dust generated.

Actions

Mitigation:

- ◆ Personnel issued with appropriate masks where excessive dust are present.
- ◆ Mitigation measures should be in place, such as dust suppression where excessive dust generation is expected.
- ◆ A complaints register should be kept for any dust related issues and mitigation steps taken to address complaints where necessary.
- ◆ Notice to be given to nearby receptors prior to activities generating excessive dust which cannot be mitigated, if any.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Any complaints received regarding dust should be recorded with notes on action taken.
- ◆ All information and reporting to be included in a bi-annual report.

10.1.10 Noise and Vibration

Construction noise, which may constitute high volume and repetitive noises, are known to impact human health. Excessive noise may result in a nuisance to nearby receptors and possible hearing loss in staff. In addition to possible impacts on human receptors, noise and vibrations will probably also have an impact to fauna and avifauna closer to construction activities. Roosting and breeding sites may be affected in such a way as to discourage further roosting and or breeding in the area. Noise and vibration may further result in a change in the ranging / foraging patterns of larger fauna species.

Noise standards have been developed by the Health and Safety Regulations of the Labour Act and WHO to protect workers and communities against the health impacts and nuisances of noise. The project will have a construction period which could cause periods of noise experienced by nearby residents (in those areas initially established). Mechanical excavations will increase the intensity of the construction noise generated.

During the operational phase, numerous and almost all aspects associated with the development will be noise emitting. Therefore, planning related to the layout of the township extensions incorporated noise related aspects with residential and institutional areas located further away from noisier areas like business areas.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Excessive noise and vibrations generated from construction activities – nuisance and hearing loss	2	-2	2	2	1	-20	-3	Definite
Indirect Impact	Cumulative noise	2	-1	2	2	2	-12	-2	Definite

Desired Outcome: To prevent any nuisance and hearing loss due to noise and vibrations generated.

Actions

Prevention:

- ◆ Follow the Health and Safety Regulations of the Labour Act for limits on noise in the workplace and World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment and not to cause a nuisance.
- ◆ Adopt or develop local regulations related to noise control.
- ◆ Allow for a community grievance mechanism.
- ◆ All machinery must be regularly serviced to ensure minimal noise production.
- ◆ Notification to nearby receptors (through a community liaison officer) of construction commencement.
- ◆ To reduce vibration levels, it is recommended that all machinery and vehicles be maintained in a good condition and that a maintenance record be kept.
- ◆ Any machinery and vehicles that cause excessive vibrations (indicative of possible malfunction) should be given defect notices and taken off site immediately. Machinery and/or vehicles may only be used again on site once they have been serviced and approval has been granted by the site supervisor.
- ◆ Unnecessary vibrations can be minimised by ensuring that no machinery or vehicles are left idling when not in use.
- ◆ The appropriate and correct placement of specific work activities can ensure the reduction of handling of machinery that cause heavy vibrations.

- ◆ Ensure personnel running the equipment are trained accordingly so that machinery is used properly.
- ◆ Pre assessment to allow for mitigation measures for any elevated levels of vibrations should take place if there is any suspicion that there may be excessive vibration levels on site during construction. These mitigation measures should then be in accordance with local regulations and standards.
- ◆ Should any blasting be conducted, a related survey of all properties will have to be conducted and an amendment to the environmental assessment and related environmental management plan will have to be submitted to MEFT.

Mitigation:

- ◆ Hearing protectors as standard PPE for workers in situations with elevated noise levels.
- ◆ An assessment of the vibrations from within premises where complaints are recorded can help determine better mitigation measures.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Health and Safety Regulations of the Labour Act and WHO Guidelines.
- ◆ Maintain a complaints register.
- ◆ Report on complaints and actions taken to address complaints and prevent future occurrences.

10.1.11 Waste Production

Waste production during the construction and operational phases are very different and require unique waste management measures to address related impacts and prevent contamination. Construction waste may have a greater component of building rubble, discarded materials and hydrocarbon-contaminated materials, with less general and domestic waste in comparison. The latter two types of waste, along with sewage and effluent, should be managed by the contracting agent responsible for construction within a specific area. Wind may blow waste, such as old cement bags (which is a hazardous waste), plastic bags and polystyrene, from the site to beyond the site boundaries. Construction waste may present physical pollution as well as chemical contamination. Waste may include hazardous waste associated with hydrocarbon products and chemicals, as well as soil and water contaminated with such products.

Once the extensions have been developed, a greater volume of general and domestic waste will have to be managed. Any form of waste, may not only result in contamination and pollution risks, but also present health and fire risks. Uncollected domestic and general waste, not contained in suitable disposal units, may attract vermin and wild animals. Waste handling and storage, albeit temporarily, may present pollution and contamination risks.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Construction waste production, littering, illegal dumping, contaminated materials	2	-2	2	2	2	-24	-3	Definite
Operation	Generation of all waste types, littering and illegal dumping	2	-2	2	2	2	-24	-3	Definite

Desired Outcome: To reduce the amount of waste produced, and prevent pollution and littering as well as safety risks associated with accumulated waste.

Actions

Prevention:

- ◆ A waste management system should be adopted and presented for the construction phase and should include measures related to construction waste handling and management.
- ◆ All construction related tender documentation should include the waste management system and should include contractual penalties for failing to adhere to the waste management requirements.
- ◆ A waste management system should be adopted for the proposed development and should include disposal to a registered landfill site.
- ◆ Ensure adequate temporary waste storage facilities are available for different types of waste during the operational phase.
- ◆ Ensure waste cannot be blown away by wind during all phases of the project.
- ◆ Prevent scavenging (human and non-human) of waste.
- ◆ Adopt or formulate regulations and by-laws relating to waste management, storage and handling.
- ◆ All construction waste produced must be removed on a weekly basis and record kept of all waste removed from site.
- ◆ Each contractor should clearly indicate their area of operations and be held accountable for all domestic and construction related waste within the area and related construction camps.

- ◆ Weekly site inspections should be conducted by a representative of the Proponent to ensure implementation of the waste management plan and compliance to the EMP.
- ◆ An independent waste and EMP management audit should be conducted on a monthly basis for the duration of construction contracts.
- ◆ Ensure all ablution facilities (chemical toilets) are properly constructed and serviced and that the contents is disposed of at the nearest, registered effluent treatment plant.

Mitigation:

- ◆ Waste should be disposed of regularly and at appropriately classified disposal facilities. This includes hazardous material disposal (empty chemical containers, contaminated rags, paper, water and soil).
- ◆ See the material safety data sheets available from suppliers for disposal of contaminated products and empty containers.
- ◆ Liaise with the regional council regarding waste and handling of hazardous waste.
- ◆ Empty chemical containers that may present a contamination/health risk must be treated as hazardous waste. Workers should not be allowed to collect such containers for purposes of storing water or food. This can be achieved by puncturing or crushing such containers prior to disposal.
- ◆ Report all fuel spills greater than 200 litres to the Ministry of Mines and Energy and enact emergency response plans for fuel spills.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/project.
- ◆ Waste management plan, weekly and monthly audit reports kept on site.
- ◆ Operational and maintenance record of all chemical toilets kept on site.
- ◆ Any complaints received regarding waste should be recorded with notes on action taken.
- ◆ All information and reporting to be included in a bi-annual report.

10.1.12 Flora

Construction related activities presents the greatest risk to habitats within the area. Destruction and or disturbance of sensitive areas such as the coastal hummock belt and dolerite ridge (which lies within the proposed development), will impact the localised ecosystem, especially during the construction of properties and trenching of service infrastructure. Construction and operational activities can create habitat for flora species to establish e.g. disturbed soil is favourable for the establishment of weeds and invader species. If construction activities or waste material are allowed into these habitats, it will lead to degradation, destruction and fragmentation of highly sensitive habitats. Illegal collection of plant materials may occur. Employees should not be allowed to harvest kelp or forage for washed-up kelp from the site or from the areas adjacent to it.

Although the operational phase is not planned to have direct physically altering activities on or around sensitive habitat areas, deviant or criminal social behaviour may result in damage to protected flora resources.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Impact on flora and loss of biodiversity	1	-1	3	2	2	-7	-1	Improbable
Daily Operations	Change in localised ecosystems	1	-1	3	2	2	-7	-1	Improbable

Desired Outcome: To avoid pollution and negative impacts on these sensitive habitats.

Actions.

Prevention:

- ◆ Designated conservation areas (such as the dolerite ridge), as part of the project layout, should be suitably fenced prior to construction of the proposed development and no go areas must be clearly indicated. In addition the Proponent should identify protected plant species on site and where possible incorporate them into the design of the development where possible (such as in open space areas).
- ◆ All preventative aspects as identified by the vegetation specialist should be adopted and where not possible an alternative possibility considered.
- ◆ All dumping of waste material in the environment, especially bricks and contaminated materials or soils, must be prevented.
- ◆ No storage of vehicles or equipment will be allowed outside of the designated area.
- ◆ Educate all contracted and related employees on the value of biodiversity and strict conditions prohibiting harvesting of flora must be part of employment contracts. Include prohibitions or regulations on the collection of kelp, beach wood, etc.
- ◆ Mitigation measures related to waste handling and the prevention of groundwater, surface water and soil contamination should limit ecosystem and biodiversity impacts.

Mitigation:

- ◆ For construction activities, contain construction material to a designated laydown area and prevent movement out of areas earmarked for clearing and construction.
- ◆ Take disciplinary action against any employees failing to comply with contractual conditions related to harvesting of flora.
- ◆ Implementation of an alien vegetation management plan for the site is required. This is especially in areas that have been disturbed.

Responsible Body:

- ◆ Contractor

- ◆ Proponent

Data Sources and Monitoring:

- ◆ All information and reporting to be included in a bi-annual report.
- ◆ Photographic documentation of the hummock dunes and vegetation growth of various points as identified for the integrated monitoring plan.

10.1.13 Fauna

The dolerite ridge and coastal dune hummocks were identified as the two most sensitive habitats hosting approximately 18 documented endemic species. Construction activities could lead to the displacement of faunal communities due to habitat loss and disturbance (noise, dust and vibration) and/or direct mortalities. Extreme caution must be taken when performing construction activities near these habitats since these are near impossible to restore once disturbed. Impacts may further extend to human-wildlife conflict such as chance encounters with the presences of brown hyenas and jackal foraging in the proposed township development. Poaching of animal materials may occur. Employees should not be allowed to poach animals such as roaming springboks or collect or injure any exotic species such as chameleons or scorpions.

Although the operational phase is not planned to have direct physically altering activities on or around sensitive habitat areas, deviant or criminal social behaviour may result in damage to protected fauna species.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Impact on fauna and loss of biodiversity	1	-1	3	2	2	-7	-1	Improbable
Daily Operations	Change in localised ecosystems	1	-1	3	2	2	-7	-1	Improbable

Desired Outcome: To avoid the negative impacts on fauna and loss of biodiversity

Actions.

Prevention:

- ◆ Designated conservation areas (such as the dolerite ridge), as part of the project layout, should be suitably fenced and no-go areas clearly indicated, prior to construction of the proposed development.
- ◆ All preventative aspects as identified by the fauna specialist should be adopted and where not possible an alternative possibility considered.
- ◆ Prior to land clearing, do systematic site walkover to as best possible, locate and remove ant slow moving animals like chameleons.
- ◆ For the construction phase, instruct workers to not deliberately injure or kill any animals perceived as dangerous, like scorpions and reptiles which may be present on site. Rather encourage reporting of such animals and arrange for the relocation of the animals to safe habitats.
- ◆ Educate all contracted and related employees on the value of biodiversity and strict conditions of prohibiting the poaching of fauna must be part of employment contracts.
- ◆ Report any extraordinary animal sightings to MEFT or the Ministry of Fisheries and Marine Resources (such as beached whales etc).
- ◆ Mitigation measures related to waste handling and the prevention of groundwater, surface water and soil contamination should limit ecosystem and biodiversity impacts.
- ◆ Prevent scavenging of waste by fauna.
- ◆ Direct all lights down to working surfaces and use minimal lighting at night at the construction camps.
- ◆ No access to quad bikes or off road vehicles to the hummocks or dolerite ridge.
- ◆ As part of the town structure plan, design parameters should be set to state that all lighting, especially at businesses and institutions, should be directed downward as to prevent impacts on birds flying overhead.

Mitigation:

- ◆ For construction activities contain construction material to a designated laydown area and prevent movement in areas earmarked for conservation.
- ◆ Report any extraordinary animal sightings, conflict or incidents to the MEFT.
- ◆ Take disciplinary action against any employees failing to comply with contractual conditions related to poaching and the environment.

Responsible Body:

- ◆ Contractor
- ◆ Proponent

Data Sources and Monitoring:

- ◆ All information and reporting to be included in a bi-annual report.
- ◆ Report any extraordinary animal sightings to the Ministry of Environment, Forestry and Tourism.

10.1.14 Groundwater, Surface Water and Soil Contamination

Contamination risks may be linked to the construction and operational phases. Sources of contamination can be spills and leaks from construction vehicles, chemicals used during construction such as paints and sewage. Shallow groundwater may lead to rapid dispersion of pollutants, and may potentially negatively impact surrounding underground utilities of infrastructure (considering the phased approach). Changes in the soil structure due to site excavation, clearance and especially ground breaking may lead to trenches along which contamination may travel.

During the operational phase, various risks of contamination may be associated with any portion of the infrastructure failing, such a leaking sewerage lines. Improper storage of hazardous materials, etc., may further pose risk to soil and groundwater contamination.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Contamination from hazardous material spillages and hydrocarbon leakages	2	-1	2	2	1	-10	-2	Probable

Desired Outcome: To prevent the contamination of water and soil.

Actions

Prevention:

- ◆ Leaking equipment shall be repaired immediately or be removed from site to facilitate repair.
- ◆ Any possible contamination of topsoil by hydrocarbons, concrete or concrete water must be avoided and an emergency spill kit must always be available on site.
- ◆ Proper training of operators of construction machinery and vehicles and employees must be conducted on a regular basis (fuel and chemical handling, spill detection, spill control).
- ◆ Spill control measures, such as drip trays, should be in place where refuelling of construction machinery is required on the site.
- ◆ All construction machines should be maintained to be in a good working condition during operations.
- ◆ Employ drip trays and spill kits when servicing / repairs of equipment are needed.
- ◆ Where relevant, determine locations of any underground structures per erven to prevent damage to underground utilities which may lead to contamination.
- ◆ Prevent off-road driving or movement of earthmoving equipment outside of areas designated for clearing.
- ◆ No dumping of rocks and removed soil in environmentally sensitive areas. Where possible it can be used to fill erosion ditches or old quarries, if any are present.

Mitigation:

- ◆ Any spillage of more than 200 litre must be reported to the Ministry of Mines and Energy.
- ◆ Spill clean-up means must be readily available on site as per the relevant MSDS.
- ◆ Any spill must be cleaned up immediately.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ A report should be compiled bi-annually of all spills or leakages reported. The report should contain the following information: date and duration of spill, product spilled,

volume of spill, remedial action taken, and a copy of documentation in which spill was reported to Ministry of Mines and Energy. The latter is only for fuel spills of 200 litres or more.

10.1.15 Visual Impact and Landscape Character

Construction activities will impact the development of natural drainage patterns, caused by surface clearance and associated decrease of vegetation cover, leading to increased surface drainage. Operations will lead to changes in the landscape character during the construction phase and subsequently in the operational phase. Furthermore the site should be kept clean, tidy and maintained to ensure it remains aesthetically pleasing.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Aesthetic appearance and integrity of the construction sites	1	-1	2	2	2	-6	-1	Probable
Indirect Impact	Change in settlement and landscape character	3	1	2	2	2	18	2	Definite

Desired Outcome: To minimise aesthetic impacts associated with the establishment.

Actions

Mitigation:

- ◆ Construction activities must be restricted to the construction site to minimize the impacts of the construction phase.
- ◆ Storm water discharge points should be designed to minimize scouring and erosion.
- ◆ Regular waste disposal, good housekeeping and routine maintenance on infrastructure will ensure that the longevity of structures are maximised and a low visual impact is maintained.
- ◆ All contractors' camps to be clearly demarcated, fenced off and kept neat.
- ◆ Active construction areas to be clearly indicated, demarcated and kept neat.
- ◆ Construction to be approached in a systematic manner to ensure uniform and methodical completion of construction areas.
- ◆ Construction planning to be shared with IAPs.
- ◆ As part of the town structure plan, design parameters should be set to state that all lighting, especially at businesses and institutions, should be directed downward and alternative street light designs that is lower to the ground with softer lights be employed.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ A maintenance record should be kept.
- ◆ A bi-annual report should be compiled of all complaints received and actions taken.

10.1.16 Archaeology, Heritage and Cultural Aspects

Both extension areas harbour archaeological resources, with the northern portion having a larger concentration of documented sites. However, as assessed and documented by the related specialist, these sites have a low significance rating and the majority of the sites have a low vulnerability rating. Construction activities will destroy archaeological resources located outside of the conservation areas on site. Although the site is void of heritage resources, the areas forms part of the larger cultural setting related to tourism and recreational use.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Change or damage to archaeological resources	1	-1	2	2	2	-6	-1	Probable
Indirect Impact	Change in cultural (rural recreational) character	3	1	2	2	2	18	2	Definite

Desired Outcome: To minimise impacts on archaeological, cultural and historic resources.

Actions

Mitigation:

- ◆ All mitigation measures as proposed by the archaeologist, in the related specialist report, should be adopted.
- ◆ All construction teams should adopt chance-find procedures. Tender documentation related to construction, should make provisions for the adoption of the measures as a requirement.
- ◆ Training may be provided to the workforce in identifying possible archaeological related artefacts.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ A maintenance record should be kept.
- ◆ A bi-annual report should be compiled of all complaints received and actions taken.

10.2 IMPACT SUMMARY

The most significant negative impacts related to the project refers to the construction phase and required activities. Disturbance and destruction of sensitive habitats rank as some of the most significant negative impacts. Of major concern is waste management and rehabilitation of construction sites.

Positive aspects permeate the operational phase through the provision of coastal residential units, services and access to public amenities. Construction phase positive aspects are of much shorter duration and related to the employment and revenue generation.

10.3 DECOMMISSIONING AND REHABILITATION

Decommissioning of the extensions is not foreseen during the validity of the environmental clearance certificate. Should decommissioning occur at any stage, rehabilitation of the area may be required. Decommissioning will entail the complete removal of all infrastructure including underground infrastructure. Any pollution present on the site must be remediated. The impacts associated with this phase include noise and waste production as structures are dismantled. Noise must be kept within WHO standards and waste should be contained and disposed of at an appropriately classified and approved waste project and not dumped in the surrounding areas. The EMP for the project will have to be reviewed at the time of decommissioning to cater for changes made to the site and implement guidelines and mitigation measures.

10.4 ENVIRONMENTAL MANAGEMENT SYSTEM

The Proponent could implement an Environmental Management System (EMS) for their operations. An EMS is an internationally recognized and certified management system that will ensure ongoing incorporation of environmental constraints. At the heart of an EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

- ◆ A stated environmental policy which sets the desired level of environmental performance;
- ◆ An environmental legal register;
- ◆ An institutional structure which sets out the responsibility, authority, lines of communication and resources needed to implement the EMS;
- ◆ Identification of environmental, safety and health training needs;
- ◆ An environmental program(s) stipulating environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy;
- ◆ Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS; and
- ◆ The EMP.

11 CONCLUSION

The project will provide a significant improvement from the current status quo related to the development of the townlands. In addition employment will be created during the construction phase.

Negative project related impacts must be prevented or mitigated by implementing strict monitoring and control, especially with regards to the conservation areas. All permits and approvals must be obtained from relevant ministries or authorities for the operations. Pollution prevention measures should be adequate to prevent incidents that may potentially damage soil, groundwater, archaeological resources and sensitive biological features. Health, safety and security regulations should be adhered to in accordance with the regulations pertaining to relevant laws and standards. Of main importance is to ensure that all the infrastructure aspects are constructed in a manner that will reflect a high standard of quality to reduce additional impacts associated with repairs and un-rehabilitated areas. It is therefore recommended that the Proponent, together with the rest of the project team, exert regular performance monitoring of contractors and include additional environmental monitoring and performance requirements in construction tenders.

The EMP should be used as an on-site reference document during all phases of the project. Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken.

It is finally suggested that should an ECC be granted, it be applicable to all project components on the areas as indicated in the locality plan. Any additional activities which may be considered for construction and or operations should be demarcated and presented as a separate environmental assessment. Particular consideration should be provided the bulk service provision.

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Appendix A Proof of Public and Authority Consultation

Registered IAPs

Initial	Surname	Organization
A	Allers	Private
C	Aspeling	Private
B	Bassingthwaighte	Private
P	Begley	Private
I	Biederlac	Private
E	Burger	Private
V	Castelyn	Private
E	Crous	Private
S	Cullum	Private
A	Dainat	Private
A	De Villiers	Private
F	Deloch	Private
E	Demasius	Private
M	Demtschuk	Private
H	Diekmann	Private
R G	Dorgeloh	Private
R	Drayer	Private
C	Eckwer	Private
D	Engelhardt	Private
A	Engels	Private
T	Erlank	Private
R	Faul	Private
A	Flachberger	Private
M	Flachberger	Private
H	Frenzel	Private
M	Frenzel	Private
M	Fritsch	Private
G	Fuller	Private
R J	Gilchrist	Private
D	Golding	Private
M	Golding	Private
B	Gous	The Gous Family Trust
M	Gous	Private
V	Haasbroek	Private
J	Hamsch	Private
M	Hamsch	Private
H	Hamukuaya	Private
A	Hassenpflug	Private
H P	Heckmair	Private
A	Herrle	Private
G	Heussen	Private
M G	Heussen	Private
R	Hoth	Private

Initial	Surname	Organization
G	Howard	Private
K W F	Hubner	Private
C	Hübner	Private
A	Ihms	Private
R	Jansen	Private
P	Jones	Private
W J	Joubert	Private
W H	Kaese	Private
U E	Kessler	Private
B	Kibble	Private
S	Kibble	Private
E E	Kopp	Private
H	Korner	Private
R	Krawinkel	Private
F	Krenz	Private
P	le Roux	Private
G	Lohmann	Private
J	Lohmann	Private
T	Lüsse	Private
G	Mai	Private
I A	Malherbe	Private
J	Mannheimer	Private
B	Maraun	Private
I	Maraun	Private
S	Maraun	Private
A	Marko	Private
W	Marko	Private
S	Martens	Private
C	Mathews	Private
P	Mathews	Private
E A	McGregor	Private
K	McNamara	Private
R	McNamara	Private
P	Meinzer	Private
B B	Mitchell	Private
M	Moeller	Private
J	Muadinohamba	Private
C	Mulder	Private
V	Munz	Private
V	Munz	Wlotzkasbaken Home Owners Association: Chairman
R	Oaseb	Private
Y	Onderweegs	Onderweegs Architects
R	Paape	Private
M	Pieper	Private

Initial	Surname	Organization
D J	Pineo	Private
I	Powell	Private
K	Powell	Private
E	Rakow	Private
S	Redecker	Private
G	Rüdiger	Private
P A	Ryan	Private
P	Saunders	Private
J	Schickerling	Private
A	Schidlowski	Private
D	Schoeman	Private
H P	Schoeman	Private
B	Schurz	Private
G	Schurz	Private
H	Senke	Private
M	Sentefol	Private
M	Simon	Private
F	Stegmann	Private
H	Steinkopf	Private
M	Steinkopff	Private
H	Teetz	Private
H W	Teetz	Private
W S	Teetz	Private
I	Theron	Private
J	Traut	Private
R	Traut	Private
M	Tröh	Private
S	Trumper	Private
H	Van Niekerk	Private
C	van Wyk	Private
H G	Voigts	Private
S	Von Der Heiden	Private
A	von Dorssen	Private
C	von Hase	Private
H G	von Hase	Private
M	Von Stryk	Private
E	Weber	Private
G	Williamson	Private
A	Wilson	Private
H	Winckler	Private
R	Winckler	Private
N U	Wurm	Private
D	Zimmer	Private

Initial	Surname	Organization
W	Zimmer	Private

Press Notices

Sun

WEDNESDAY 5 APRIL 2023 NEWS

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NEWS IN SHORT

Cameroonian in court over counterfeits

Cameroonian citizen Scott Mbah appeared in the Magistrates' Court in Windhoek yesterday on charges of counterfeiting banknotes. Mbah was arrested alongside a Namibian co-accused, who did not appear in court yesterday morning and thus cannot be named. Mbah indicated that he will submit his guilty plea on 17 April, when the case is scheduled to proceed. He was denied bail due to the fact that his foreign citizenship makes him a possible flight risk.

- IRÉNE-MARI VAN DER WALT

Justice ministry wants more courtrooms

The justice ministry would like to see more courtrooms across Namibia, minister Yvonne Dausab said in a budget motivation in the National Assembly. "In 2022, marked progress was made on the Office of the Judiciary's capital projects. The office, in collaboration with the Ministry of Justice, continued with the construction, renovation and rehabilitation of existing courthouses and facilities across the country," she said. This included the construction of the Sees Periodical Magistrates' Court and renovations to magistrates' courts at Okakarara, Walvis Bay and Gobabis. "Despite the good progress made in expanding and maintaining the judiciary's capital infrastructure, the need for the construction of new courtrooms and for the upgrading and renovation of the existing ones and other facilities still remains," Dausab added.

- ELLANIE SMIT

Export earnings increase by nearly 4%

Namibia's export earnings in February 2023 increased by 3.8% to N\$8.1 billion from N\$7.8 billion recorded in January 2023, according to the Namibia Statistics Agency. The import bill stood at N\$8.5 billion in February, compared to N\$10 billion registered in January 2023.

- PHILIPPE UUSIKU

CRASH CLAIMS WOMAN'S LIFE

Eenhana family wants answers over relative's death

The deceased's family claims she was in an abusive relationship.

ENZO AMUJUE OMUTHIYA

A family from Eenhana in Ohangwena Region is demanding justice for the loss of their relative, who they claim died under mysterious circumstances in the presence of her boyfriend.

The deceased, Rachel Shiyanga, reportedly died in a car accident between Oshivelo and Omuthiya on 13 March.

She was driving with her boyfriend, Jackson Adolf, who escaped unharmed. According to the family, the couple were returning from doing stocktaking at a bar that they own at their farm.

It is alleged that they had an argument at the bar and that they allegedly left the farm around midnight. The accident only happened around 06:20 in the morning.

Questions asked

The family said it takes about an hour to reach the main road that leads to Omuthiya, where they were headed. "Where were they during all those hours?" they asked.

According to a police report, the licensed driver tried to overtake a truck, and in the process of overtaking, he hit the truck from the rear.

A family member told Namibian Sun that the deceased and her boyfriend allegedly had an abusive relationship. "The boyfriend was constantly abusing our sister," it was alleged.

History of abuse

Speaking under anonymity, a close friend of the deceased said that she would take sick leave on various occasions because of the abusive relationship and was on the verge of losing her job as a teacher.

The deceased's mother, Cecilia Heita, said she tried to get assistance for her daughter when she was still alive.

"I have tried to get the police involved in my daughter's abusive relationship, but she never listened. I want to urge mothers to report these issues so they do not let their daughters suffer at the hands of their boyfriends," she said.

The family added that the de-



The late Rachel Shiyanga during her happy days.

ceased had allegedly withdrawn cases that were opened with the Eenhana police station.

"There was a time she was beaten to the point she could not move her neck, but she never wanted to get assistance," the family claimed.

The couple, who were not married, allegedly bought livestock and had a business together.

Allegations made

The family further told Namibian Sun that Adolf's ex-girlfriend was the one who alerted the family members about the accident.

Members of the family are demanding that Adolf apologise to them and allege that he was unsympathetic and did not show up at the deceased's funeral.

"We want him to be interrogated; we want our sister's things that she brought to be brought back to us," the family stressed.

Report it

Oshikoto regional police commander, Commissioner Teopoline Kalompo-Nashikaku, called on members of the public to speak up about issues of abuse and immediately report them to the police.

Kalompo-Nashikaku said that her region will not entertain any gender-based violence and that serious action will be taken.

She further refuted the family's claims that the vehicle was removed from the scene before the police arrived. An autopsy indicates that the cause of death was a severe head injury.



BAD STATE: Works minister John Mutorwa says government buildings are in a bad state. PHOTO: FILE

State of govt buildings a concern - Mutorwa

OGONE TLHAGE WINDHOEK

Works and transport minister John Mutorwa has expressed concern about the dilapidated state of government properties, saying they are in a permanent state of decay.

Mutorwa said this during the tabling of his ministry's budget in the National Assembly last week, highlighting that the time to renovate government buildings is now.

"Government inherited buildings that were built many years ago, and all materials used have reached their expiration date. There is an urgent need to revamp all is now."

High cost of decay

The state of the government's property also meant it was paying private landlords steep rental prices, he said.

"Government institutions are renting from private landlords and paying exorbitant money. The time has come that government commits to and pays urgent attention to renovation and maintenance through adequate budgeting," Mutorwa said.

Another notable concern for Mutorwa was that a lot of money is earmarked towards building new properties instead of renovating current properties.

"The current budget is focusing more on building new buildings but not on maintenance and renovations; continuing to construct new infrastructure while the existing ones are left to deteriorate is simply shooting oneself in the foot," Mutorwa said.

The ministry has been allocated N\$204 million for operational expenses for the maintenance of buildings, while N\$81 million is allocated for development expenses for the current fiscal year.

PUBLIC PARTICIPATION NOTICE

ENVIRONMENTAL ASSESSMENT: WLOTZKASBAKEN TOWNSHIP DEVELOPMENT, ERONGO REGION, NAMIBIA

Geo Pollution Technologies (Pty) Ltd was appointed by the Erongo Regional Council, to undertake an environmental assessment for the development and implementation of their proposed Wlotzkasbaken Township Development, located within the Wlotzkasbaken Townlands, Erongo Region. Background information to the project, containing a location map, is available at:

www.thenamib.com/projects/projects.html

The environmental assessment will be according to the Environmental Management Act of 2007 and its regulations as published in 2012. The environmental assessment requires the consideration of biophysical features, social structures and economic opportunities, guide and plan for infrastructure and services related to the proposed townlands. The townlands will provide for the establishment of additional erven, business- and institutional facilities as well as areas for recreation and open spaces.

All Interested and Affected Parties are invited to register with the environmental consultant to receive further documentation and communication regarding the Environmental Clearance Certificate applications. Reports for review and comment periods will be communicated to all registered parties. For further information regarding the project and/or to register as an Interested and Affected Party, please contact:

Quzette Bosman Geo Pollution Technologies Telephone: +264-61-257411 Fax: +264-88626368 E-Mail: wlotzkasT@thenamib.com



Advertisement for a sports event: WINDHOEK DRAUGHT WELWITSCHIAS VS VALKE. Includes logos for the teams and the event.

SPORTS

SATURDAY 8th April LIVE @ 16H00 on one

DStv GOtv Channel 284 Channel 90



www.oneafrica.tv

Ons het nog 'n lang pad om te gaan, sê Dausab

► Jemimah Ndebele

Die minister van justisie, Yvonne Dausab, versoek dringende hervorming van die direktoraat van die meester van die hooggeregshof, vanweë kommer oor die buitensporige verdragings wat dikwels voorkom.

"Die mandaat van hierdie direktoraat het 'n impak op die lewens van diegene in die mees haglike omstandighede in ons samelewing. Die terugvoering van die publiek dui daarop dat ons 'n lang pad het om te gaan in die verskaffing van voldoende en gehalte-diens," het Dausab tydens haar parlementêre begrotingsmotivering gesê.

Sy het die afhandeling van oordeelens se boedels en die betaling van toelae deur die Guardian Fund as sleutelgebiede uitgelig. "Te veel verdragings word veroorsaak as gevolg van die nienaakoming van voorgeskrewe tydlime asook swak kommunikasie tussen amptenare en eksekutiewe agente wat aangestel is om die boedels namens die eksekutiewe te administreer," het sy gesê.

ETIESE BEKOMMERNISSE

Dausab het ook kommer uitgespreek oor die etiese optrede van agente wat deur die meester se kantoor aangestel is, aangesien meer en meer gevalle van oneerlikheid, wanhantering van boedelbates en algemene



Die minister van justisie, Yvonne Dausab, vra vir hervorming. FOTO ARGIEF

minagting van die erfename se belange aangemeld is. "Die belanghebbendes wat betrokke is om hierdie besorgheid te takel, sal binnekort byeen geroep word om oplossings vir dié kwessies te vind. Kliëntesorg by die kantoor van die meester is ook 'n groot bekommernis wat die ministerie op 'n deurlopende basis deur opleiding sal takel, wat emosionele intelligensie-opleiding van personeel insluit," het sy gesê.

PROJEKTE

Verder het Dausab die bou van 'n hofgebou op Keetmanshoop, wat in geslagsebaseerde geweldsake sal spesialiseer, asook hoofstrukture op Okahao en Hoachanas aangekondig. Sy het verder die platform gebruik om 'n aansoek om die Katima Mulilo-landdroshof op te klaar.

"Die aangeleentheid is 'n voortdurende geskil tussen die ministerie van justisie en die kontrakteur wat vir die projek aangestel is. Dié dispuut is aan arbitrasie onderwerp, wat sedertdien ook misluk het. Die saak sal nou na die hooggeregshof geneem word vir 'n aansoek om die besit van die gebou te verkry om die projek te voltooi," het sy verduidelik.

Die minister het 'n begroting van N\$599 miljoen voorgestel.

► Moses gaan slaap gereeld honger

Leerling stap daagliks 14 km vir 'n beter toekoms

'n Negentienjarige stap elke dag vanaf die dorpie Omhito na die skool om sy droom te verwesenlik om eendag 'n onderwyser te word.

► Enzo Amuele

Moses Nghitotelwa word elke oggend vyfuur wakker om vir sy twee uur lange stap na die Oshikunde Gekombineerde Skool in die Ohangwenastreek voor te berei. Moses is een van talle leerlinge wat daagliks dié afstand skool toe moet stap.

Dié 19-jarige stap elke dag vanaf die dorpie Omhito na die skool om sy droom te verwesenlik om eendag 'n onderwyser te word.

Moses woon alleen in sy oorlede oma se huis. Hy sê hy gaan slaap gereeld honger en dit het 'n negatiewe impak op sy studies. Hy word soms gedwing om by sy bure om hulp te gaan aanklop.

Hy het aan *Republikein* se susterkoerant, *Namibian Sun*, gesê hoewel sy ma in dieselfde dorp bly, is sy met 'n ander man getroud.

"My ma sorg nie vir my nie. My tannie van Walvisbaai stuur vir my kos met 'n bus. Ek weet net my pa is in Ondangwa en ek het hom laas gesien toe ek 11 jaar oud was," het hy vertel.

Moses sê hy is gemotiveerd om eendag 'n wetenskaponderwyser te word.

Die onderwysers by sy skool het hom geïnspireer en hy wil 'n beter toekoms



Moses Nghitotelwa (19) is 'n leerling aan die Oshikunde Gekombineerde Skool. FOTO ENZO AMUELE

vir homself skep.

Hy wens dat hy in die skool se koshuis kon woon wat tans meer as 200 leerlinge van omliggende gemeenskappe huisves.

"Ek was verlede jaar in die koshuis. Een van die onderwysers het my koshuisgeld betaal, maar vanjaar kon ek dit nie bekostig om die fooie te betaal nie," het hy gesê.

TALLE ANDER LEERLINGE

Die Ohangwenastreek se onderwysdirekteur, Isak Hamatwi, het aan *Namibian Sun* gesê hy is onbewus van hierdie spesifieke leerlinge wat sulke lang afstande stap, maar dat sommige afstande verminder word namate nuwe skole opgerig word.

Hy het bygevoeg die bou van nuwe skole dui daarop dat die kwessie aandag geniet.

Die skoolhoof, Hoster Simasiku, sê die meerderheid van die leerlinge wat nie in die koshuis is nie, stap daag-

liks lang afstande om by die skool uit te kom omdat hul plaaslike gemeenskappe nie sekondêre onderwys aanbied nie.

"Die koshuis is reeds oorvol, want ons het die vereiste kapasiteit oorskry," het hy gesê.

Hoster voeg by dat die opgradering van die koshuis sowel as klaskamers beplan word.

"Ons kan nie waarborg dat alle leerlinge in die koshuis gehuisves sal word teen die tyd dat die opgradering voltooi is nie, maar dis ons prioriteit om al die leerlinge wat lang afstande stap, in die koshuis te akkommodeer," het hy afgesluit.

Moses het leerlinge wat in dieselfde situasie as hy is, aangemoedig om nooit moed op te gee nie en vorentoe te kyk, goeie dinge sal uiteindeelik kom. Hy het ook 'n beroep op barmhartige Samaritane gedoen om hom by te staan met wat hulle ook al kan, om sy lewe makliker te maak.

Inkoopcentrum bied unieke betaalopsie

Die Maerua Mall-gevenkiewys en inligtingstoonbank is op Saterdag 1 April by die inkoopcentrum bekend gestel.

Dié geskenkiewys is 'n unieke produk wat ontwikkel is in samewerking met Bank Windhoek, wat die unieke funksionaliteit van die kaart moontlik gemaak het.

Hoewel dit 'n geskenkiewys genoem word, is hierdie 'n meer veelsydige produk.

"Ons glo hierdie kaart sal aansienlike voordele vir ons kliënte inhou,

aangesien dit saam met die implementering van 'n nuwe inligtingstoonbank in Maerua Mall se eet- en drinkarea bekendgestel word," lui die mediaverklaring wat Maerua na die bekendstelling uitgereik het.

KAART

Hierdie kaart maak verkooppunt-aankope by enige en alle winkels in die inkoopcentrum moontlik.

Die geskenkiewys is 'n laerisiko-betalingsoplossing vir kliënte wat her-

bruikbaarheid en aanpasbaarheid bied.

Die geskenkiewys is 'n Visa-kaart waarmee kaarthouers veilig kan koop, aangesien dit PIN-verifikasie voor 'n transaksie vereis.

Die gebruik hiervan is nie soos ander winkelgeskenkiewyse beperk tot 'n enkele winkel, handelsmerk of groep

handelaars nie.

Dit laat slegs aankope by winkels toe en geen kontantonttrekings by OTM's of winkels nie. Geld kan voortdurend op die kaart gelaai word, byna soos om 'n debietkaart te hê, maar sonder 'n bankrekening.

"Hierdie kaart kan gesien word as 'n voor-skou van die soort grens-

verskuiwende innovasie wat ons hoop om na die Namibiese mark te bring, aangesien ons ook begin

met die eerste fase van die herposisionering van Maerua Mall, waar ons voortdurend daarna

streef om 'n meer gerieflike en aangename inkoop-ervaring aan ons kliënte te bied."

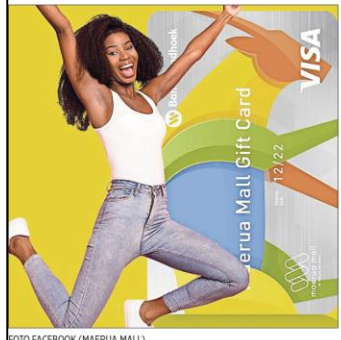


FOTO FACEBOOK (MAERUA MALL)

PUBLIC PARTICIPATION NOTICE
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NEWS IN SHORT

Cabinet greenlights social contracting health policy

The ministry of health's social contracting policy has been approved by Cabinet. The framework will guide the ministry's collaborations with non-governmental organisations (NGOs) operating in the health sector, allowing these organisations to deliver health services where the ministry's reach falls short. Some of the biggest shortcomings in the sector are the lack of healthcare facilities in rural areas, the shortage of doctors and nurses in the country and the availability of medicines. Many rural Namibians, those living in remote villages and on farms, are forced to walk or travel long distances to access critical healthcare services, minister Dr Kalumbi Shangala said. "In some regions, you will find one big community in one settlement and 100 or more kilometres away, you find another small community who have an equal right to health services. This means the cost to deliver healthcare is quite enormous."

jemima@namibiansun.com - JEMIMA BEUKES

Namibia's ICT dream

Namibia will soon become a "world-preferred destination" for the offshoring of information, communication and technology (ICT) services. This according to information deputy minister Emma Theofelus, who was speaking during a digital transformation workshop a fortnight ago. She said Namibia is currently drafting and reviewing legislation and policies to accelerate ICT development, access and innovation. Among this legislation is the Cybercrime Bill, Data Protection Bill and amendment of the Communications Act as well as the review of ICT policies and their consolidation into a national ICT policy, and a national digital strategy concept. "This presents the ministry with an opportunity to develop laws and policies that will make Namibia an attractive destination for doing business in ICT. "The world should feel safe to have its data stored and processed in Namibia," she said.

- ELIZABETH JOSEPH AND WETUMWENE SHIKAGE

COMMUNITIES URGED TO BE CAREFUL

Government declares war on crocodiles



DANGEROUS: The environment ministry aims to implement practical and innovative preventative measures against crocodile attacks. PHOTO: FILE

Mathilde Muhuli (11) was killed by a crocodile in the Kavango East Region on 1 April.

ELLANIE SMIT WINDHOEK

The environment ministry is currently working on practical and innovative preventative measures against crocodile threats.

These include setting up crocodile enclosures and the provision of water to communities, ministry spokesperson Romeo Muyunda said.

Other measures will include maximising the benefits of conservation to ensure that the benefits outweigh the costs, he added.

This after an 11-year-old girl, Mathilde Muhuli, was killed by a crocodile in the Ndiyona constituency in the Kavango East Region recently while fetching water.

The incident took place at Shikoro village on 1 April.

"This incident is unfortunate and concerning for the ministry, especially

since a young girl had to lose her life in this manner. This is definitely not the intent of our conservation," Muyunda said.

ROMEEO MUYUNDA

This incident is unfortunate and concerning for the ministry, especially since a young girl had to lose her life in this manner.

Dangerous predators

The ministry urged parents and community leaders living alongside rivers in the north and north-eastern regions to stop children from swimming or bathing in these rivers. "We cannot afford to

lose more people to these dangerous predators," the spokesperson said.

He added that the ministry understands that communities draw resources from rivers for their livelihoods; however, people must do so safely by taking the necessary precautions at all times.

"Children should not be allowed to collect water by themselves, but rather be under the supervision of an older person. We strongly discourage conducting activities such as washing in or at close proximity to the river."

He added that the ministry's staff members will provide more information and render services to communities along these rivers to enhance safety.

Communities can also report any disturbances or threats caused by crocodiles to ministry officials nearest to them to prevent incidents of conflict.

The ministry's policies make provision for the identification and destruction of crocodiles or other animals that threaten people's livelihoods or properties, Muyunda said.

PUBLIC PARTICIPATION NOTICE

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NUUS 3

>> **Boere kap** na Agribank oor terugneming van plase

Voorheen benadeelde boere kry nie 'spesiale behandeling'

Agribank sê boere onder die Regstellende Aksie-leningskema (AALS) wat versium om hul lenings terug te betaal, sal nie spesiale behandeling ontvang nie.

Mathias Haufigu

Agribank is onder skoot van leningsbegunstigdes – veral dié onder die Regstellende Aksie-leningskema (AALS) – wat voel hulle word onregverdig geteiken wanneer dit kom by plase wat teruggeen word.

Ingevolge die AALS, wat deur Agribank bestuur word, is altesaam 648 lenings ter waarde van N\$776,4 miljoen toegestaan. Die grondoppervlakte wat onder die skema verkry is, beloop altesaam meer as 3,4 miljoen hektaar.

Agribank voer egter aan die uitkakeling van diegene wat hulle telkens aan wanbetaling skuldig maak, is noodsaaklik vir sy voortbestaan en dat die bank dus alle kliënte gelyk sal behandel.

Die bank voer tans 'n aantal sake in die hof om die regbank se goedkeuring te verkry om plase terug te neem wat in besit is van individue wat versium het om hul lenings te vereffen.

GEBREK AAN ONDERSTEUNING

Ons susterkoerant *Namibian Sun* het die afgelope weke met minstens ses boere gepraat wie se plase op die punt is om teruggeen te word weens geld wat aan die bank verskuldig is. Hulle het almal gekies om anoniem te bly uit vrees vir viktimisasie.

'n Algemene faktor in die boere se reeks klagtes is dat Agribank nie ondersteuning bied nie en na bewering weer om boere se aansoek om herstrukturering van hul lenings goed te keur.

Dit beneuens boere se misnoeë oor die bank glo soos 'n kommersiële entiteit bestuur word in plaas van 'n ontwikkelingsbank met die doel om boere te bemagtig en

by te staan om uiteindelik die regering se voedselkennedepartement te versterk.

'ONGEREGULEERDE ENTITEIT'

Die suideboer Wiekus Steenkamp, wat in September 2022 deur die bank hof toe gesleep is nadat hy versium het om sy lening te vereffen, se regspan het in hofstukke aangevoer Agribank is nie 'n handelsbank nie en word ook nie deur sy magtigingswet gemagtig om soos een op te tree nie.

"Artikel 2 van die wet bepaal dat Agribank nie onderhewig is aan enige wet wat bankinstellings in Namibië reguleer nie. As sodanig word die aansoeker [Agribank] nie gereguleer soos enige ander bankinstelling nie en word dit aan hom oorgelaat om homself te reguleer," het hy aangevoer.

Hy het bygevoeg: "Hierin lê die gevaar. Wie kyk na die ongereguleerde entiteit om ingewoone sy magtigende wetgewing op te tree? In die lig hiervan versoek ons die hof om die applikant volledig onder die soeklig te plaas."

'n Week nadat Steenkamp se prokureurs hul hofdokumente ingedien het, het die bank die saak teruggetrek.

'LAASTE UITWEG'

In reaksie op medianavrae verlede week het Agribank se uitvoerende hoof, dr. Raphael Karuaihe, bewerings ontken dat dit boere in die AALS-kategorie in die steek laat.

Hy het gesê die bank het die afgelope 10 jaar slegs drie plase wat in besit van AALS-begunstigdes was op 'n veiling verkoop.

"Soos met enige skuldeiser aan wie 'n debiteur iets verskuldig is, word die regsmedel om fondse te verhaal uitgestel en gereguleer deur die wet, wat Agribank nougeset en



Agribank se uitvoerende hoof, Raphael Karuaihe. FOTO ARGIEF

getrou volg. Indien 'n skuldenaar nie saamwerk nie, maak die proses voorsiening daarvoor dat 'n lasbrief van eksekusie verkry kan word en waarvolgens 'n bate teruggeen kan word," het hy gesê.

Ondanks besluitings dat die bank oorhaastig is om grond terug te neem, het Karuaihe gesê dié stap is Agribank se laaste uitweg: "daarom is ons terugnemingskoers baie laag vergeleke met die aantal wanbetalers".

Oor bewerings dat Agribank se optrede strydig is met die regering se grondherverdelingspogings omdat voorheen bevoordeelde persone meestal skarrel om teruggeenende plase te koop, het hy gesê:

"Die veilingproses is 'n openbare proses en val binne die jurisdiksie van die ad-junkbalju. Agribank het geen beheer oor wie die suksesvolle bieder sal wees nie."

Karuaihe het boere aangemoedig om die bank te nader en betalingsreëlings te tref in gevalle van wanbetaling.

Hy het ook sommige boere daarvan beskuldig dat hulle die bank se versoek geïgnoreer het totdat laasgenoemde regstappe sou neem.

NIE GETEIKEN

"Agribank teiken nie plase van enige aangewese groep nie. Elke kliënt word op 'n kliënt-

vir-kliënt-basis hanteer, met inagneming van die terugbetalingsgeskiedenis en tevredenheid. Die stelling dat Agribank plase teiken wat deur voorheen benadeelde persone besit word, is onwaar. Die aantal verbintenisse wat ons steeds met kliënte het, weeg veel meer as die regsaksies wat teen Agribank-kliënte ingestel is," het Karuaihe gesê.

Hy het bygevoeg hoewel sommige lenings ingevolge die AALS toegestaan word, word sulke begunstigdes in die geval van wanbetaling hanteer soos enige ander kliënt van die bank wat versium om hul leningsverpligtinge na te kom.

Terwyl van die boere gesê het om met Agribank te onderhandel om plaasveilinge te staak "is soos om 'n bewegende trein te probeer stop", het Jane Kungana, die voorsitter van die vereniging vir voorheen benadeelde kommersiële boere in Namibië (PDNCFU) gesê pogings is aan die gang om die oppeiling van plase stop te sit na aanleiding van 'n vergadering met die bank se uitvoerende leierskap.

"Ons het 'n afvaardiging gehad wat onlangs saam met die nuwe voorsitter en uitvoerende hoof vergader het. Die vergadering het goed verloop en ons het besluit om probleme uit te streek in plaas daarvan om na die media te hardloop. Ek glo daar was verstandhouding oor die saak, en ons het hulle gevra om die veilinge te stop," het sy gesê.

Volgens 'n boer wat sy plaas verloor het, het Agribank nie veel ondersteuning gebied nadat hy die grond gefinansier het nie.

"Sodra hulle jou finansier, volg hulle nooit op nie. Soms onderhandel jy met hulle, maar hulle sal reguit vir jou se hulle sal jou plaas verkoop," het 'n ander boer gesê wie se plaas opgeveel is.

NOG AANTYGINGS

Nog 'n boer het gesê Agribank het 'n finansiële gat gegrawe



Agribank sê hy sal nie spesiale behandeling gee aan boere onder die Regstellende Aksie-leningskema (AALS) wat versium om hul lenings terug te betaal nie. FOTO AGRIBANK

waarin boere kan val.

"Daar is geen ondersteuning nie. Hulle grave 'n gat en stamp jou in. Hulle hou vergaderings om blykbaar probleme op te los, maar hulle hou dit nie in goeder trou nie," voer die boer aan.

Hy beweer selfs al word reëlings getref om lenings af te betaal by wyse van ad hoc-betalings wat dikwels honderdduisende beloop, is dit steeds nie genoeg om die bank daarvan te weerhou om sukkelende boere se plase op te

veel nie.

"Watter wanbetalende boer sal byvoorbeeld N\$500 000 hê om te keer dat Agribank jou plaas opveel? Hulle sal sê dit is goed en 'n paar maande later weer eis. Daardie mense lieg blatant."

Hy het bygevoeg boere vermy om met die media te praat uit vrees vir viktimisasie.

"As Agribank uitvind wie met die media praat, teiken hulle jou," het nog 'n sukkelende boer beaam.

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3

POLIZEI ERHÄLT UNTERSTÜTZUNG VON PRIVATUNTERNEHMEN



Der Vorstandsvorsitzende und Geschäftsführer der FP du Toit-Gruppe, Stephan Terblanche (Foto links), übergab in der vergangenen Woche die renovierten Büros der Sprengstoffkontrollabteilung in Windhoek. Die stellvertretende Generalinspektorin Anne Marie Nainda übernahm die Büros im Namen der namibischen Polizei. Terblanche betonte, dass die durchgeführten Arbeiten Teil der sozialen Verantwortung des Unternehmens seien. Zu den wichtigsten Renovierungsarbeiten an der Anlage gehören: Anstrich, Markenbildung und Umzäunung. Nainda bedankte sich bei der FP du Toit Gruppe für die Unterstützung der Polizei und betonte, dass die verbesserte Einrichtung dazu dient, die Arbeitsumgebung der Empfangsabteilung zu verbessern. Am darauffolgenden Tag nahm Nainda Verkehrsausrüstungen an der Okapuka-Straßensperre entgegen (Foto rechts). Die Ausrüstungsgegenstände wurden von First National Bank of Namibia, Namibia Breweries (NBL), Standard Bank Namibia, Hollard Namibia, Glasfit/Trentyre und AA gespendet. Die Spende umfasst Blitzlichter und Verkehrsleitkegel, die an den Straßenverkehrskontrollpunkten eingesetzt werden sollen. - FOTOS: NAMPOL

Korrektur zum Wlotzkasbaken-Siedlungs-Artikel

Windhoek (AZ) • Bedauerlicherweise sind in der vergangenen Woche der AZ zwei Fehler in der Donnergangsausgabe unterlaufen. In dem Artikel „Neuentwicklung für Wlotzkasbaken-Siedlung“ steht, dass die Firma The Namib die Umweltverträglichkeitsstudie ausführe. Der Name dieser Firma ist jedoch Geo Pollution Technologies (Pty) Ltd. Auch nennt der Artikel, dass öffentliche Anhörungen zu der Umweltverträglichkeitsstudie stattfinden werden. Dies ist jedoch ebenfalls nicht richtig. Geo Pollution Technologies wird jedoch alle Interessentenvertreter persönlich via ihrer E-Mail-Adresse wlotzka@thenamib.com über weiteres informieren. Die AZ bittet um Verständnis.

Kupferdiebe werden verhaftet

Oshakati/Windhoek (th/cr) • Vier Männer wurden am Samstagnachmittag in Tsumeb verhaftet, nachdem sie im Besitz von Taschen mit gestohlenen Kupferdrähten gefunden wurden. Die Verdächtigen wurden angeblich von einem Rubicon-Sicherheitsangestellten mit Taschen angetroffen. Bei der Durchsuchung fand der Sicherheitsbeamte Kupferdrähte in den Taschen und benachrichtigte sofort die Polizei.

Die Verdächtigen im Alter von 29, 31, 31 und 48 Jahren wurden daraufhin in der President Avenue in Tsumeb festgenommen. Die Beauftragte für Gemeindeangelegenheiten in Oshakati, Inspektor Ellen Nehale, erklärte: „Sie waren nicht in der Lage, eine zufriedenstellende Erklärung für den Besitz der Kupferdrähte zu geben“.

Der Wert der gestohlenen Kupferdrähte muss laut Nedale noch ermittelt werden. Die Verdächtigen wurden verhaftet und befinden sich derzeit auf der Polizeizelle in Tsumeb in Haft. Sie sollen heute vor dem Magistratsgericht von Tsumeb erscheinen. Die polizeilichen Ermittlungen in dieser Angelegenheit dauern an.



• FOTO: PRIVAT

Bald Schutz für Whistleblower

• Nach sechs Jahren Beratschlagung – Gesetze endlich eine Realität

Das Justizministerium stellt endlich ein ordentliches Zeugen- und Informanten/Hinweisgeber-Schutzprogramm auf die Beine. Es soll den polizeilichen Ermittlungen fortan helfen und Whistleblowern Schutz vor Verfolgung geben. Auch der Ombudsmann soll mehr Freiheit genießen.

Von Brigitte Weidlich
WINDHOEK

In den kommenden Monaten wird das Justizministerium endlich ein Zeugenschutzprogramm einführen und auch Schutz für Hinweisgeber/Informanten (Whistleblower) bieten. Damit öffnen sich Chancen für Zeugen in brennenden Gerichtsverfahren, wie zum Beispiel im Fishrot-Korruptionsprozess, unter Schutz der Anonymität auszusagen und eventuell eine neue Identität danach anzunehmen. Auch schwerwiegende Korruptionsfälle könnten somit leichter, durch den Schutz für Whistleblower, aufgedeckt werden.

„Mittel für die Umsetzung des Zeugenschutzgesetzes von 2017 (Gesetz Nr. 11) und des Gesetzes zum Schutz von Hinweisgebern von 2017 (Gesetz Nr. 10) werden in dem neuen Haushalt bereitgestellt“, kündigte Justizministerin Yvonne Dausab in der vergangenen Woche im Parlament an.

Die Personalstrukturen und die damit verbundenen Verwaltungsvereinbarungen seien vorbereitet und würden eingerichtet, um diese wichtigen Rechtsvorschriften im neuen Haushaltsjahr (April 2023-März 2024) umzusetzen, teilte Dausab in ihrer Haushaltsrede mit.

Die Umsetzung dieser Gesetze wurde nach Prioritäten geordnet und



Justizministerin Yvonne Dausab
• FOTO: AZ-ARCHIV

werde schrittweise erfolgen. Für den Zeitraum 2023/24 werden die Ernennungen von Schlüsselpositionen abgeschlossen sein und Dienstwohnungen bereitgestellt werden. Die Schulung der neu ernannten Beamten für Zeugen- und Hinweisgeberschutz sei ebenfalls vorgesehen.

„Die Umsetzung dieser Gesetze ist kostenintensiv, und das Ministerium wird sicherstellen, dass die Mittel umsichtig zugewiesen werden, um die Umsetzung der Rechtsvorschriften zu

gewährleisten“, sagte die Justizministerin.

Der Schutz von Zeugen und Hinweisgebern werde sich positiv auf die erfolgreiche Verfolgung von Straftätern in Namibia auswirken und die Bemühungen Namibias zur Bekämpfung von Korruption, Geldwäsche und anderen schweren Straftaten weiter verbessern. So würden gute Leitungsgrundsätze im gesamten öffentlichen und privaten Sektor gefördert. Dem Ministerium wurden insgesamt 599,4 Mio. NS zugewiesen.

Des Weiteren wird in Keetmanshoop ein Sondergericht eingerichtet, das sich ausschließlich mit Fällen häuslicher und geschlechtsspezifischer Gewalt befassen soll.

Das Amt des Ombudsmanns soll unabhängig und aus dem Justizministerium herausgelöst werden. Ein diesbezüglicher Gesetzentwurf sei vor kurzem vom Kabinett genehmigt worden, sagte Dausab.



HEY KIDS!

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Site Notices



Background Information Document

**PROPOSED WLOTZKASBAKEN TOWNSHIP DEVELOPMENT,
ERONGO REGION, NAMIBIA**

BACKGROUND INFORMATION DOCUMENT



Prepared by:



Prepared for:



April 2023

1 INTRODUCTION

Geo Pollution Technologies (Pty) Ltd (GPT) was appointed by the Erongo Regional Council (the Proponent) to undertake an environmental assessment for their proposed Wlotzkasbaken Township Development Extension 1 and 2. Figure 1-1 presents the proposed township development in relation to the existing Wlotzkasbaken Township (Wlotzkasbaken Proper). Spatial planning required for the intended development of the township includes consideration of biophysical features, social structures and economic opportunities. The establishment of the township is an ongoing process facilitated by WinPlan Town and Regional Planning Consultants.

In terms of the Environmental Management Act, Act No 7 of 2007, the proposed township development requires an environmental clearance certificate (ECC). A scoping environmental assessment report and a draft environmental management plan, to accompany an application for the ECC, have therefore been commissioned. The purpose thereof is to determine the impacts the proposed township development will have on the environment.

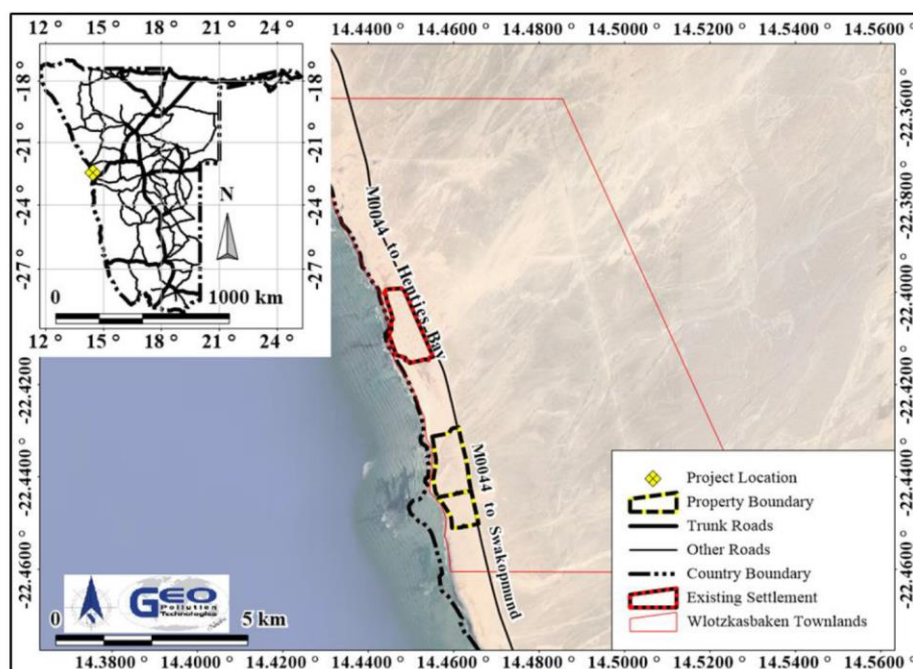


Figure 1-1 Project location

2 PURPOSE OF THE BID

With this background information document (BID), GPT aims to provide the Department of Environmental Affairs (DEA), authorities and interested and affected parties (IAPs) with information about the project, and to register the ECC application with the DEA. IAPs are therefore invited to register with GPT for the project in order to:

- ◆ Provide GPT with additional information which should be taken into account in the assessment of impacts and during decision-making;
- ◆ Share any comments, issues or concerns related to the project; and
- ◆ Review and comment on the reports and findings of the environmental assessment process.

Wlotzkasbaken Township Development: BID – April 2023 Geo Pollution Technologies (Pty) Ltd

3 WLOTSKASBAKEN CURRENT STATUS

Wlotzkasbaken was proclaimed a settlement area in 1993 known as the Wlotzkasbaken Village. There are currently 258 erven in the village of which some are vacant. Along with the proclamation, a townlands area was demarcated around the settlement. The Townlands of Wlotzkasbaken is known as Wlotzkasbaken Town and Townlands No. 221. Although located inside of the Dorob National Park, the Townlands area is excluded from the park. In addition, a considerable portion of the Townlands is undevelopable due to biophysical sensitivities.

As part of the Erongo Regional Council's strategic planning, the coastal area of Wlotzkasbaken was identified as an area to accommodate additional coastal development. Therefore, the Erongo Regional Council initially embarked on the development of a township adjacent to the existing settlement. The locality of the proposed township development has since changed to an area approximately 2 kilometres south of the existing Wlotzkasbaken Proper.

4 PROPOSED TOWNSHIP DEVELOPMENT

A draft structure plan was developed through a matrix consideration of bio-physical and conservation constraints and existing amenities such as the water pipeline, and the existing village. Three main options for future township establishment were considered. Known as Option 1, Option 2 and Option 3, the various alternatives were presented to the Erongo Regional Council to consider. Ultimately the Erongo Regional Council resolved that Option 2 deems to be the most favourable option, to not only incorporate the known constraints from an environmental perspective, but this option also offers the opportunity for future growth (which is limited in the areas surrounding Wlotzkasbaken Proper). Option 1 and option 3 for the proposed township will be considered as alternatives in the environmental assessment.

4.1 TOWNSHIP COMPONENTS

As part of the development mandate received from the Erongo Regional Council, the proposed township development will include the provision of approximately 522 erven of varying land use and zoning. The proposed layout of these erven was based on various site visits and township development guidelines. As such, a new central business district, residential areas, institutional areas and public open space were tailored within proposed township layout. The layout makes provision for two extensions, Extension 1 and Extension 2.

The spatial form of the layout plans was dominated by the desire to establish a local authority area that will ultimately provide a variety of choice for future inhabitants, whilst also focusing on the provision of social services, a defined business area and possibilities for future growth. In addition to this, the layout proposal incorporates known environmental limitations. The dolerite ridge area (known as Black Rocks) has been incorporated in the layout proposal under the zoning "conservation". This implies that no development may take place on the erven as indicated.

As a direct result of known coastal erosion in the coastal areas where the above development is proposed, a coastal degradation study was conducted and consequently a coastal setback line was proposed for the study area. The recommendations of this study was incorporated in the layout proposals for Extension 1 and 2. The Township layout components for Extension 1 is presented in Figure 4-1 and the layout proposal for Extension 2 depicted in Figure 4-2.



Figure 4-1 Proposed Wlotzkasbaken Extension 1

Most services associated with the township development will be provided by the Proponent. These include water supply, sanitation, waste removal, road and related infrastructure maintenance, public open space management, etc. Some of these services will require the establishment of large infrastructure components such as bulk water supply lines and effluent treatment plants. Such infrastructure components will for the most part be located outside of the proposed township footprint and will be subject to separate environmental assessments, which will have to consider component specific aspects in relation to its ultimate location or route. All things remaining equal, such services will be provided as follows:

- ◆ Bulk electricity supply to be provided by Erongo Red as sourced from NamPower (via an overhead power line to a distribution point at the township).
- ◆ Bulk water supply to be provided by NamWater from their existing and planned bulk water supply lines (via a reservoir(s) and bulk supply pipeline up to a distribution point at the township).
- ◆ Wastewater treatment facilities and services by the Proponent (via sewers to an effluent treatment plant via a bulk sewage line).
- ◆ General waste management by the Proponent (collection, transportation and disposal of household waste to a registered landfill site).

For services provision within the proposed township footprint itself, the following was proposed and will be included in the environmental assessment:

- ◆ The provision of potable water to each erf via an underground and metered reticulation system.
- ◆ Sewer lines from each erf via an underground sewer system.
- ◆ General waste removal services for domestic waste via a collection system (garbage trucks).
- ◆ The provision of electricity via underground cable systems to each erf.



Figure 4-2 Proposed Wlotzkasbaken Extension 2

4.2 ADDITIONAL CONCERNS

The development of the proposed township has in the past caused significant concern among land owners of the existing settlement. The land owners emphasize that Wlotzkasbaken is a very unique settlement in Namibia, with the character of the town exclusive to not only Namibia, but also SADC and the world. Significant concern was raised related to the destruction of the settlement character which inherently is rural in the sense of service provision, trade and recreation. Although not against development of Namibia and coastal resources, there is a strong sense of place and community amongst its residents. This distinctive settlement intrigues all tourists travelling past and through it, and any development in close proximity thereto, is considered to be a threat that will impact its character, sense of place and security. The local community strongly feels that all and any development be thoroughly thought through, well planned, and implemented to reduce the impacts on the existing settlement. In addition, an open channel by means of a community liaison officer should be established, to facilitate communication between the community and the Proponent. All concerns received from any interested and or affected parties during the public consultation process of the environmental impact assessment will be included in the environmental assessment report which will be submitted to the environmental commissioner.

5 PRELIMINARY IDENTIFIED IMPACTS

It is foreseen that the establishment of the township will make a positive contribution to Namibia's Gross Domestic Product and will create much needed employment opportunities in especially the construction sector which, in the recent past, has suffered some decline. The development will increase tax revenues and will also bring about improvements for basic service delivery such as water and sanitation. During the environmental assessment, all elements of the environment will be considered and those foreseen to

be significantly affected will be highlighted and related specialist assessments conducted. Sensitive environmental aspects include, but are not limited to, the following:

- ◆ Geology and soil,
- ◆ Land use and tourism potential,
- ◆ Habitats for sensitive fauna and flora species,
- ◆ Air quality (dust),
- ◆ Noise,
- ◆ Settlement and community character,
- ◆ Archaeological resources,
- ◆ Road management and traffic incidents,
- ◆ Social ills and deviance due to in-migration,
- ◆ Economic resilience, diversification and development,
- ◆ Groundwater (aquifer contamination), and
- ◆ Surface water (run-off and contamination).

6 PUBLIC CONSULTATION

GPT invites all IAPs to provide in writing, any issues and suggestions regarding the project. This correspondence must include:

- ◆ Name and surname,
- ◆ Organization represented or private interest,
- ◆ Position in the organization,
- ◆ Contact details,
- ◆ Any direct business, financial, personal or other interest which you may have in the approval or refusal of the application.

All contributions become public knowledge and will be circulated along with the reports as per the EMA requirements. The comments, inputs and suggestions will also be submitted to the DEA along with how any issues have been addressed in the environmental assessment. The public participation process will remain ongoing during the environmental assessment. However, all comments and concerns should be provided to GPT to ensure incorporation into the report. For any additional information the project team may be contacted at:



Geo Pollution Technologies (Pty) Ltd.

Telephone: (+264-61) 257411

Fax: (+264) 88626368

E-mail: wlotzkaT@thenamib.com

**PROPOSED WLOTZKASBAKEN TOWNSHIP DEVELOPMENT,
ERONGO REGION, NAMIBIA**

BACKGROUND INFORMATION DOCUMENT

Received
Wind pump 14
[Signature]
081 4090097
083 700444



Prepared by:



Prepared for:



April 2023

Issues and Responses Report

IAP Details	Comment / Concern	Response
<p><i>Ricardo Jansen</i> <i>Email:</i> <i>12/05/2023</i></p>	<p>I would like to stay in contact of this development and are in support of the development. Please keep me updated since I am interested in acquiring a plot there and build a house or even a business.</p>	<p><u>Response:</u> Noted.</p>
<p><i>Naude Theron</i> <i>Email:</i> <i>09/10/2023</i></p>	<p>Sir/Madam</p> <p>This email serves as an official registration as an affected and interested party as per your communication of 6 April 2023. I represent the 4 members of the property Erf 190 Wlotzkasbaken, owned by Zest Investments 92 cc, with members: N & C Theron, J & JA Venter, U & E Schickerling, AS Schickerling</p> <p>We object to the proposed development:</p> <p>The historical Wlotzkasbaken will be destroyed by a nearby development.</p> <p>There is no need for a modern seafront development as existing areas such as between Walvis and Swakop could be utilised.</p> <p>The ERC is not capable of managing more development as they are incapable of providing basic services already (refer water situation and late invoicing).</p> <p>Strip development along the accessible coastline of Namibia should be limited.</p>	<p><u>Initial Response:</u> Thank you for your efforts in reaching out to us with your concerns related to the proposed township development. These will be included in the environmental assessment report and will become part of the public document. Responses thereon, as prepared by the project team, will also be in the environmental assessment. This is so, for all written comments received from community members. Please note that once the environmental assessment and related specialist studies are completed, that report will also be circulated to the homeowners association as well as all IAP on our distribution list. You will be awarded the opportunity to give comment on the final report as well. It will however be some time before the final report will be completed.</p> <p>Then, I have taken the liberty to add the registration details below to the current EIA being conducted for the distribution pipeline - just to make sure you also receive that EIA which will be completed in a week or two as well. Your time and consideration, regarding the EIAs, is much appreciated. You are also most welcome to contact me on my mobile for any clarification related queries.</p> <p><u>Subsequent Response:</u> Comment noted.</p>
<p><i>Henner Diekmann</i> <i>Email</i> <i>13/04/2023</i></p>	<p>Given the Erongo Regional Council's past conduct of ignoring and disregarding the conditions of development imposed by the Ministry of Environment & Tourism as well as the advice of the previous town planners employed by the Erongo Regional Council, I can only come to the conclusion that the intended environmental impact assessment of the proposed Wlotzkasbaken Township Development Extension 1 and 2 is nothing but a tool to greenwash a development, which the Erongo Regional Council has already decided to implement i.e. a fait accompli.</p>	<p><u>Initial Response:</u> Thank you for the comments received, we will make sure to include these in the report. All specialist work to be completed will inform the EIA and will also be made available to the public for review. These include vegetation and bird studies which have been commissioned.</p> <p>At the moment we have no additional information being shared with the project as this is still the notification phase. We now need to generate information do the field work and various specialist investigations. We will let you know as soon as there is any additional information to share.</p>

IAP Details	Comment / Concern	Response
	<p>Attached please find an extract of the report (pages 15 and 16) compiled by Stubenrauch Planning Consultants CC, employed during 1997 by the Erongo Regional Council in respect of the development of Wlotzkasbaken and which confirms inter alia the following:</p> <p>1)“In previous correspondence (Annexure D) with the Ministry of Environment and Tourism, it was accentuated that the following need protection (See Figure 2):</p> <ul style="list-style-type: none"> ◦ The vegetated sand hummocks along the coast for 200 m from the beach ◦The Damara Tern breeding sites from Mile 14 to Wlotzkasbaken and directly north of Wlotzkasbaken ◦The lichen fields to the east of Main Road No.44 ◦The beaches” <p>Attached please also find a copy of a further extract of the report (pages 41 and 42) containing the findings and recommendations of Stubenrauch Planning Consultants CC according to which:</p> <p>2)“The natural environment with its unique fauna and flora that exists along the beaches and in the sand and rock desert surrounding the residential settlement <u>must be protected</u> (our underlining). All existing and proposed development within the greater settlement area must be evaluated on environmental sustainability principles to ensure the minimum environmental damage. The use of all terrain vehicles along the sensitive areas <u>must be controlled</u> (our underlining).”</p> <p>There is absolutely no control in respect of all terrain vehicles along the sensitive areas. The Damara Tern breeding areas, the lichen fields and the vegetation on the sand hummocks are being destroyed with impunity by the general public due to no action ever having been undertaken by the Erongo Regional Council to protect the fauna and flora along the beaches and in the sand and rock desert . The vegetated sand hummocks along the coast for 200 m from the beach and the Damara Tern breeding sites from Mile 14 to Wlotzkasbaken , which the Ministry of Environment and Tourism directed to be protected, are precisely the areas which the Erongo Regional Council now intends to develop as Extensions 1 and 2 of Wlotzkasbaken.</p>	<p>Your time and consideration regarding the matter is much appreciated.</p> <p><u>Subsequent Response:</u></p> <p>1 & 2) Kindly note that various specialist studies have been commissioned, fauna, flora, avifauna, archaeological and a coastal set-back line. These specialist assessments have delineated sensitive environmental features and will inform the layout of the proposed development. Furthermore, mitigation measure detailed in the report have been incorporated into management plan proposed for the development. These assessments have been attached to the main report for perusal.</p> <p>3) Comment noted</p> <p>4) All town planning related concerns have been provided to the town planner. Please refer to the background document from WinPlan, as attached to these comments.</p> <p>5) The coastal erosion assessment as mentioned is attached as an appendix to the main report.</p> <p>6) This environmental assessment was commissioned by the council as part of the feasibility of the project, specifically in relation to the sensitive environmental features around the site. Should the Proponent continue in further planning related to the proposed development, further investigations, specifically related to the bulk services infrastructure should be undertaken.</p> <p>7) No geotechnical investigation was conducted as part of this environmental assessment.</p>

IAP Details	Comment / Concern	Response
	<p>I furthermore wish to comment as follows:</p> <p>3)“There are currently 258 erven in the village of which some are vacant.” – This statement is wrong. There are currently 258 erven of which not “some are vacant” but at least 128 are vacant and have not been sold by the Erongo Regional Council.</p> <p>4) “As part of the Erongo Regional Council’s strategic planning, the coastal area of Wlotzkasbaken was identified as an area to accommodate additional coastal development.” – Please send me a copy of the strategic plan of the Erongo Regional Council. Did the Erongo Regional Council undertake a need and desirability study to establish the proposed Extensions 1 and 2 of the Wlotzkasbaken Township and if so, please send me a copy of the need and desirability study and a copy of the approval of same by the Urban and Regional Planning Board. I also require a copy of the urban structure plan prepared by the Erongo Regional Council in respect of Wlotzkasbaken in accordance with section 31(1) of the Urban and Regional Planning Act 5 of 2018 as well as the Minister’s approval of the urban structure plan in terms of section 31(2) of the Urban and Regional Planning Act 5 of 2018.</p> <p>5) “As a direct result of known coastal erosion in the coastal areas where the above development is proposed, a coastal degradation study was conducted and consequently a coastal setback line was proposed for the study area.” – Please send me a copy of the coastal degradation study.</p> <p>6)“Some of these services will require the establishment of large infrastructure components such as bulk water supply lines and effluent treatment plants. Such infrastructure components will for the most part be located outside of the proposed township footprint and will be subject to separate environmental assessments, which will have to consider component specific aspects in relation to its ultimate location or route.” – How can the infrastructure components be the subject of separate environmental assessments? Certainly you cannot complete an environmental assessment of the proposed township without simultaneously dealing with the environmental impact of the large infrastructure.</p>	

IAP Details	Comment / Concern	Response
	<p>7)“For services provision within the proposed township footprint itself, the following was proposed and will be included in the environmental assessment: The provision of potable water to each erf via an underground and metered reticulation system. Sewer lines from each erf via an underground sewer system.General waste removal services for domestic waste via a collection system (garbage trucks).The provision of electricity via underground cable systems to each erf. “– Has a geotechnical study of the soil conditions been undertaken and if so, please send me a copy.</p>	
<p><i>Ursula Lüsse</i> <i>Email:</i> <i>11/10/2023</i></p>	<ol style="list-style-type: none"> 1. It is doubtful that there is a need for additional housing along the coast, in view of the many houses along the main road Henties - Windhoek in Swakopmund, which have been vacant for years, demolished, rebuilt, and still vacant and vandalised by now. 2. The planned extensions of Wlotzkabaken will wipe out the unique and visually defining characteristics of the original settlement 3. it is doubtful that commercial and service sector opportunities are desirable in Wlotzkabaken 4. Maximising the use of existing proclaimed land in relation to National available coastline could barely be beneficial, when taking the environmental destruction of the nature land into account 5. The construction of a new desalination plant close to the existing one already will mean a massive destruction of the fragile desert flora and fauna, i.e lichen fields. How much more will a township development destroy permanently. Safeguarding is impossible, especially during construction phase. Most of the working force is interested in earning a salary and having a place to live, environmental issues is one of their interest and understanding. After construction damage is irreversible and permanent. 6. The ERC is barely able to provide sustainable services for the existing settlement of Wlotzkabaken. (water supply) It would be a miracle if services improve within a development of the sizes like the planned extensions. 7. The nature of the Namibia Desert along the coast is destroyed by reckless 4x4 driving, by an overall attitude of not adhering to rules. Rules are in place but there is absolutely no control. It is doubtful that 	<ol style="list-style-type: none"> 1. Concern incorporated into Section 6 of the environmental assessment report. 2. The proposed extensions are located approximately 2 km south of the existing settlement while the dolerite ridge has a higher elevation. The distance and natural topography reduced any impact on the immediate landscape character. 3. Comment noted. 4. Environmental assessment conducted. 5. Please refer to Figure 8-3 in the environmental assessment which depicts the proposed extensions in relation with the documented lichen fields. 6. An application for an environmental clearance certificate for servicing the existing Wlotzkabaken settlement was submitted to the environmental commissioner and the project is pending implementation. 7. Comment noted.

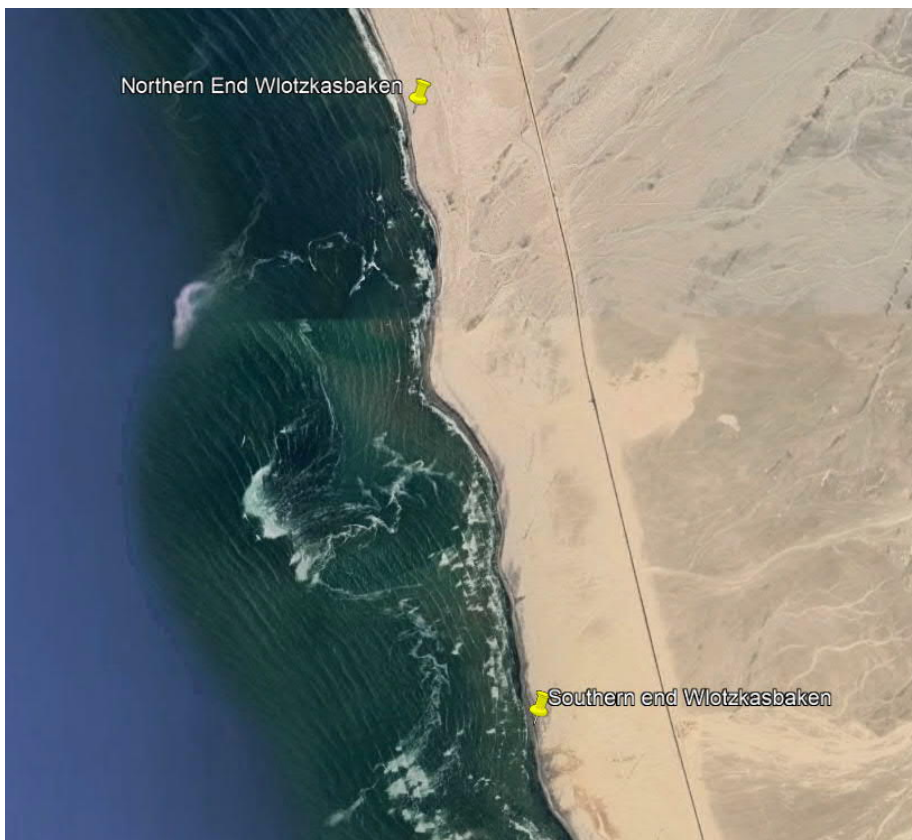
IAP Details	Comment / Concern	Response
	all named environmental control measurements during construction of the development will be adhered to. The same will be applicable for environmental mitigation efforts.	

Appendix B Coastal Set Back Line Specialist Report

WINPLAN

WLOTZKASBAKEN COASTAL DEVELOPMENT COASTAL SETBACK LINE

13 OCTOBER 2021 REVISION 02





WLOTZKASBAKEN COASTAL SETBACK LINE




WINPLAN

PROJECT NO.: 43101716
DATE: OCTOBER 2021

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QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Finalised			
Date	30 September 2021			
Prepared by	G Smith			
Signature	 Digitally signed by Smith, Geoff (ZAGS09142) DN: cn=Geoff, Geoff (ZAGS09142), ou=Active, email=Geoff.Smith@wsp.com Date: 2021.10.13 08:42:45 +0200			
Checked by	G Jacobs			
Signature	 Jacobs, Gert (ZAGJ00753) 2021.10.13 08:50:00 +0200			
Authorised by	G Smith			
Signature	 Digitally signed by Smith, Geoff (ZAGS09142) DN: cn=Geoff, Geoff (ZAGS09142), ou=Active, email=Geoff.Smith@wsp.com Date: 2021.10.13 08:45:29 +0200			
Project number	43101716			
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CLIENT

WSP



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PROJECT TITLE
Project No. OUR REF. NO.
CLIENT

WSP

1 INTRODUCTION

1.1 BACKGROUND

The Wlotzkasbaken Township Development Phase 1 is located on a section of shoreline which has experienced major change in recent decades, effectively resulting in erosion retreat of the shoreline by up to 900 m. Before developing on a shoreline with such a track record, it is vital that changes are understood, in order confirm whether further erosion will occur and at what rate this may occur. This study aims to understand the local coastal dynamics and accordingly to assess likely shoreline behaviour in the short- and long-term. The end result of this process will be a development setback line for permanent structures.

1.2 REPORT OUTLINE

Section 2 provides a description of the coastal setting at Wlotzkasbaken, including wave, current and sediment transport conditions and the role of rocky reefs. Section 3 assesses long-term shoreline change trends from available satellite images. Section 4 deals with sea-level rise and likely shoreline change from that source. Section 5 deals with short-term shoreline change, specifically storm erosion. Storm wave run-up is also considered. Finally, Section 6 provides a discussion and presentation of the final setback line, conclusions and recommendations.

2 COASTAL SETTING

2.1 WAVE AND WIND CLIMATE

2.1.1 OFFSHORE

WIND

Figure 2-1 illustrates the distribution of wind speed and direction, derived from 10 years of hindcast data at a location about 90 km offshore, which is representative of deep-water conditions near Wlotzkasbaken. The data indicate a dominant southerly direction with winds frequently exceeding 7.5 m/s (i.e. 14.6 knots, or 27 km/hour).

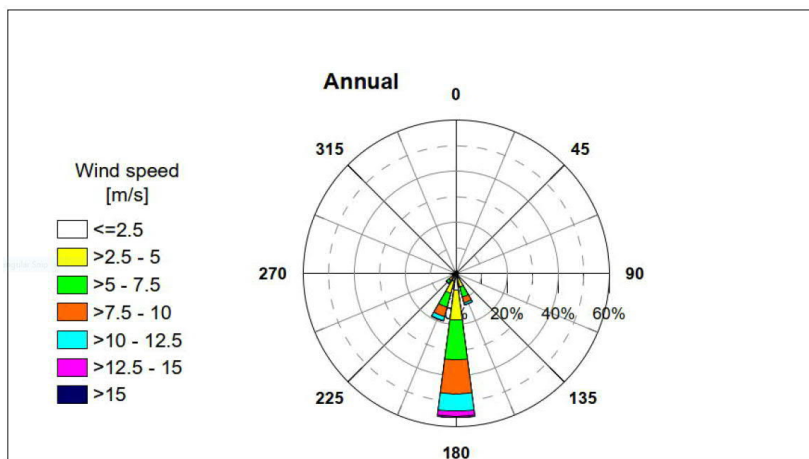


Figure 2-1: Distribution of wind speed and direction offshore of Wlotzkasbaken

WAVES

In simple terms, waves at Wlotzkasbaken originate from two primary sources:

- Cold front systems that originate from around 40-60 degrees south (the “Roaring Forties”). Figure 2-2 provides a schematic example of such a low-pressure system that is always associated with a cold front. The proximity of the isobars generates high winds (directed parallel to the isobars due to the Coriolis effect – with deflection to the left in the southern hemisphere) that can blow over a significant fetch, often for several days. Relatively long waves emanate from these systems, with peak periods in the region of 12 to 16 seconds and typically with a south-westerly direction. These frontal systems represent the primary source of destructive storm waves which cause erosion and/or damage on the African west coast;
- Waves are also generated by the South Atlantic High-Pressure system (Figure 2-2). This high-pressure cell is part of the discontinuous high-pressure belt that circles the southern hemisphere at about 30° south with associated anticyclonic air flow. This system generates slightly smaller (than cold front-generated) waves with a typically southerly direction and peak periods of 6 to 10 seconds.

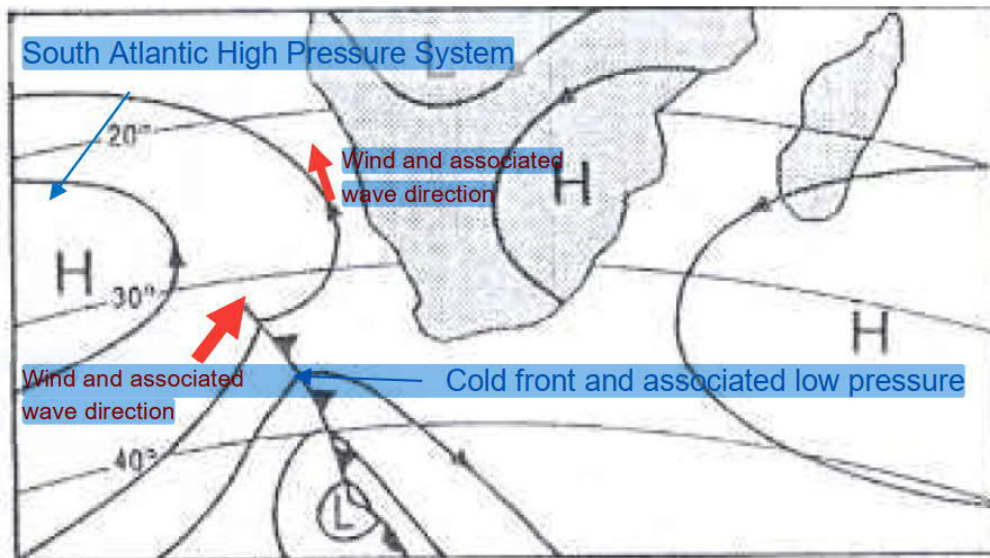


Figure 2-2: Primary weather influences on west coast waves (after Machutchon, 2006)

The South Atlantic High-Pressure Cell shifts further south in summer. In combination with greater heat-induced low pressures over the land, this results in more intense southerly winds during this season. In addition, the wave-generating frontal systems are forced southwards, effectively stifling the wave-generating influence of these systems, resulting in more moderate waves from this source in summer.

Conversely, the South Atlantic High-Pressure Cell shifts northwards in winter allowing the frontal systems to shift northwards. The increased proximity to the African land mass results in intensified frontally-generated wave action on the west coast shores. The more northerly position of the South Atlantic High-Pressure system, together with reduced continental land mass heating, results in slightly less intense winds from this source during winter.

The result of these systems is a predominantly south-south-westerly offshore wave direction, as shown in Figure 2-3.

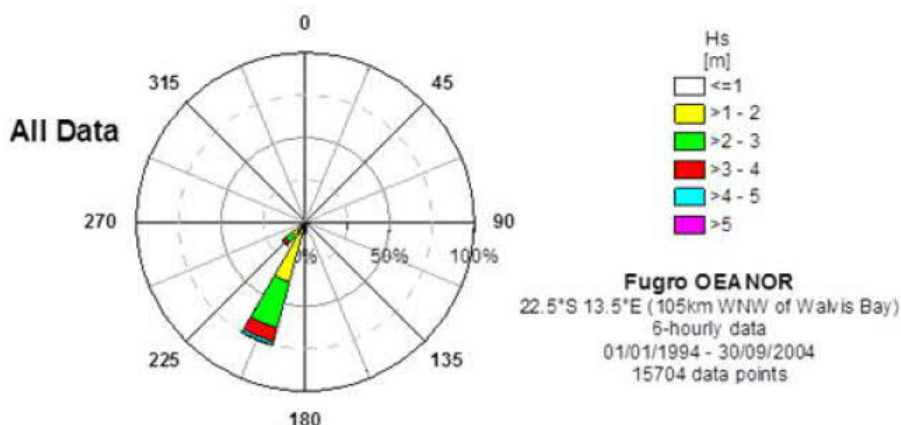


Figure 2-3: Offshore wave height and direction distribution (from a 10-year hindcast data set).

2.1.2 NEARSHORE

WIND

In addition to the above global influences (as depicted in the wind climate of Figure 2-1) the Namibian coastal region also experiences more local influences, such as warm winter easterlies (generated by means of adiabatic heating as air descends from inland towards a coastal low-pressure cell).

Furthermore, land/sea temperature differentials at the shoreline induce on/offshore components to the wind. Thus, while variations in wind occur, the southerly sector winds remain dominant, as has been observed in the region.

WAVES

Waves transform under the influence of friction on the relatively shallow sea-bed. The process of *wave refraction* tends to “bend” the waves to a direction close to shore-perpendicular while reducing wave height. On the other hand, the process of *wave shoaling* causes wave heights to increase towards the shore. *Wave diffraction* is the lateral “spreading” (and direction change) of wave energy into sheltered zones behind obstacles (such as offshore reefs), while the more familiar process of *wave breaking* results in a rapid reduction in wave height as waves rapidly dispel energy in a turbulent fashion. It is the result of all of these processes that causes the complex wave pattern that is evident at the Wlotzkasbaken study site (Figure 2-4). These waves are responsible for shaping the shoreline, through the processes of longshore transport and cross-shore transport, discussed below.



Figure 2-4: Complex wave patterns observed at the study site (the northern and southern extents of the area of interest are as shown).

2.2 SEDIMENT TRANSPORT

Sediment transport (primarily the transport of sand at the study site) can be simplified into longshore and cross-shore components (although more complex combinations of these occur in reality).

2.2.1 LONGSHORE TRANSPORT

Waves approaching the shore at an angle (even if slightly oblique) break near the shore and drive a current alongshore. Turbulence from wave breaking suspends sand from the sea-bed which is then transported alongshore by this current.

At Wlotzkasbaken the waves tend to have a southerly component, which would tend to drive a north-bound longshore transport (similar direction to Figure 2-5). Typically such transports are in the order of several hundred cubic metres per year, but localised variations and temporary reversals in such transports will occur.



Figure 2-5: Longshore transport driven by obliquely approaching waves.

2.2.2 CROSS-SHORE TRANSPORT

During storms, waves approaching the shoreline on elevated water levels (caused by storm surge – wind and low atmospheric pressure - and storm wave action itself) attack and erode the beach, particularly at high tides. The eroded sand deposits in the nearshore region, seaward of the breakers. This generally occurs in winter when storm waves are prolific.

During interim calm conditions, asymmetrical wave orbital currents (currents that occur with the passing of each wave) slowly work the sand back to restore the eroded beach. This tends to occur in summer.

2.3 ROLE OF ROCK OUTCROPS AND REEFS

2.3.1 BARRIERS TO LONGSHORE TRANSPORT

Rock reefs or outcrops situated in the near-beach region and/or in the inter-tidal zone form a barrier to longshore transport. This results in accumulation of sand on the south side and erosion on the north side of such barriers (due to the reduced sand supply there). Figure 2-6 provides an example of this effect: the result is in an effective promontory/”bump” in the coastline.



Figure 2-6: Rock barrier inducing sand accretion and erosion to form a kink/bump in the shoreline at Wlotzkasbaken.

2.3.2 PROTECTION FROM WAVE ACTION

An offshore reef can serve as a barrier to waves. The shelter-zone and associated wave directions created in the lee of such a reef can result in formation of a salient (accreted promontory or “bump” in the coastline). Figure 2-7 illustrates the formation of a salient on the study shoreline, in which the dashed line provides an estimate of how the shoreline would look without the offshore reef.

According to coastal engineering research, such a salient will form if the ratio of the barrier length (X in Figure 2-7) to the distance (from the general shoreline orientation) to the barrier (Y in Figure 2-7) is greater than 0.5, as determined by Dally and Pope (1986), and Gourlay (1981). For the case of Figure 2-7, $X/Y = 0.55$ (approximately), thus conditions for the salient are indeed confirmed.

In the event that the ratio X/Y increases, the conditions for tombolo formation may be reached. A tombolo is a sand spit which extends from the shore out to the offshore barrier. Research indicates that a ratio greater than 1 to 2 (researchers differ) will result in tombolo formation (Gourlay, 1981; Herbich, 1991; SPM, 1984; Dally and Pope, 1986; Suh and Dalrymple, 1987)



Figure 2-7: Salient formation at Wlotzkasbaken

2.3.3 THE ROLE OF SAND SUPPLY

In a desert environment, where soil is not secured by vegetation, very large fluvial sand loads can be supplied by rivers in flood. It is known that the Swakop River supplied massive volumes to the shoreline north of the river mouth (causing localised accretion of as much as 250 m at times) and this sand would have moved northward, by means of longshore transport. Major sand supply such as this was probably responsible for the accreted state of the shoreline in the form of a tombolo which existed at the study site previously (per images from 1973 and 1984) – Figure 2-8. Since then the tombolo has detached from the offshore protective reef and has retreated by about 1 km (Figure 2-8 illustrates a recent February 2021 shoreline). This retreat of the tombolo may have been caused by the following factors which impacted sand supply from the south:

- Construction of dams on the Swakop River, in 1970 and 1978;
- Ongoing sand mining in the Swakop River-bed;
- A reduction in fluvial sand supply to the shoreline between Swakopmund and Wlotzkasbaken, possibly.

Structures in Swakopmund, causing entrapment of sand, may have played a minor role.

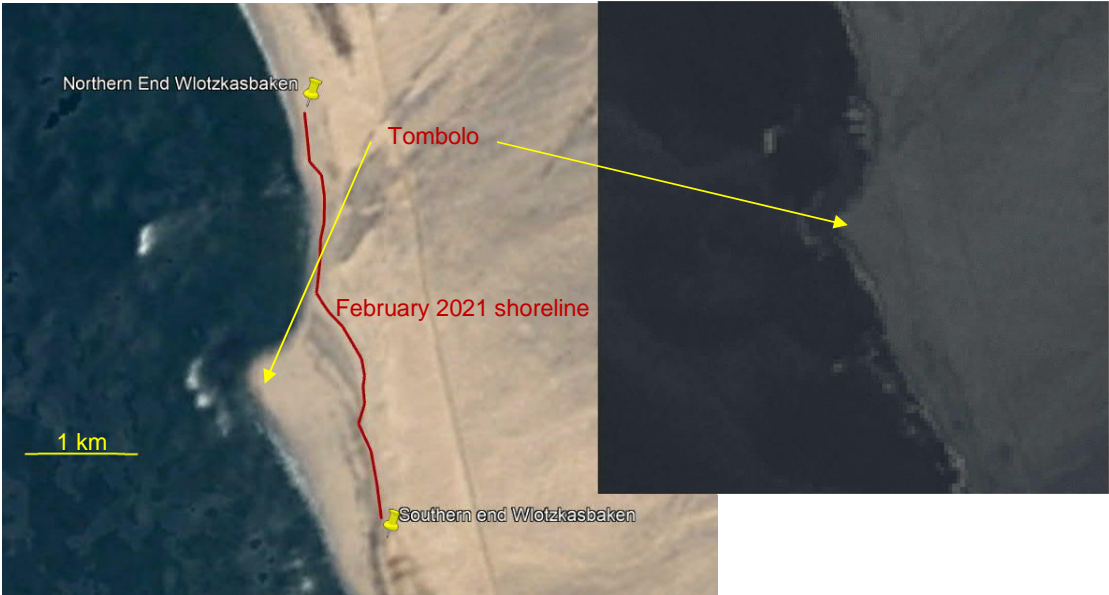


Figure 2-8: Tombolo at the study site, evident in both the image of 31 Dec 1985 (left) and the image from 10 August 1973 (right). The February 2021 shoreline (red line, left) shows how this feature has eroded away.

3 LONG-TERM SHORELINE CHANGE

3.1 INTRODUCTION

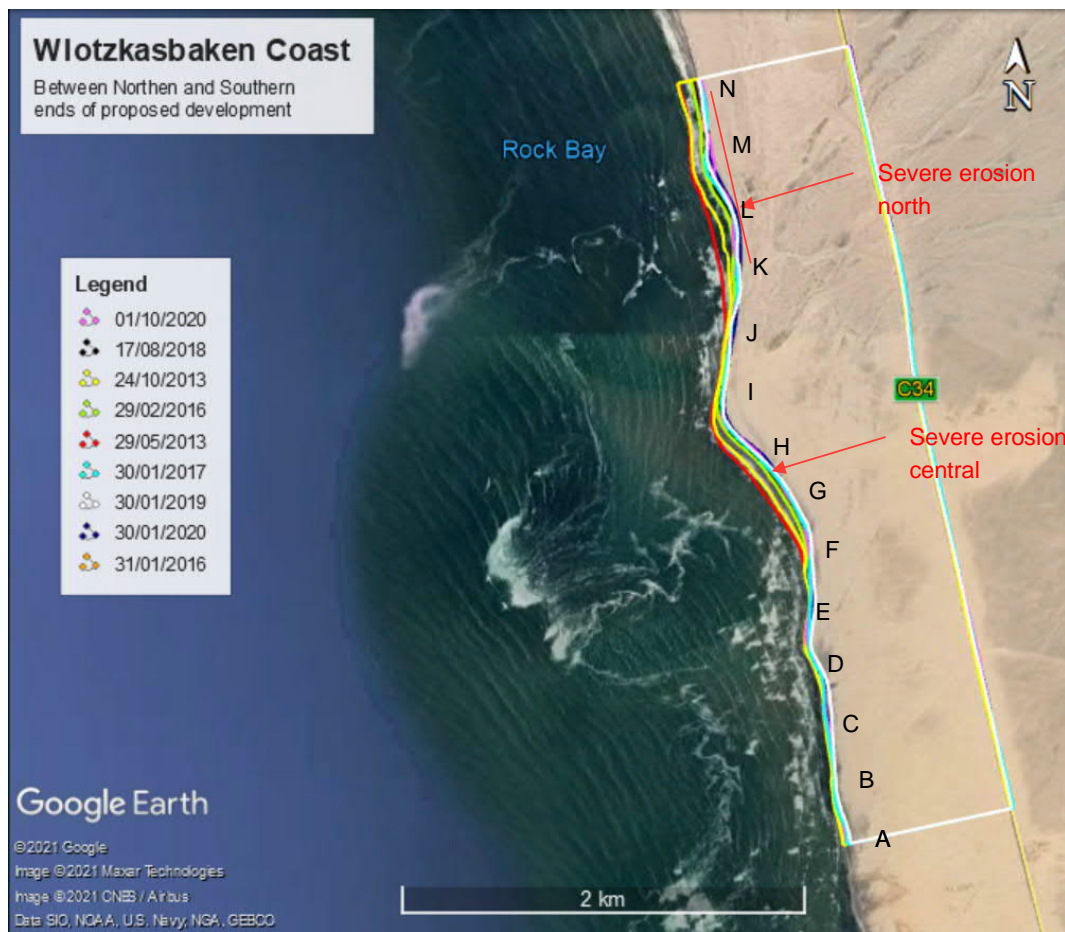
Satellite images (from Google Earth and Sentinel - <https://apps.sentinel-hub.com/eo-browser>) are employed to estimate any long-term trends in the shoreline movement (i.e. trends of erosion or accretion). Immediately obvious is the fact that all readily- available satellite shorelines up to February 2013 indicate the shoreline to be significantly accreted, relative to the present (2021). The images indicate that the accreted tombolo condition of 1985 eroded away by 29 May 2013 after which comparatively small changes (but still significant) occurred for the last 8 years. This latter period of slower change is analysed in order to assess recent trends in shoreline behaviour.

3.2 METHOD

A total of 10 images were employed from Sentinel and from Google Earth Pro, with dates as follows:

- 29 May 2013
- 24 October 2013
- 31 January 2016
- 29 February 2016
- 30 January 2017
- 17 August 2018
- 30 January 2019
- 30 January 2020
- 6 July 2020
- 1 October 2020

Relevant Sentinel images were transferred to Google Earth Pro in which the High-Water Mark was traced. The inland edge of the C34 road passing through Wlotzkasbaken was used as a reference line for all the HWM shorelines traced. The digitised shorelines are depicted in Figure 3-1. It is evident that shoreline erosion has occurred in places. Two areas of severe erosion (central and north) are indicated, where erosion in the order of 100 m has occurred in the 8-year period.



1

Figure 3-1: High-water marks traced in Google Earth Pro.

A total of 14 cross-sections at 300m intervals were generated – the approximate locations of these, labelled A to N from south to north - are indicated in Figure 3-1. Plots of the high-water mark position (as indicated by the wetted beach line) approximately perpendicular to the road at the imagery dates (i.e. versus time) were derived in order to assess erosion or accretion trends at each of the shoreline positions.

3.3 RESULTS AND ANALYSIS

The results of a linear regression applied to the shoreline data at each of the sections A to N is shown in Appendix A. At every one of the sections, erosion is evident. Figure 3-2 depicts an example of a linear trend analysis at profile N. In this case an R^2 value of 0.848 is determined, indicating that the linear trend provided represents 84.8% of the variance of the shoreline data.

Table 3-1 provides an analysis of the linear trends for all the profiles. It is evident that erosion rates from 0.4 m/year to as high as 15.7 m/year are determined. It is important to note that:

- There are minor inaccuracies in estimating the position of the high-water mark/wetted beach line. It is estimated that this will be ± 5 m; and
- Some of the R^2 values obtained are low, indicating low confidence in some of the trend analyses.

- The measurements are taken from the road, the only firm reference –shorelines that are oblique to the road indicate greater retreat than would occur in a shore-perpendicular orientation.

Regardless of these limitations on accuracy, the erosion rates that result are of great concern since allowance for a period of 50 years could render development west of the coastal road unfeasible in places. However, it is conceivable that some reduction in erosion rate is occurring. In order to test this possibility, a 2nd order polynomial fit was applied to the shoreline data. An example is shown in Figure 3-3, for section N. In this case the fit (regression) indicates a reduction in the erosion rate. Similar results were obtained at several other profiles, with moderate to high confidence (shown in Appendix B). While the results of this 2nd order polynomial fit provide an indication of a reduction in erosion rate, they cannot be used to estimate future shoreline location by extrapolation. In some cases (Appendix B) the trend suggests that accretion is occurring in recent years. However, this is deemed to be a feature of the parabolic curve selected and is not valid.

For cases where no meaningful trend is obtained (or poor correlation was attained) the result of this polynomial curve fitting is excluded. Results for the polynomial analysis are also provided in Table 3-1.

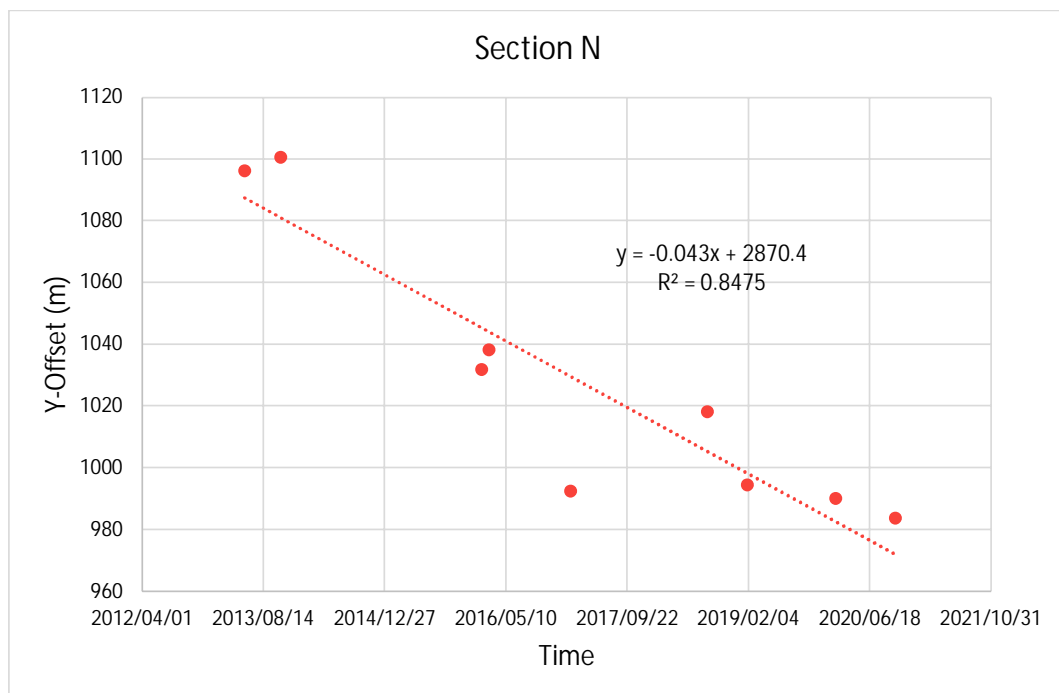


Figure 3-2: Linear trend analysis at Profile/Section N.

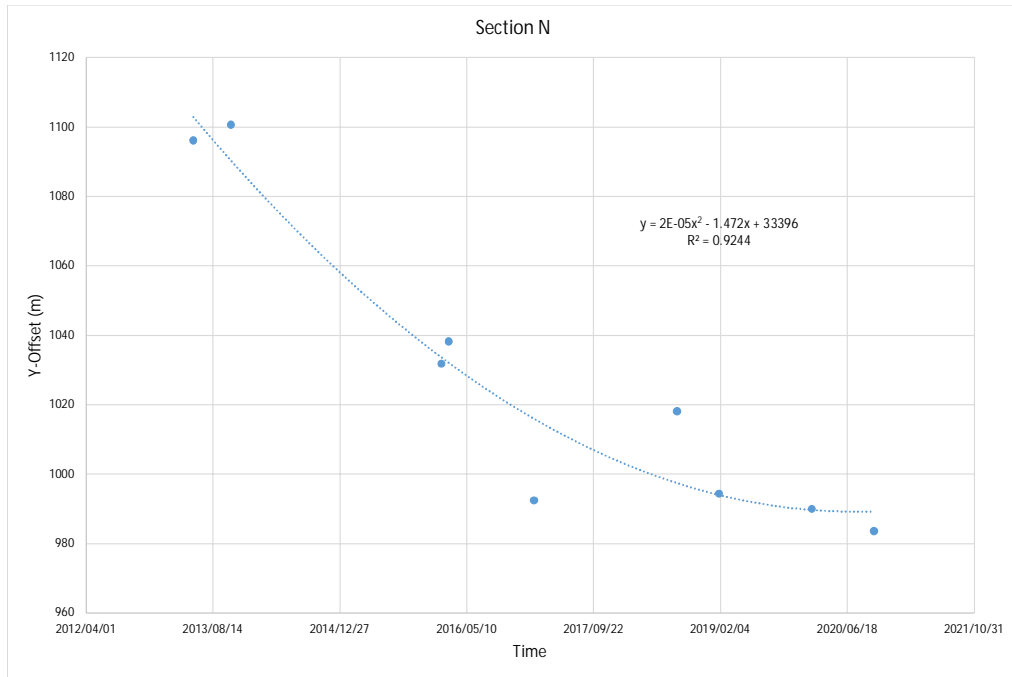


Figure 3-3: Polynomial fit to the shoreline data (Section N)

Table 3-1: Trend analysis of shoreline erosion excursions

Section	Erosion rate (m/year) from the linear trend	Linear R ²	Polynomial order 2 trend?	Polynomial R ²	Comments
A	-2.30	0.549	Yes	0.599	Reduction in rate of erosion (but low confidence). Rock not evident nearshore here, but wide, dissipative surf zone. Rock evident north and south of A. Evidence of wave overtopping (up to 30 m inland of beach summit)
B	-2.23	0.557	Not evident		Linear erosion rate applies. Rock nearshore visible at low water
C	-1.64	0.491	Not evident		Linear erosion rate applies. Rock nearshore visible at low water
D	-1.53	0.592	Not evident		Linear erosion rate applies. Prominent Rock outcropping evident nearshore
E	-0.40	0.057	Not evident		Very low confidence, but also minor variability (maximum variation only 16 m for the 8 years). Prominent Rock outcropping evident nearshore
F	-5.80	0.500	Yes	0.720	Reduction in rate of erosion (medium confidence). Rock evident at low water (no outcrop north of this point)
G	-14.89	0.809	Yes	0.889	Reduction in rate of erosion (medium to high confidence). No rock evident
H	-11.97	0.837	Yes	0.939	Reduction in rate of erosion (high confidence). No rock evident
I	-4.75	0.785	Not evident		Linear erosion rate applies. Some scattered basaltic rock nearshore
J	-6.28	0.654	Yes	0.811	Reduction in rate of erosion (medium confidence). Rock nearshore. Black rock – possibly basalt
K	-12.01	0.650	Yes	0.908	Reduction in rate of erosion (medium to high confidence). Some rock nearshore and extensive rock outcropping up the beach face
L	-14.71	0.890	Yes	0.954	Reduction in rate of erosion (high confidence). No rock evident
M	-10.33	0.686	Yes	0.867	Reduction in rate of erosion (medium to high confidence). No rock evident
N	-15.70	0.848	Yes	0.924	Reduction in rate of erosion (high confidence). No rock evident

From these results, the following preliminary findings are made, assuming a 50-year design life.

- In the southern region (Sections A to E) the average erosion rate is about 1.5 m/year. Thus if 50 years is considered, then 75 m of setback would be sufficient to accommodate erosion in this region.
- In the region further north all profiles, except for one, indicate a reduction in the erosion rate based on the polynomial order 2 trend (R^2 from 0.720 to 0.954). However, confidence based on a linear trend is also high in places (Table 3-1). The result is considerable uncertainty regarding the allowance to be made for long-term erosion, and it would therefore be prudent to allow a large buffer if development is to be considered in this northern region.

4 SEA-LEVEL RISE

4.1 SEA-LEVEL RISE

The estimated sea level rise (SLR) in this study is based on the AR5 (5th assessment report by Church *et al*, 2013, for the Intergovernmental Panel for Climate Change). SLR was derived from the global sea level changes, which are predicted for a number of climate change scenarios, referred to as the Representative Concentration Pathway (RCP) scenarios, each accounting for the relevant climate change impact factors such as greenhouse gas levels, carbon dioxide levels and the melting of ice sheets. Four SLR scenarios were investigated, namely RCP2.6, RCP4.5, RCP6.0 and RCP8.5. The number, *e.g.* 2.6, refers to the “radiative forcing” scenario in Watts/m². RCP8.5 is the most conservative of these scenarios and represents the status quo or “do-nothing” scenario in terms of global interference: this SLR scenario was selected for the present study. Figure 4-1 shows the predicted future global mean sea level rise (the red dashed line is relevant; the other lines indicate the various components of sea-level rise).

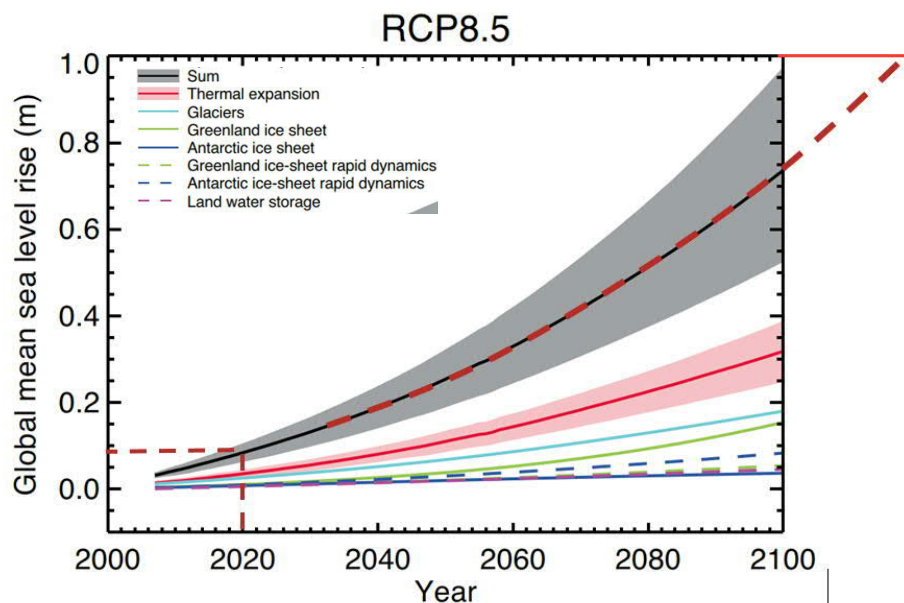


Figure 4-1: Projected Sea-level rise from process-based models of global mean sea level (Church *et al*, 2013) for RCP8.5

From this figure, and taking the liberty of extending the curve slightly, it can be inferred that about 0.9 m of sea-level rise could occur in the next 100 years (relative to 2021), with the SLR increase in 50 years being about 0.33 m.

Furthermore, recent information (IPCC, 2019) indicates that a further 0.14 m should be added to accommodate the predicted contribution of land-based ice/snow to sea-level rise. Thus, just over 1 m of sea-level rise can be expected in the next 100 years, with about 0.39m in the next 50 years.

4.2 THE METHOD

4.2.1 BRUUN RULE

The Bruun Rule (described in Cooper and Pilkey, 2004) provides a simplified assessment of erosion retreat of the shoreline in response to sea-level rise. Reference is made to Figure 4-2 below. As the sea-level rises by **S** metres, waves attack the beach at a higher level, inducing erosion of the upper beach and corresponding deposition at depth, with the eroded and deposited volumes being the same. Bruun assumes that the shape of the profile also remains approximately the same. Accordingly, the Bruun formula is as follows:

$$R = S \times (L / (B + h))$$

where:

S= the rise in sea-level

L= the length of the profile from the top of the dune to the seaward end of deposition

h = the depth of “closure” beyond which changes to the profile (from deposition) are negligible

B= the height of the dune (or dam wall in this case).

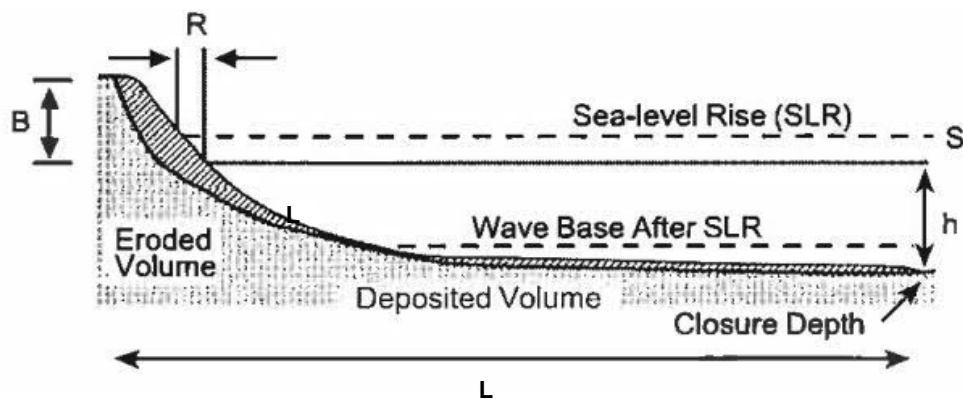


Figure 4-2: Bruun Rule definition sketch (after Cooper and Pilkey, 2004)

Estimation of beach retreat due to sea-level rise requires information on the offshore bathymetry (sea-bed topography). As no bathymetry data is available, the bathymetry profile was roughly estimated, by applying a combination of:

1. Linear wave theory (if the offshore wave condition is known, and the wavelength is known (as measured from Google Earth) then the depth at various points offshore could be roughly estimated;
2. Dean’s equilibrium profile (Dean, 1991) If grain size of the beach (and nearshore region) is known, then the offshore profile can be estimated according to Dean’s equilibrium profile equation.

An exposed, northern part of the site was selected (location, Figure 4-3). Here, the land-side of the profile was obtained from the topography survey. Figure 4-4 indicates the estimated bathymetry profile employed.



Figure 4-3: Location of the profile at the northern end of the site

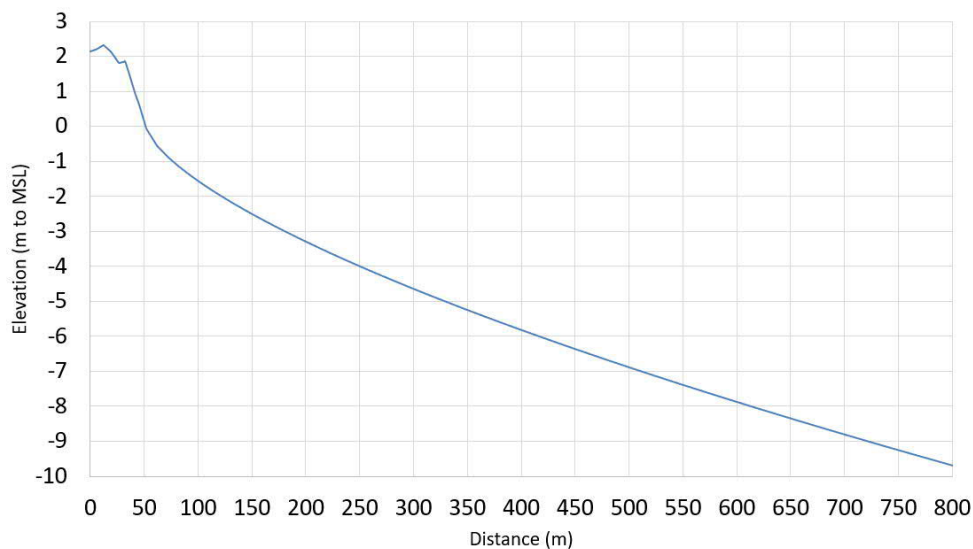


Figure 4-4: Estimated nearshore profile (assumed grain size, 0.3 mm – site observations indicate a median grain size close to this)

In applying the Bruun rule formula above, the depth of closure was estimated by employing the formula of Birkemeier (1985) with typical storm wave conditions.

4.2.2 LINEAR TRANSLATION

If the beach were not erodible, the shoreline retreat due to sea-level rise would simply be dependent on the beach slope. The slope near the shoreline is generally about 1v:10h.

4.3 RESULTS

The results of this calculation and also of the Bruun Rule calculation are summarised in Table 4-1. This results in a calculated shoreline retreat of 20.9 m.

Table 4-1: Parameters employed in the Bruun Rule

Parameter	Value	Units	Comment
Tp	16	sec	Wave period indicative of conditions occurring 12 hours/year (from calculations conducted at Walvis Bay)
Hs	3.3	m	Wave height indicative of conditions occurring 12 hours/year (from calculations conducted at Walvis Bay)
h	7.23	m	Depth of closure, calculated from Birkemeier (1985)
B	2.3	m	Vertical height of the beach summit from sea-level (from profile measurement)
S	0.39	m	Estimated sea-level rise for 50 years from now (from 4.1 above)
L	510	m	Length of the profile (top of beach to the offshore depth of closure)
R	20.9	m	Calculated retreat of the beach (Bruun Rule)

On the other hand, applying the *linear translation approach*, sea-level rise over 50 years of 0.39 m would translate to only 3.9 m of retreat.

Recognising that the occurrence of rock in places would retard sea-level induced shoreline retreat, a shoreline setback value of 15 m is proposed (i.e. a little more than the average – 12.5 m - for the two methods).

5 STORM IMPACTS

5.1 STORM EROSION MODELLING

5.1.1 METHOD

The SBEACH model developed by the US Army Corps of Engineers may be employed to predict the extent of storm erosion on a sandy beach. A version of the model was used that was previously calibrated (employing storm erosion data) in Oranjemund, Namibia. The following inputs were employed within the model:

- A representative beach and constructed bathymetry profile as illustrated in Figure 4-4;
- An actual (hindcast) 1:10 year storm event from Pelican Peninsula, Walvis Bay which was transformed to a 10m depth (i.e. similar conditions) was employed (duration 60 hours). In reality, the waves penetrating to the near-beach region at the study site are likely to be slightly more subdued (reduced in height) than at Walvis Bay due to the protective offshore reefs. Therefore this approach is conservative.
- The actual tidal water-levels during this storm event were employed.

The influence of nearshore or underlying rock was ignored, representing a conservative (greater erosion) scenario as the extent of rock under the beach and hinterland is not known;

In order to address uncertainty, model sensitivity testing was conducted by including;

- a. Spring tidal water levels
- b. Adjusted wave period (increased all original wave periods by 1 sec to represent a greater storm).

It was considered to test a wave height increase. However, as the applied wave height is conservative (as it excludes wave height reduction due to refraction and diffraction at the offshore reefs) this was not considered relevant.

5.1.2 RESULTS

The predicted erosion retreat, relative to the +1 m MSL contour (representative of the shoreline) for these cases is indicated in Table 5-1, while Figures 5-1 and 5-2 depict beach profiles predicted by the SBEACH model.

Table 5-1: Model results and sensitivity

Model Sensitivity Case	Erosion retreat relative to the beach contour (+1 m MSL)
Base case: 1:10 year storm	31
Increased wave period by 1 second	31
Tidal variation increased – spring tides	33
Average	31.7

The average of the model tests indicates about **30 m of erosion** (relative to the +1 m contour). This is deemed a reasonable (if slightly conservative) extent of erosion for a low profile, based on experience, for a 1:10 year to 1:50 year storm event (the latter was tested by means of increased wave height). The model sensitivity results show that further erosion could occur if spring tides coincide with the storm, but this increased shoreline retreat would be no more than 4m.

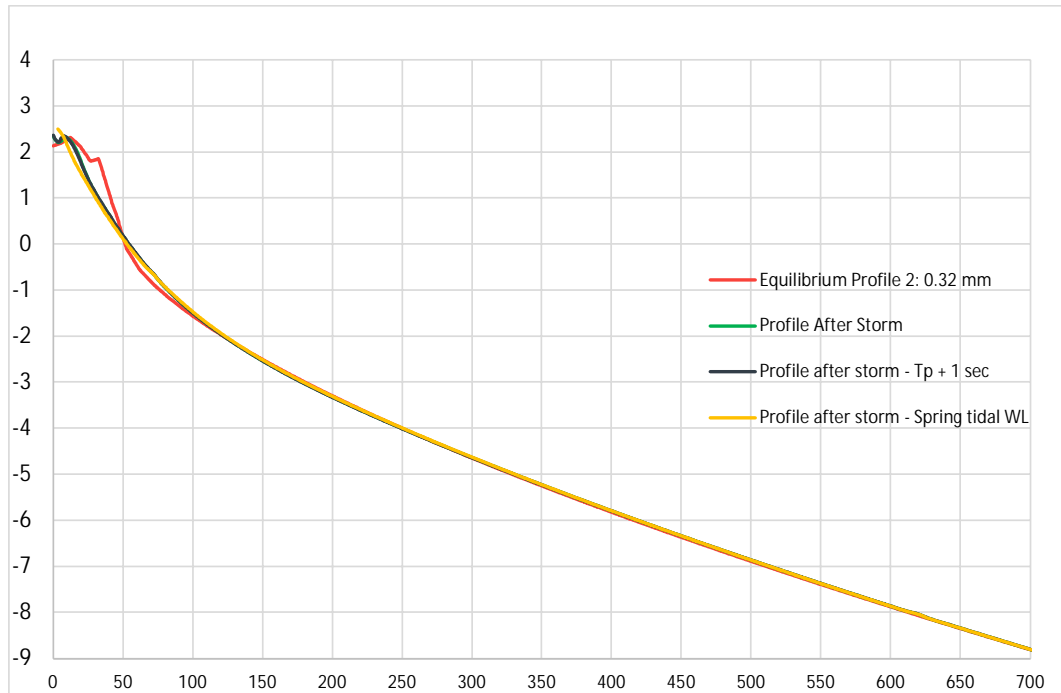


Figure 5-1: Profile Erosion Predictions

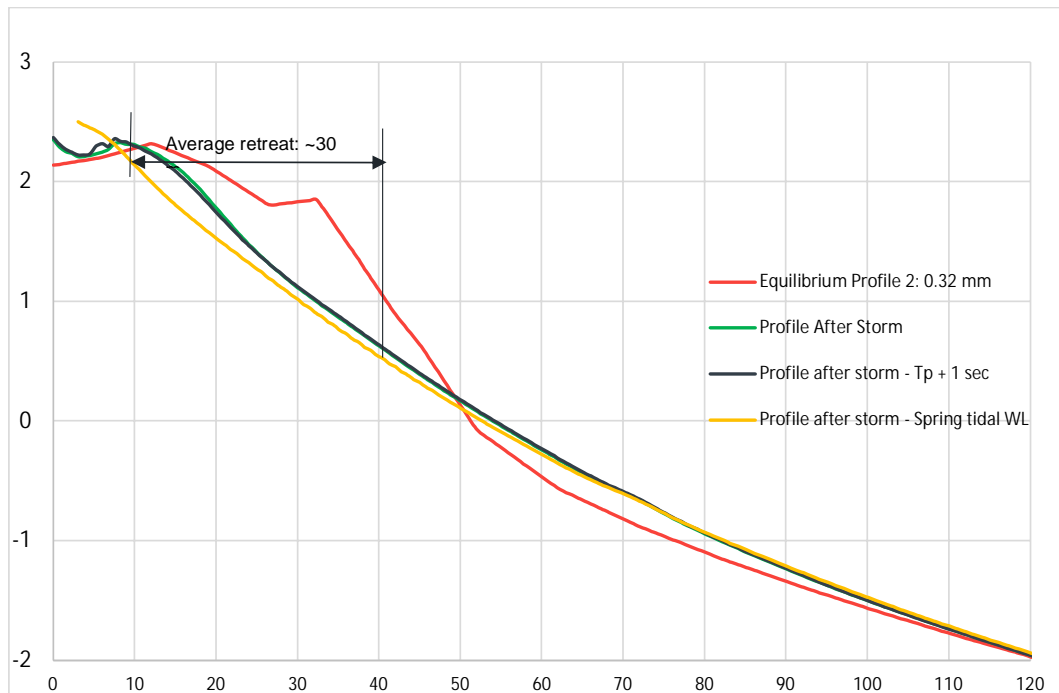


Figure 5-2: Profile erosion predictions (zoomed in)

5.2 STORM WAVE RUN-UP

5.2.1 INTRODUCTION

Observations of debris lines on site indicated that waves have recently overtopped the beach summit in places. Calculations are conducted in order to estimate the elevation of the beach summit required to prevent wave penetration inland during storms.

5.2.2 METHOD

The method of Nielsen and Hanslow (1991) is applied in order to estimate the extent of wave runup during storm wave conditions.

5.2.3 RESULTS

Surveyed upper beach slopes at the study (Appendix C) have slopes of 1v:10h and steeper. While the results at every individual beach profiles should ideally be assessed with detailed nearshore wave data from a computational model, a rough idea of run-up is obtainable. It is clear from calculations that even wave height with a 1 in 1 year recurrence, the summit of the beaches will certainly be overtopped (predictions indicate wave-runup over 3 m). This indicates that it would be advisable to raise the beach summit level by at least 1 metre, to accommodate wave run-up.

6 DISCUSSION, CONCLUSIONS, RECOMMENDATIONS

6.1 DISCUSSION

In this study, the minimum design period for residential homes of 50 years is considered since application of a 100-year period would result in unrealistically large setback distances, considering the likelihood of underground rock which will retard erosion.

Setback is estimated relative to the shoreline (represented by the +1m MSL contour) as measured in April 2021. The total setback is the sum of:

- Setback allowance for long term trends;
- Setback allowance for sea-level rise (up to 50 years hence); and
- Setback allowance for storm erosion.

In the southern region of the site (Figure 6-1), nearshore rock outcrops appear to retard the rate of erosion. Considering a period of 50 years, the section of shoreline in the south will have a total setback requirement as indicated in Table 6-1 and shown in Figure 6-1. This setback distance is based on firm coastal engineering science and experience and comes with a *high* level of confidence.

Further north of this region (*Northern Region* in Figure 6-1) the analysis of shoreline erosion indicates that an average shoreline retreat of about 10 m/year occurs. Continuation of this rate would imply that a massive setback distance of at least 500 m would be required to accommodate this erosion rate for 50 years. However, the analysis does also indicate that the erosion rate is reducing. In many cases, this is due to the occurrence of rock in the intertidal and nearshore region. Based on this reduction in erosion rate, an estimated setback of some 200 m should be sufficient to accommodate the long-term shoreline erosion. The total setback for this northern region, including an allowance for storm erosion and sea-level rise, is indicated in Table 6-1. However, the confidence in this estimate is considered *low* since the future rate of erosion is uncertain.

Table 6-1: Setback Requirements

Region	Allowance for long-term trend (m) for 50 years	Allowance for sea-level rise (m) for 50 years	Allowance for storm erosion (m)	Total setback (m)	Confidence in result
Southerly section (Figure 6-1)	75 m	15 m	30 m	120 m	High
Northerly section (Figure 6-1)	200 m	15 m	30 m	240 m	Low

The coordinates of the development setback line are as in Table 6-2.

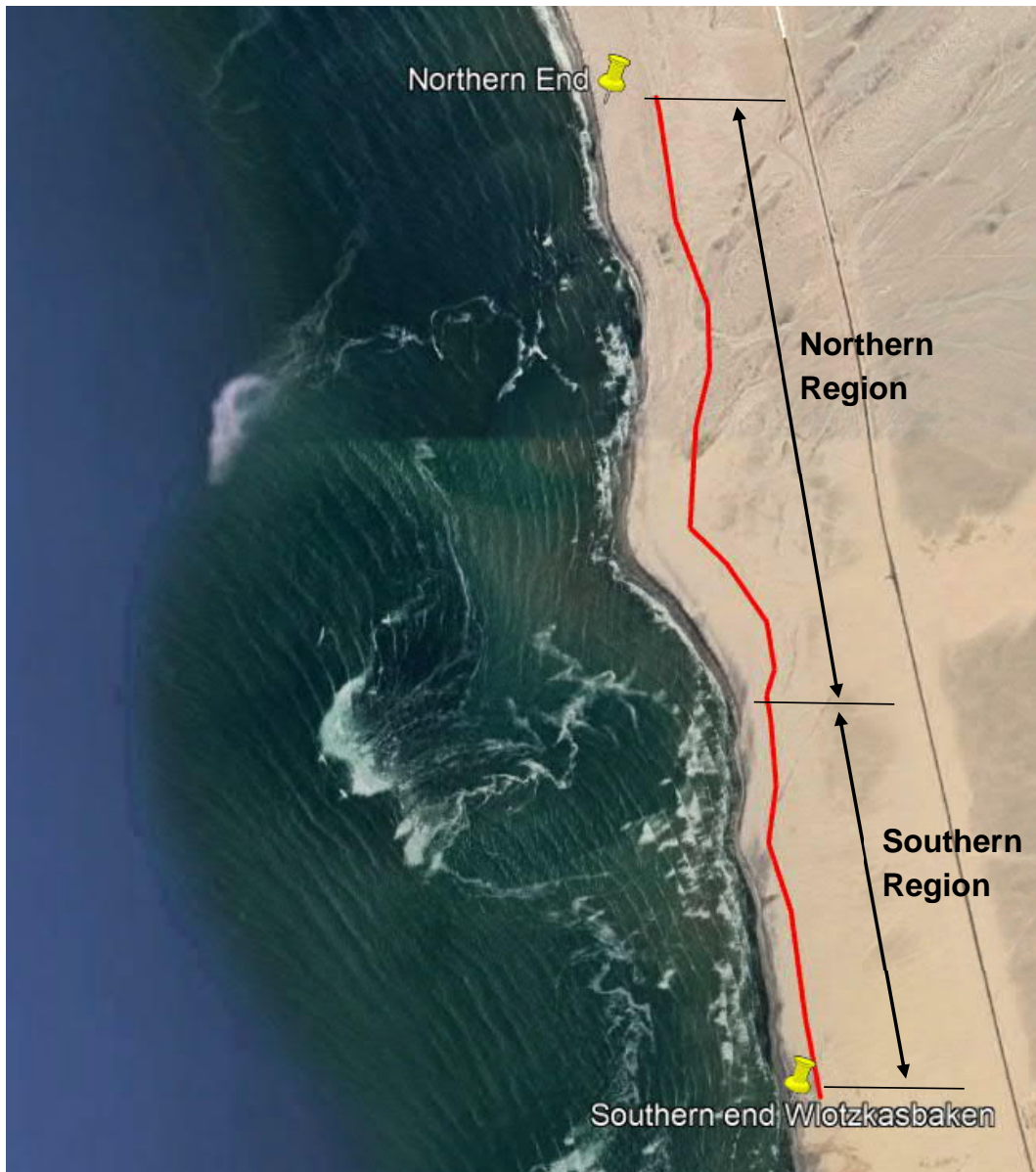


Figure 6-1: Recommended Setback Line (red) and Demarcation of the Southern and Northern Regions

Table 6-2. Coordinates of the Development Setback Line (UTM)

X (m)	Y(m)
444579.3	7515989
444569.6	7516040
444520.6	7516291
444464.7	7516695
444378.9	7516949
444406.7	7517167
444385.4	7517415
444369.2	7517504
444399.4	7517602
444369.5	7517779
444217.8	7517997
444078.4	7518133
444086.3	7518288
444099	7518514
444150.2	7518729
444141.8	7518972
444019.4	7519286
443956.1	7519697
443942.6	7519757

6.2 MITIGATION MEASURES

The setback distance can be decreased by raising the beach. It is estimated that raising the back-beach region (between the shoreline +1m MSL contour and the development line) would result in the setback distance being decreased, by roughly 20 m for each 1m of increased elevation of the backbeach area. This estimate is based on the additional volume of sand that would need to be eroded in the event of a storm and is applicable for raising the beach by 1 m to 2 m . Calculations of wave run-up indicate that raising the beach summit would be advisable in any event, in order to restrict the overtopping of waves.

In addition, increased confidence in the future shoreline evolution, required to estimate setback, could be obtained by means of:

1. Defining the configuration of subsurface rock in the coastal region, from the present shoreline to about 250 m inland. One of several geophysical methods could be employed, depending on the soil and rock types;
2. Employing this information (assuming rock is found near-surface) together with coastal engineering principles, a coastal engineering study to estimate the future shoreline configuration resulting from configuration/contours of underground rock. Such a study could employ comprehensive computational modelling and/or empirical relationships to assess reductions in wave energy and consequent shoreline re-configuration.

6.3 RECOMMENDATIONS

It is recommended:

1. That the first phase of development be conducted on the more stable southern shoreline as indicated in Figure 6-1;
2. That raising the back-beach area (between the shoreline at +1m MSL and the setback line) be considered since this will allow for a decrease in the setback by an estimated 20 m for each metre of increased elevation;
3. That a subsurface rock survey be considered to identify the configuration (contours) of rock that will influence the future shoreline, and that a coastal engineering study follow this, to provide an updated setback line based on this information;
4. That the first stage of development be focussed in the southern region, where setback is less and confidence in this setback is high;
5. Given the large setback indicated for in the northern region, and the associated low confidence in this setback, development of this shoreline should be delayed. In the interim period, this shoreline can be monitored to confirm whether the erosion trend is tapering off as indicated by this study. This monitoring will also inform the finalisation of an updated setback line with increased confidence.

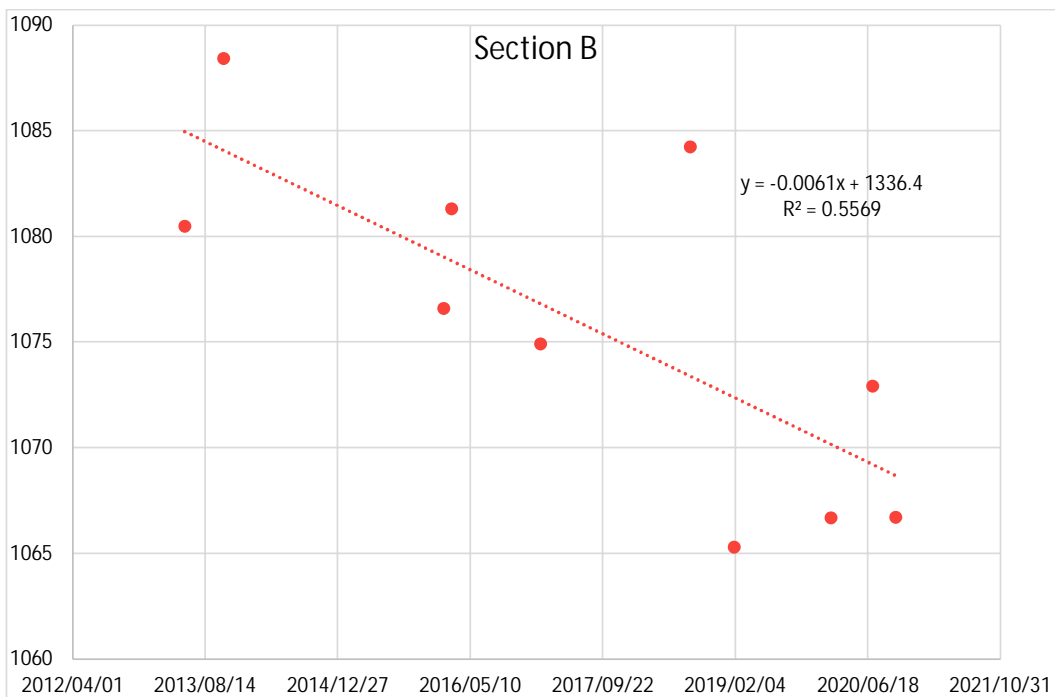
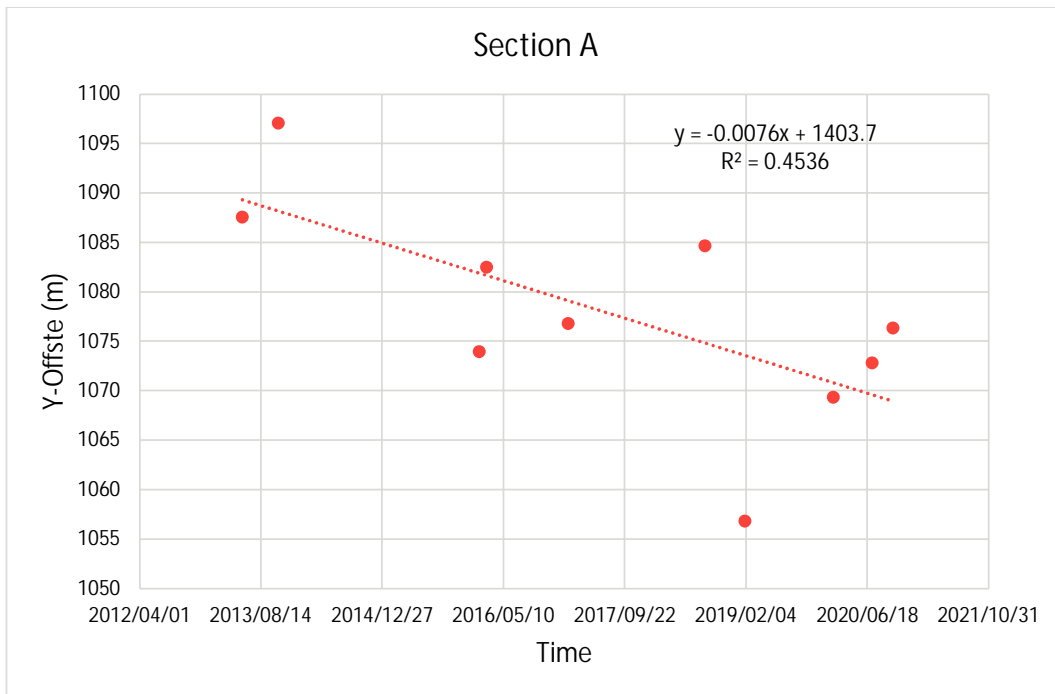
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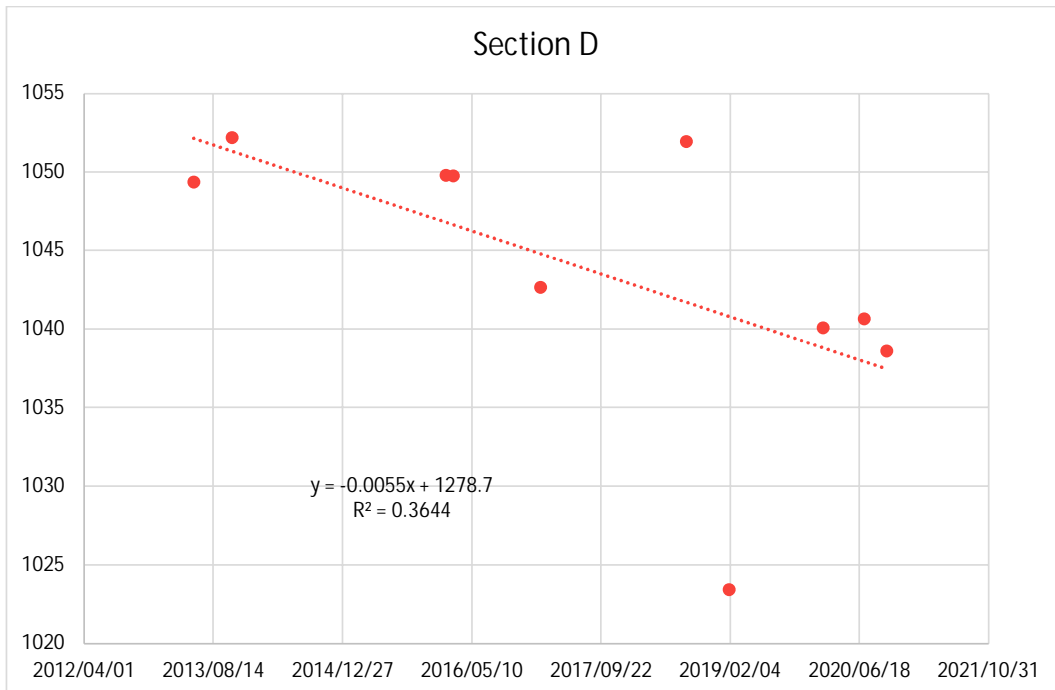
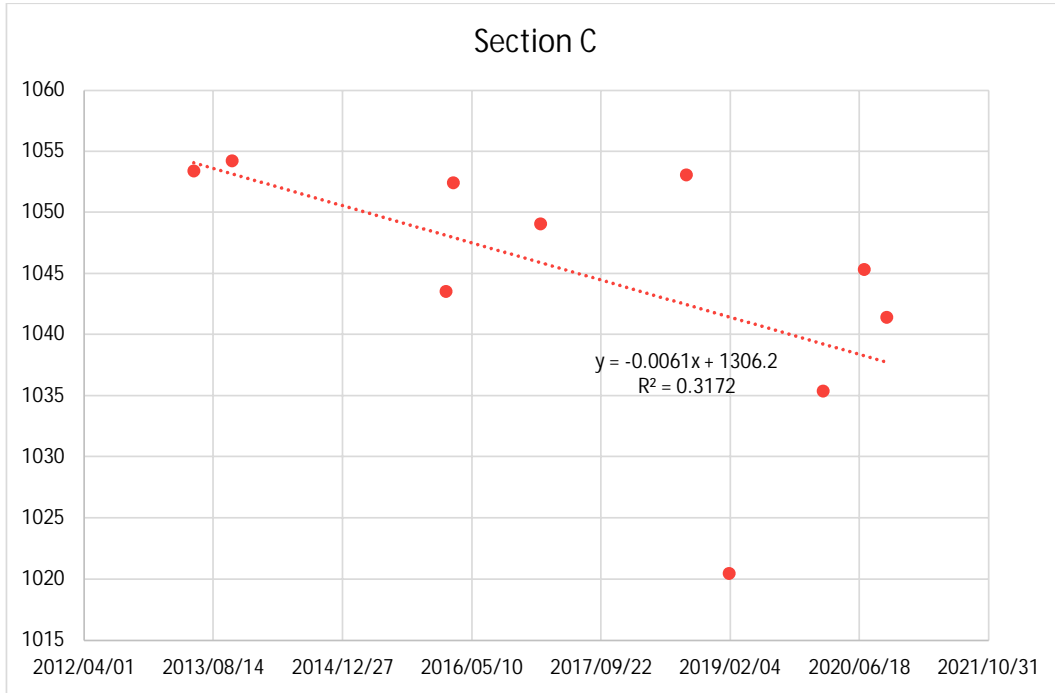
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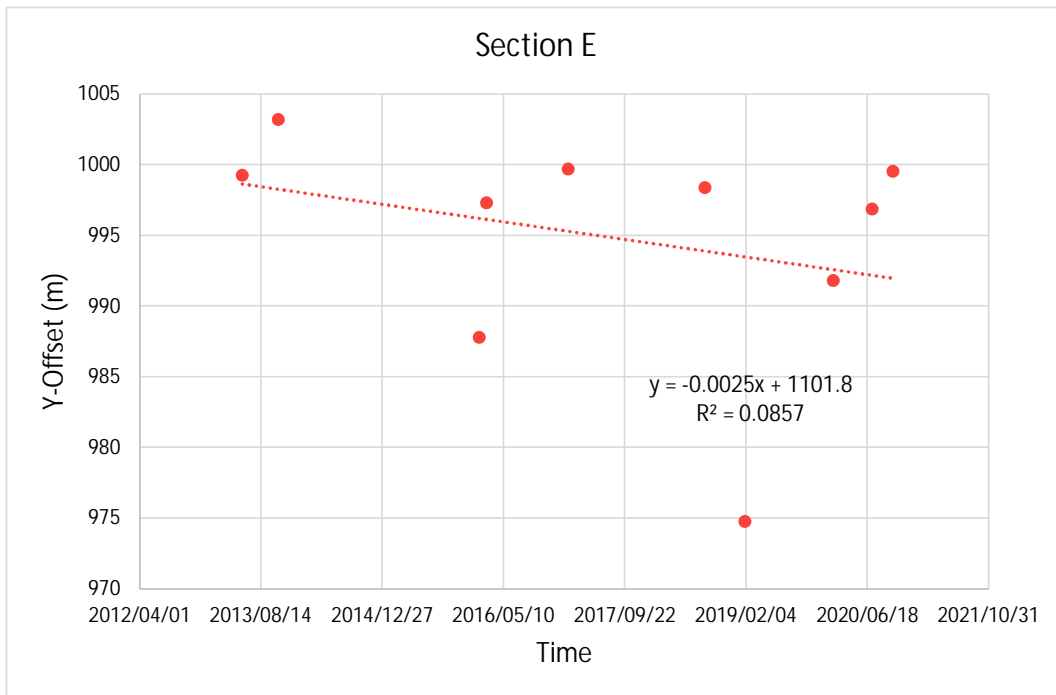
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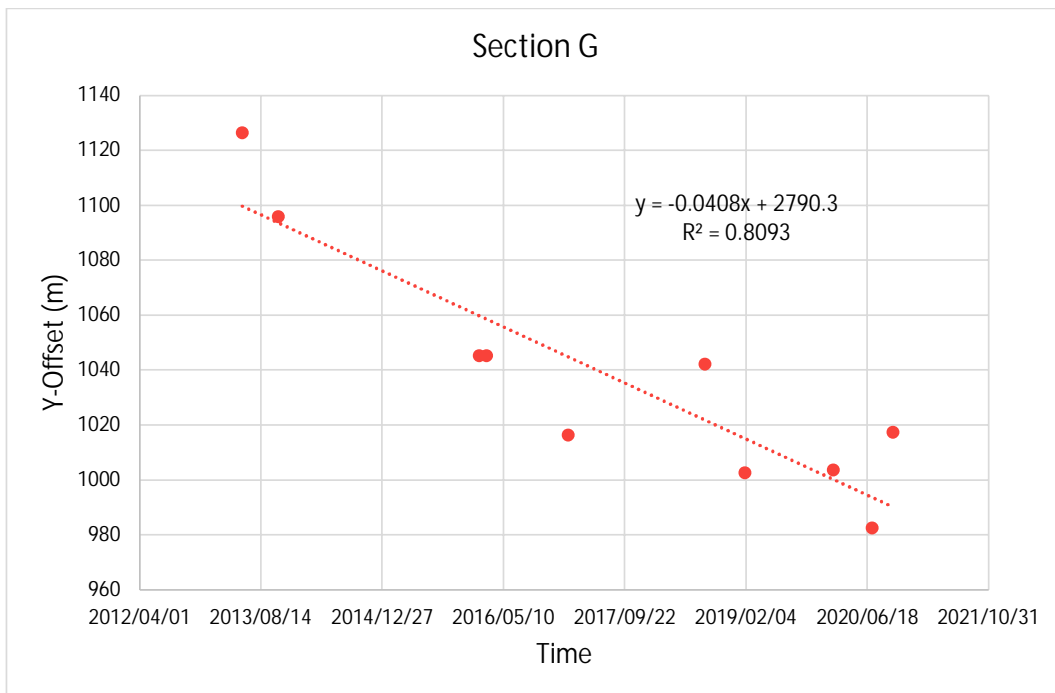
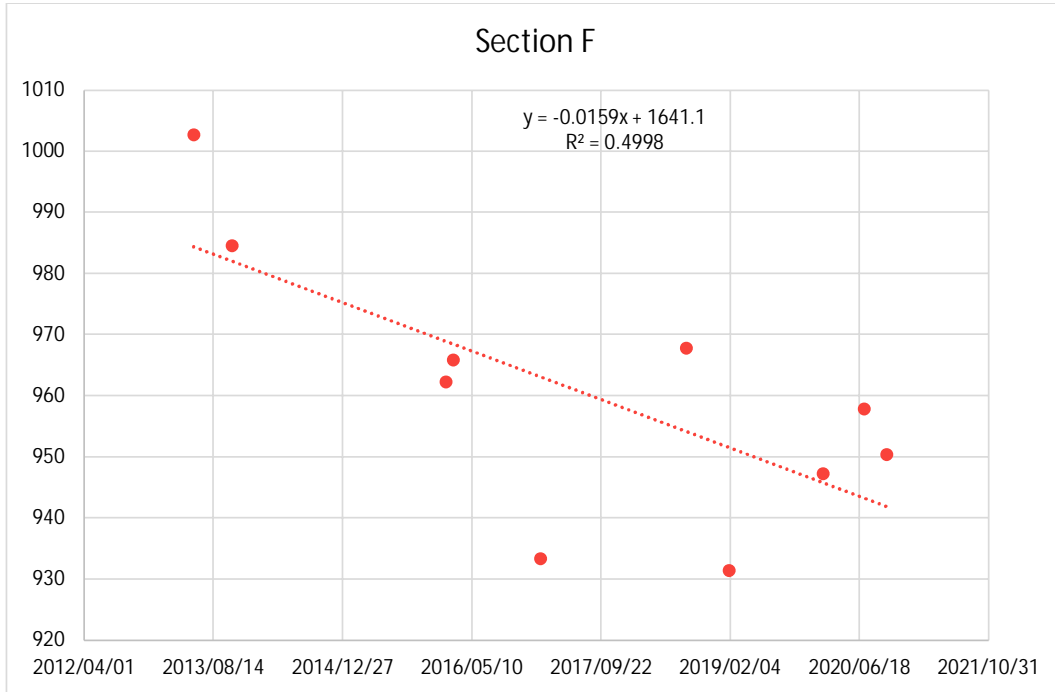
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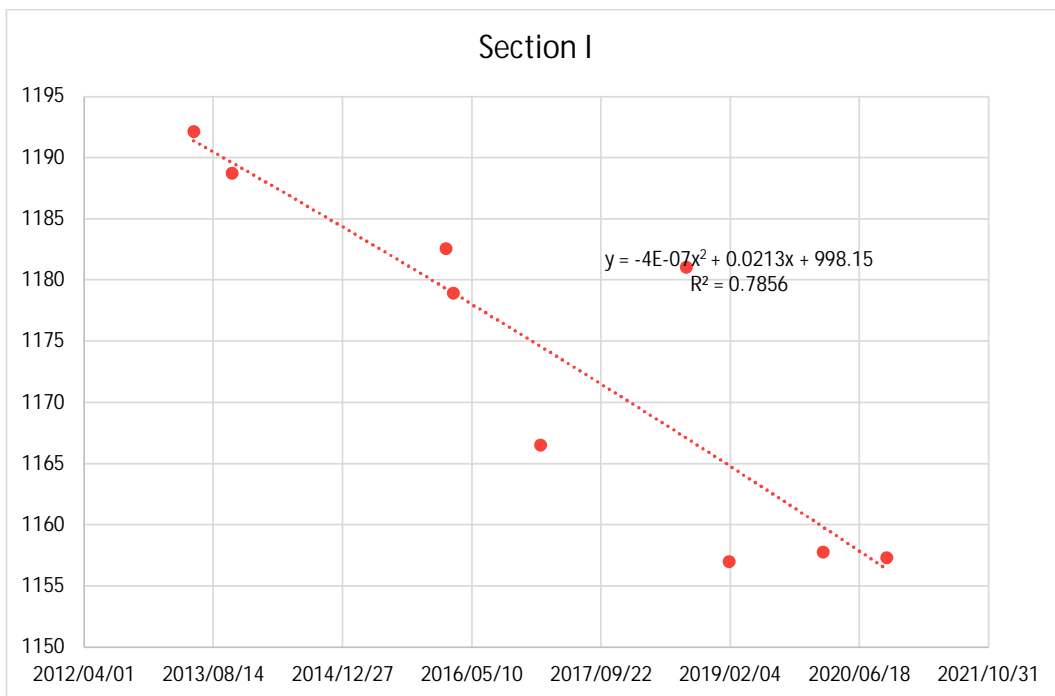
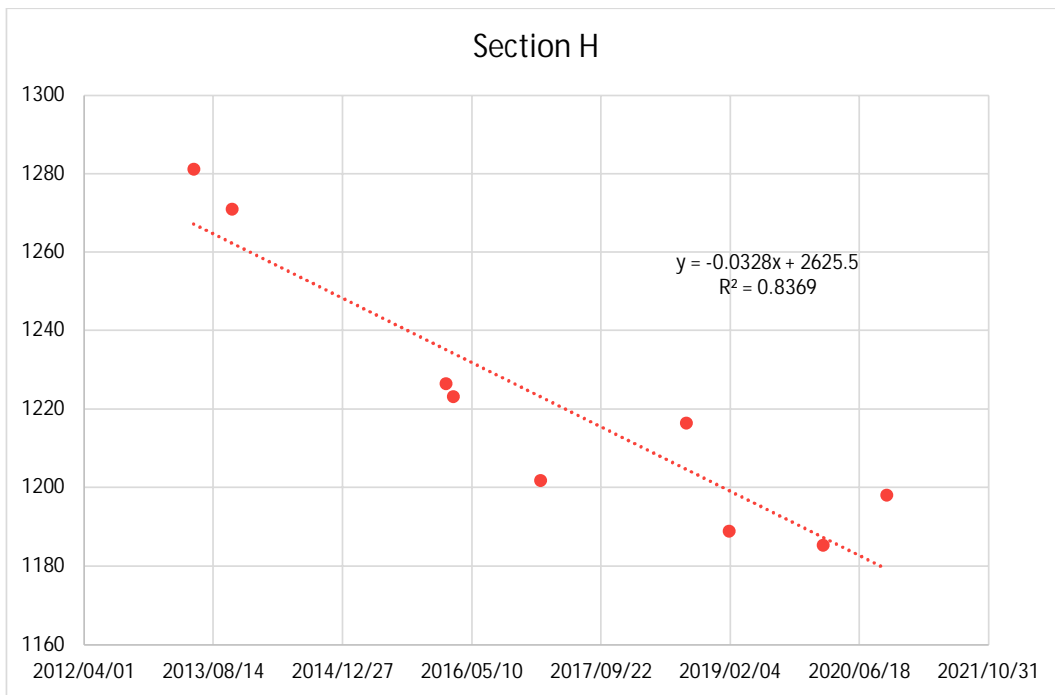
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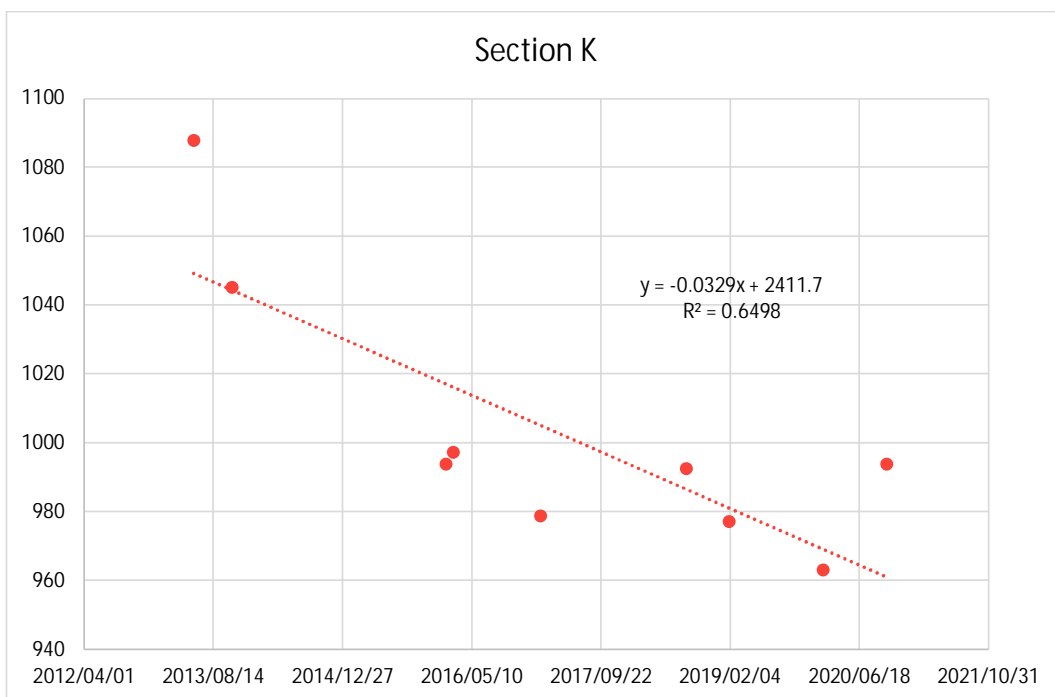
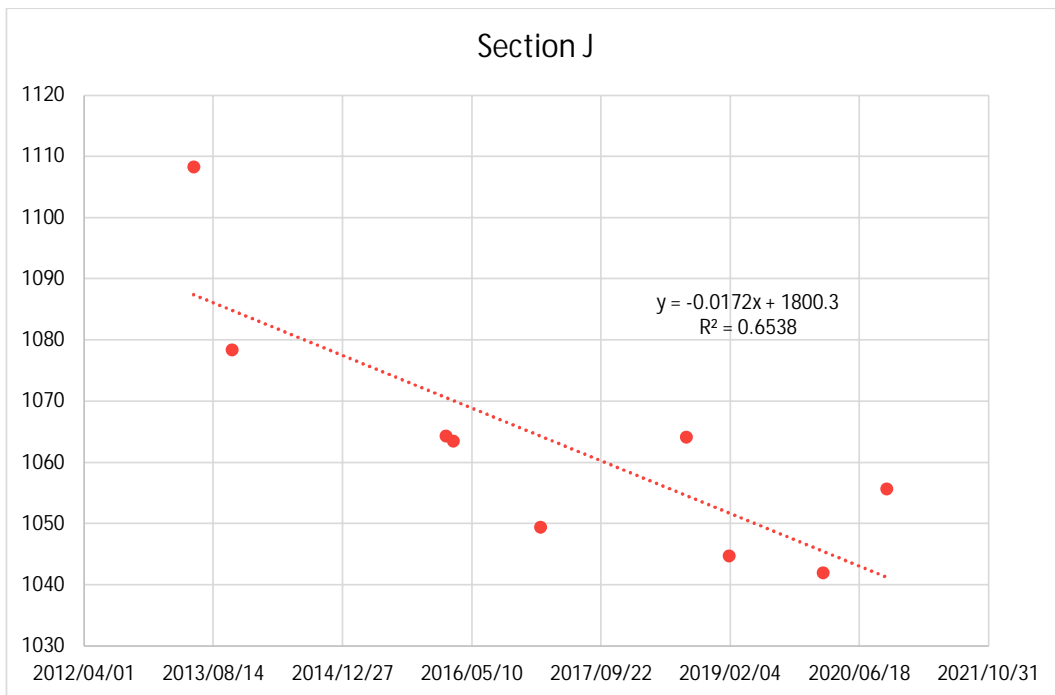
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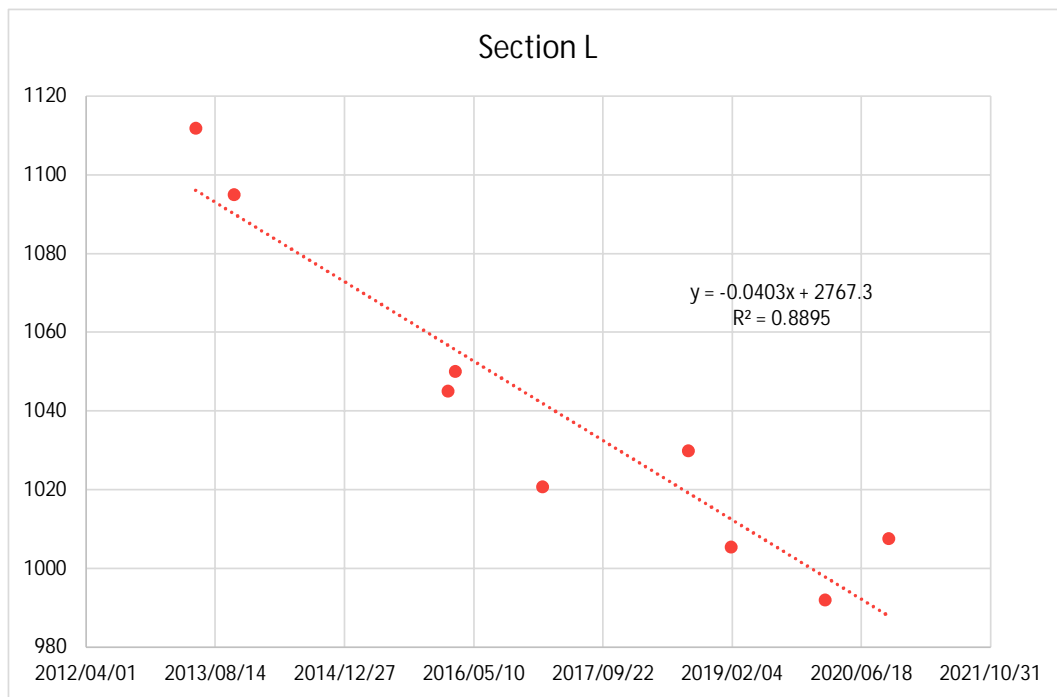
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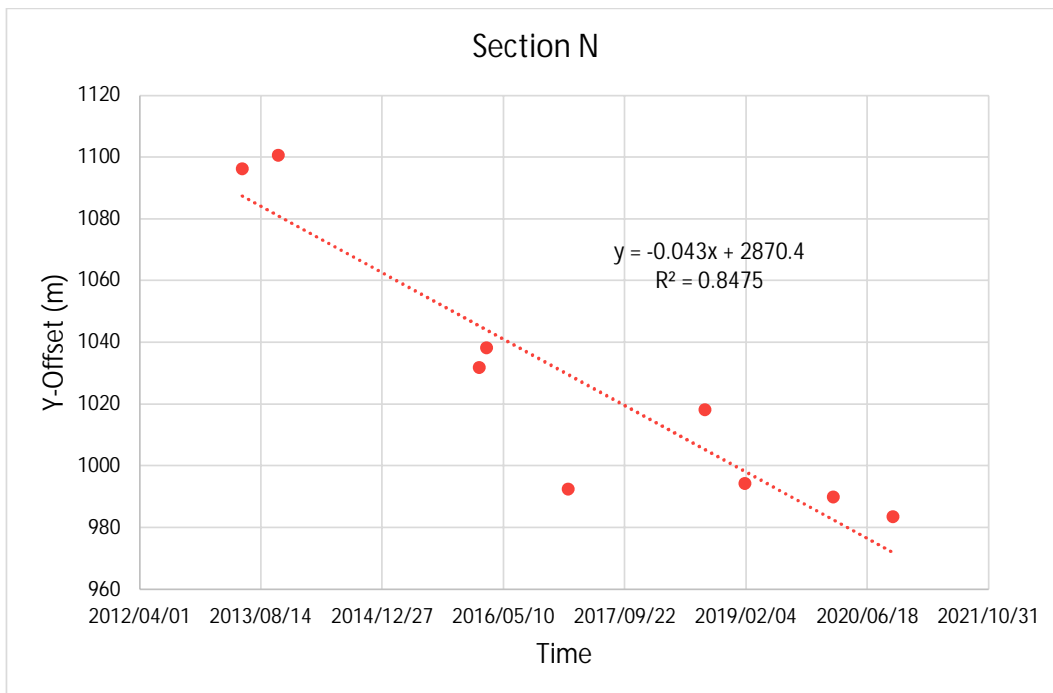
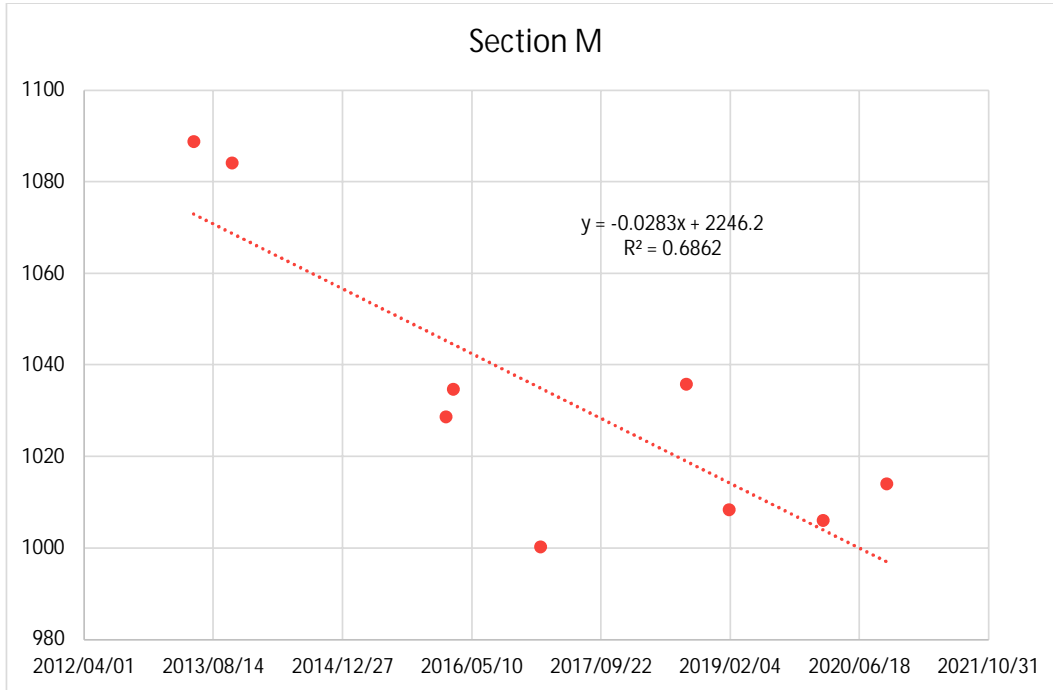
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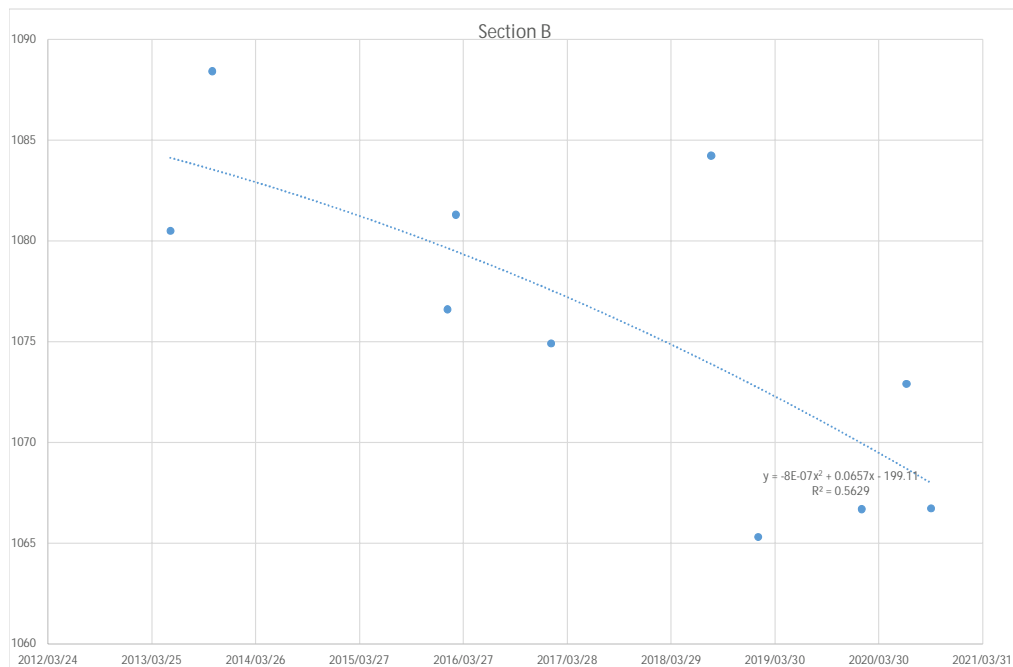
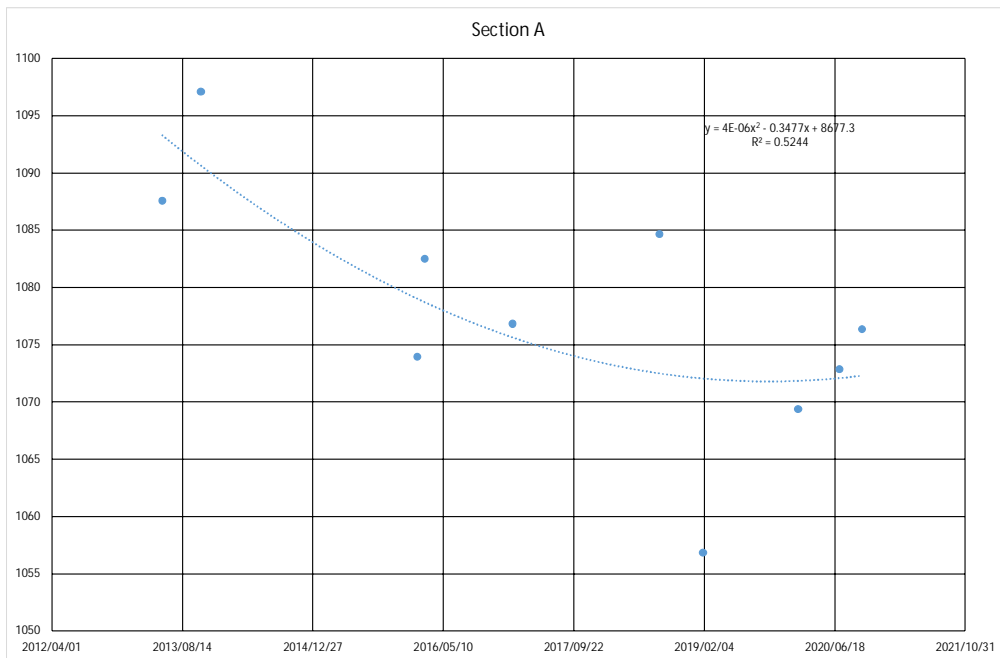
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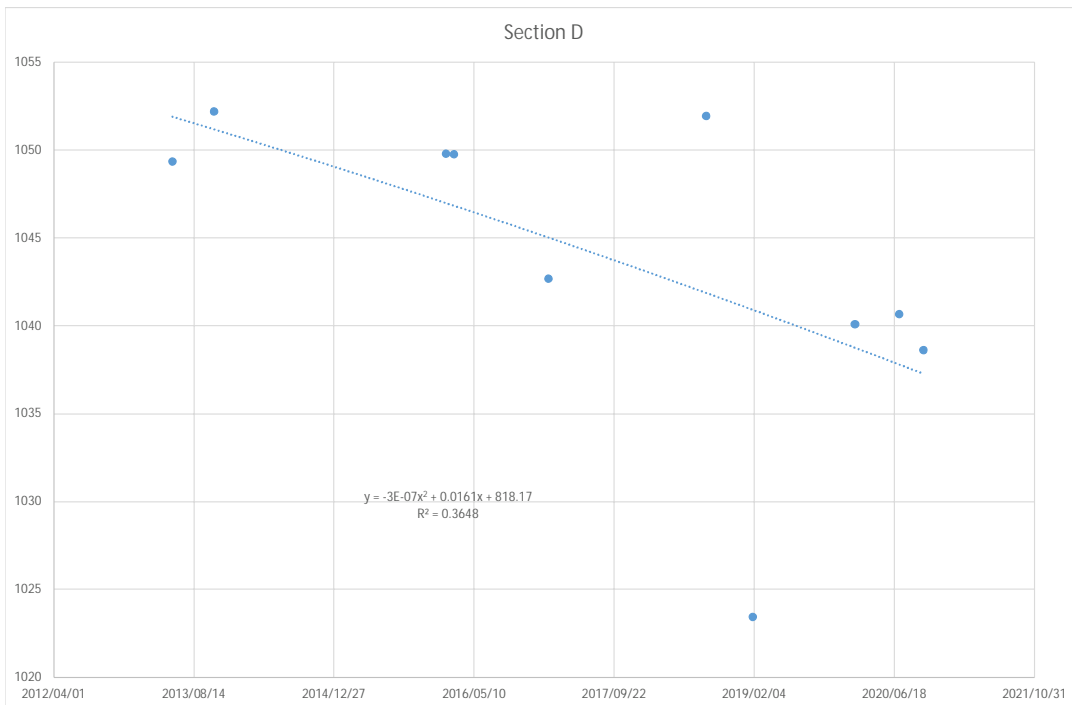
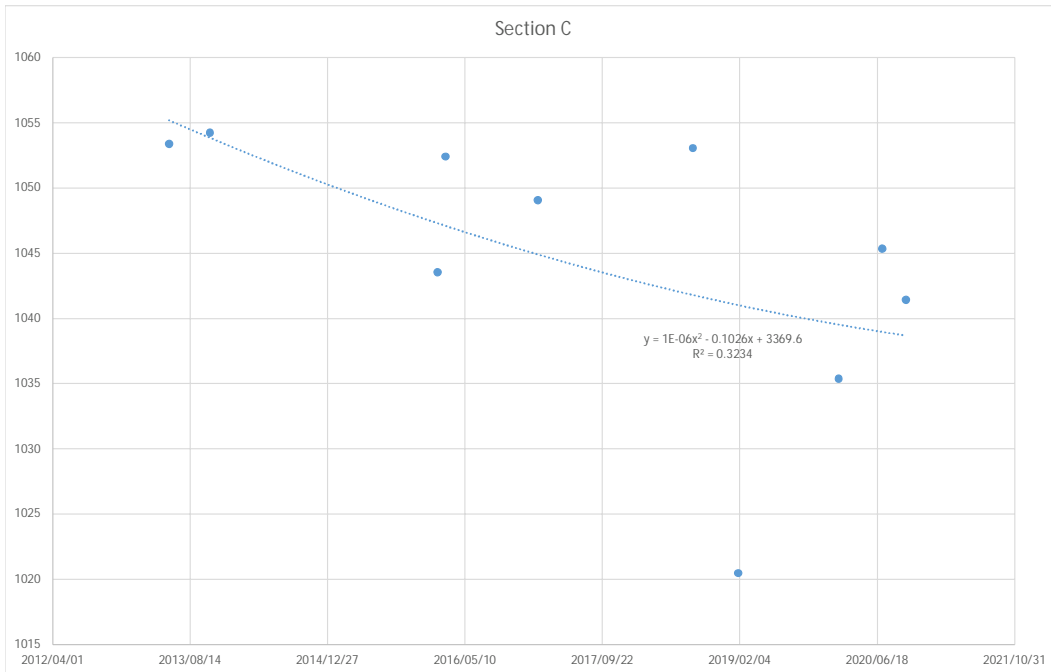
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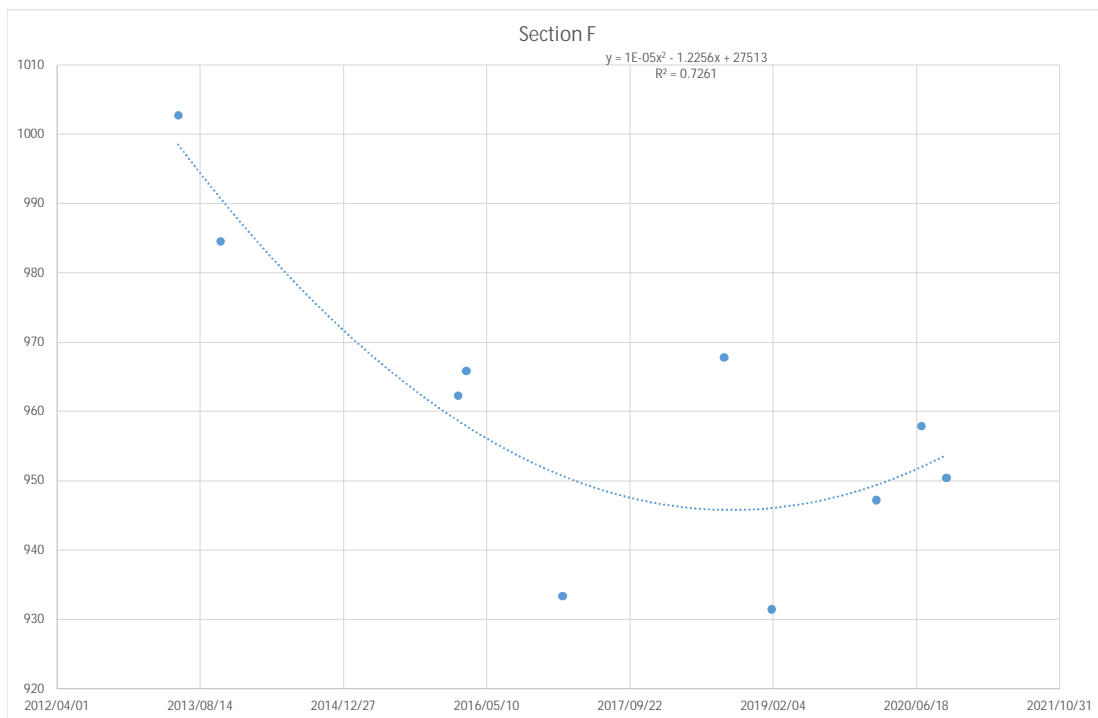
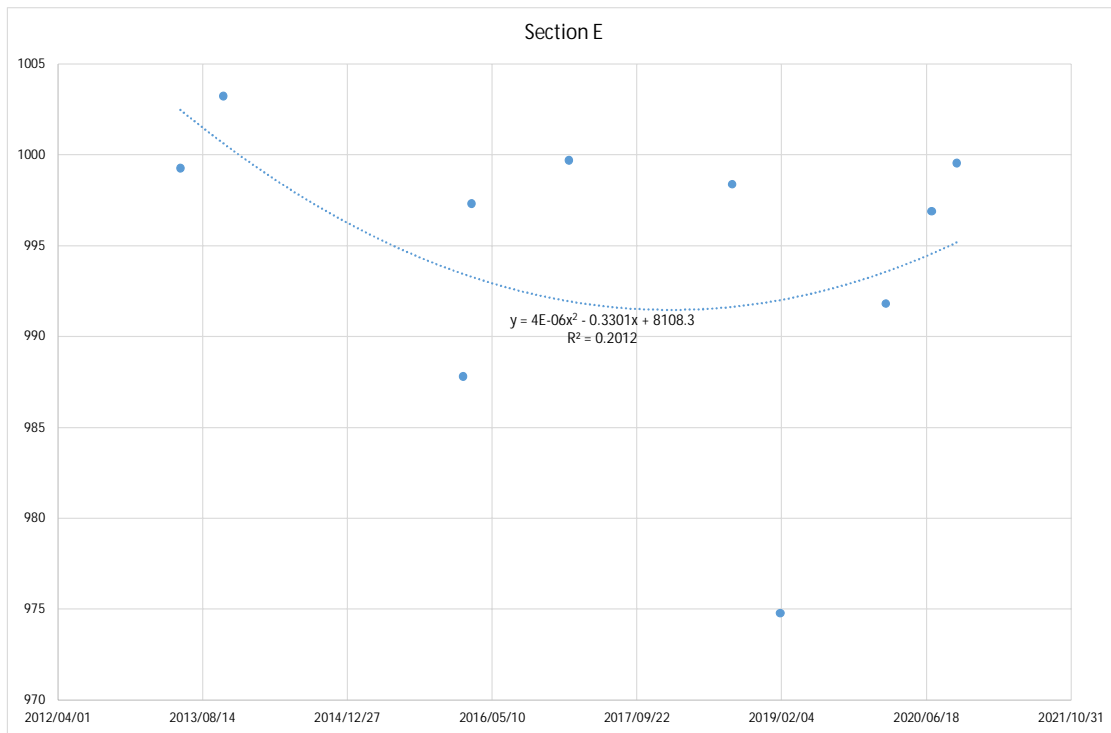
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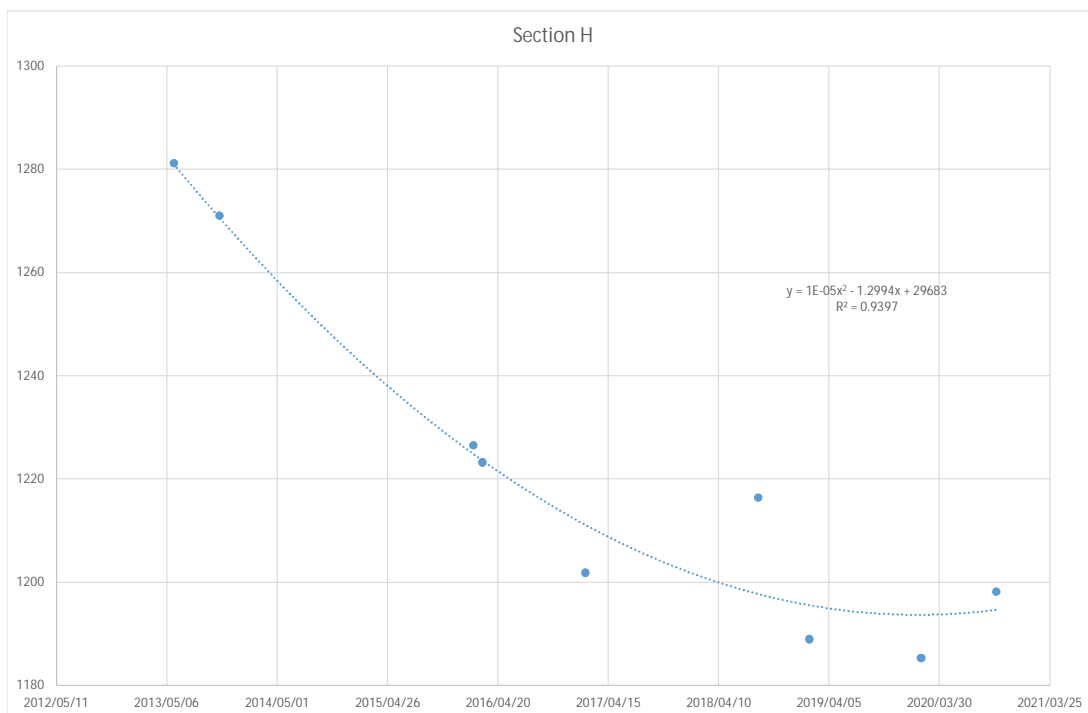
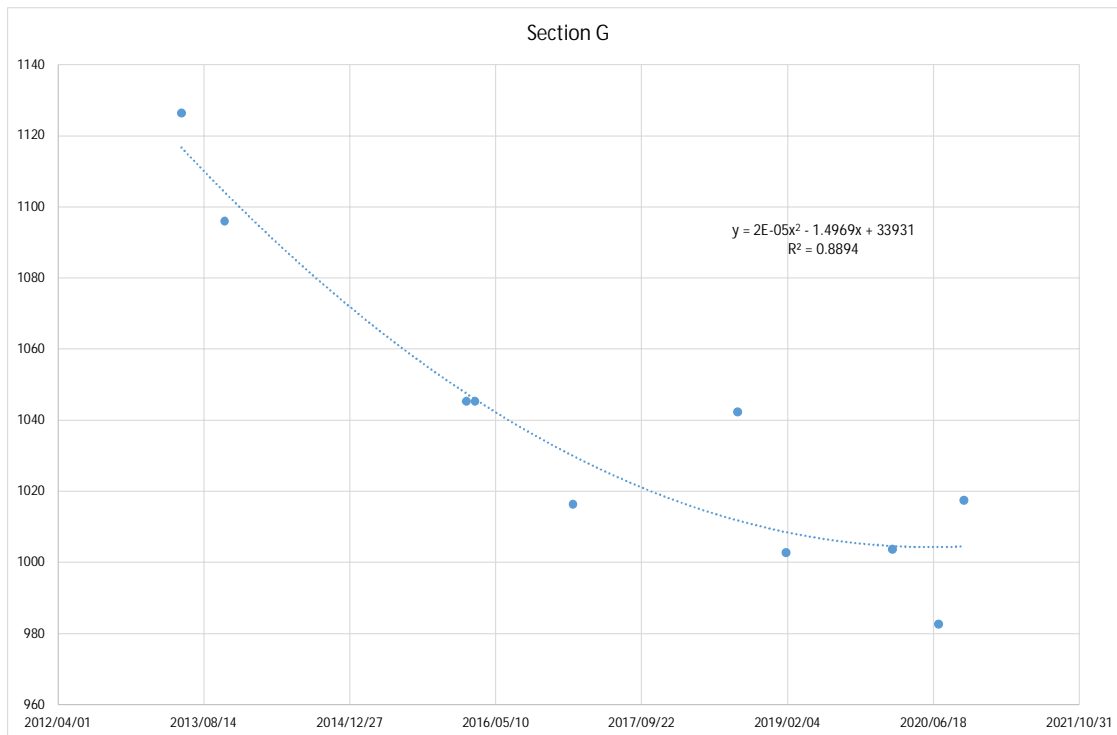
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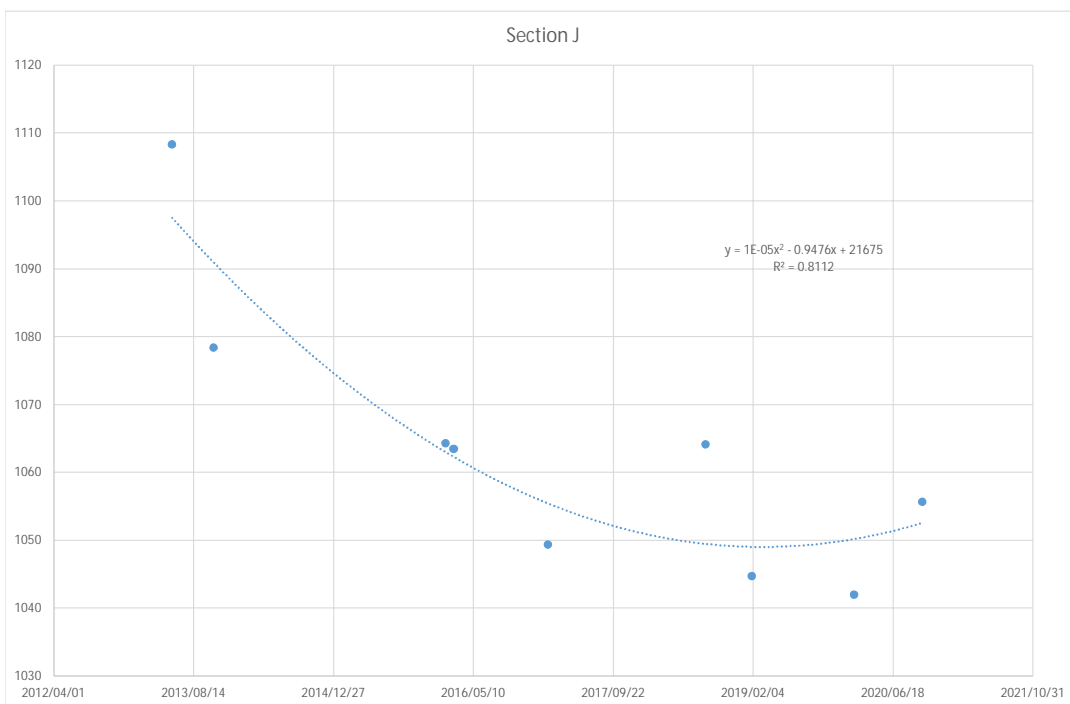
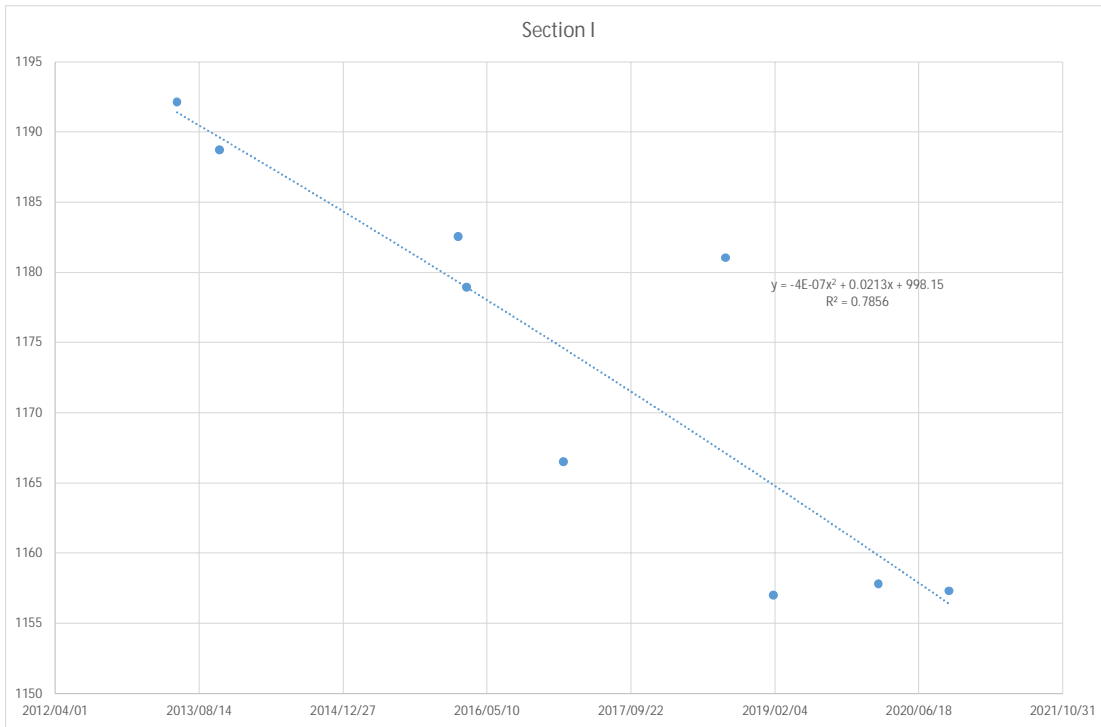
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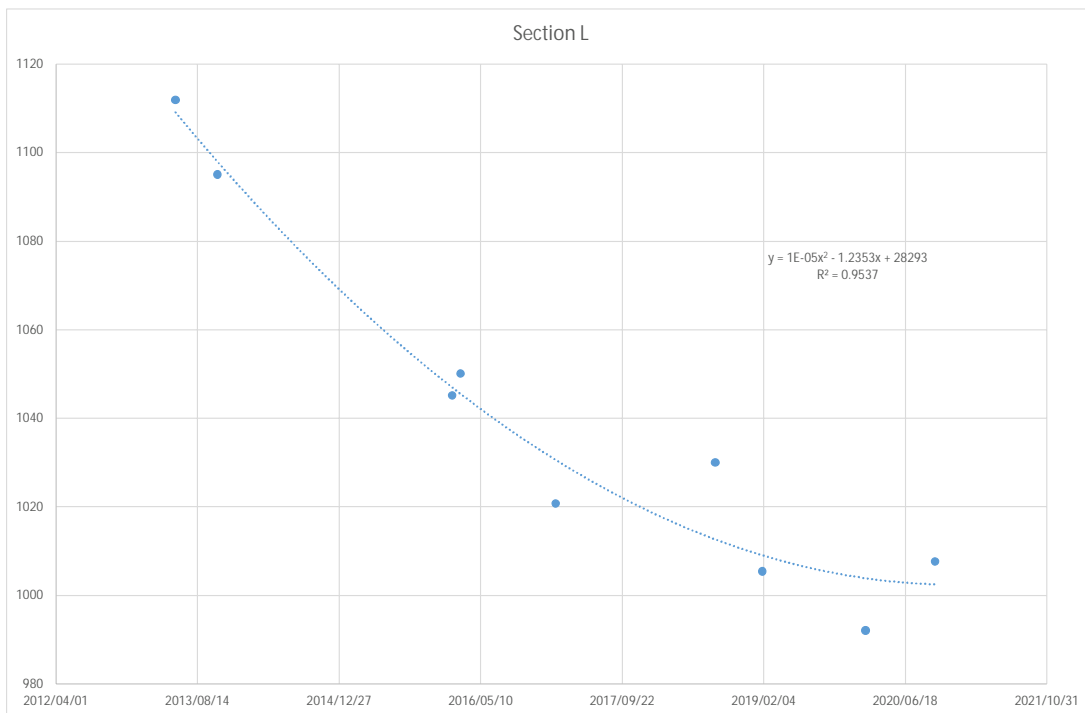
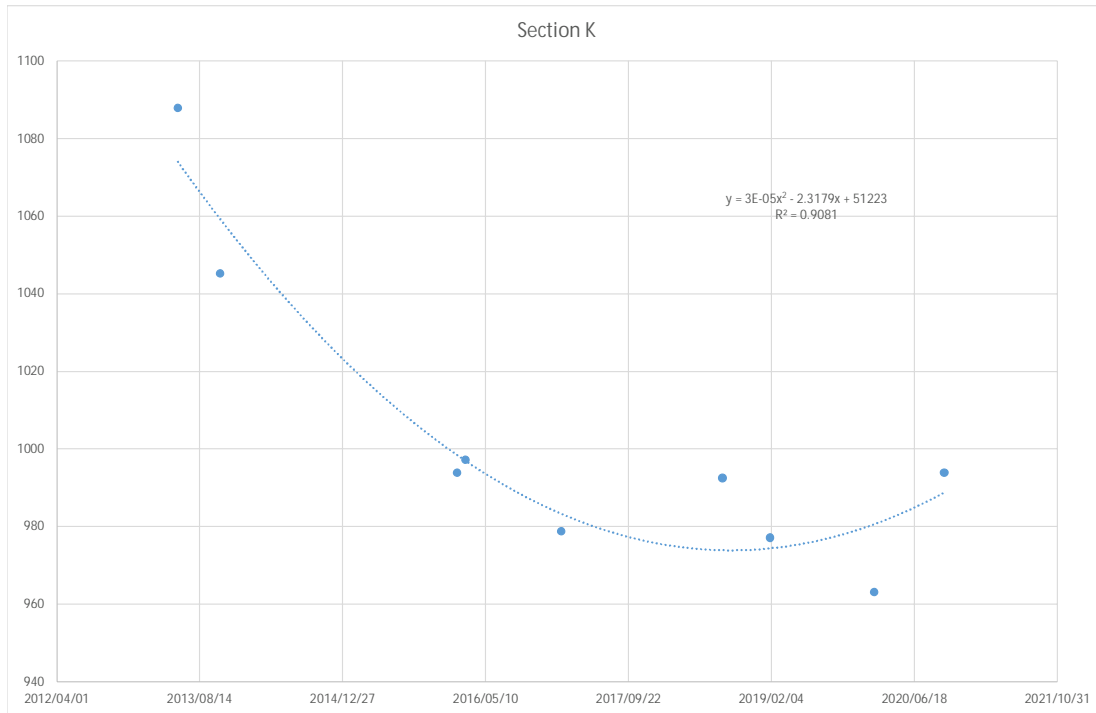
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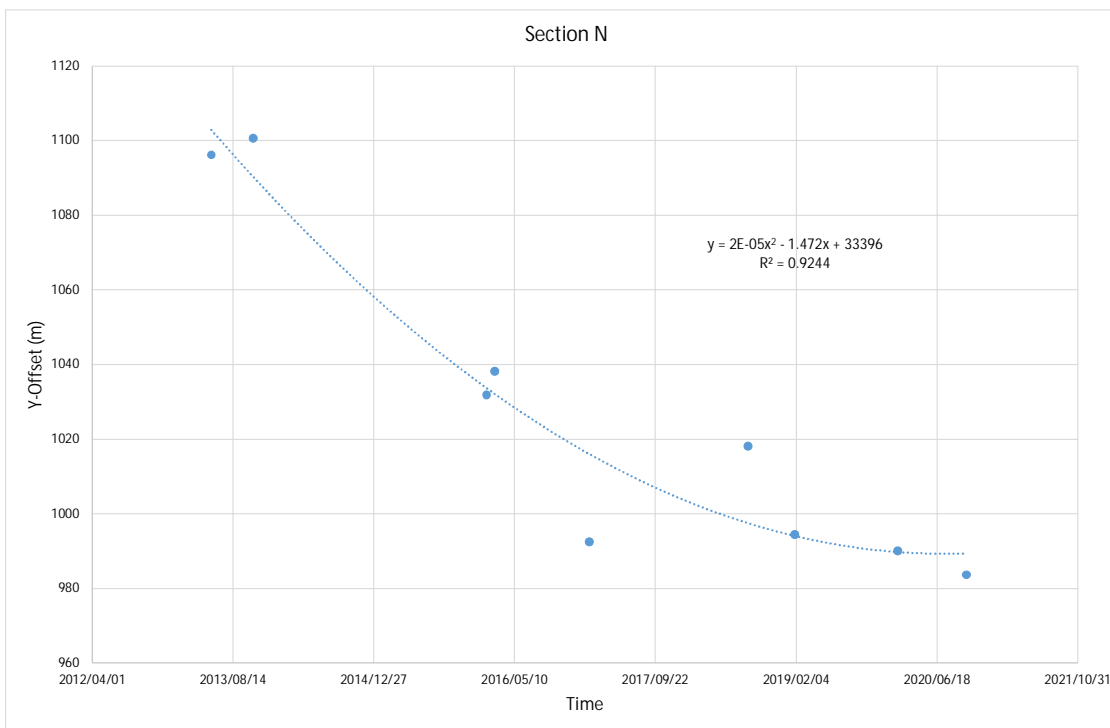
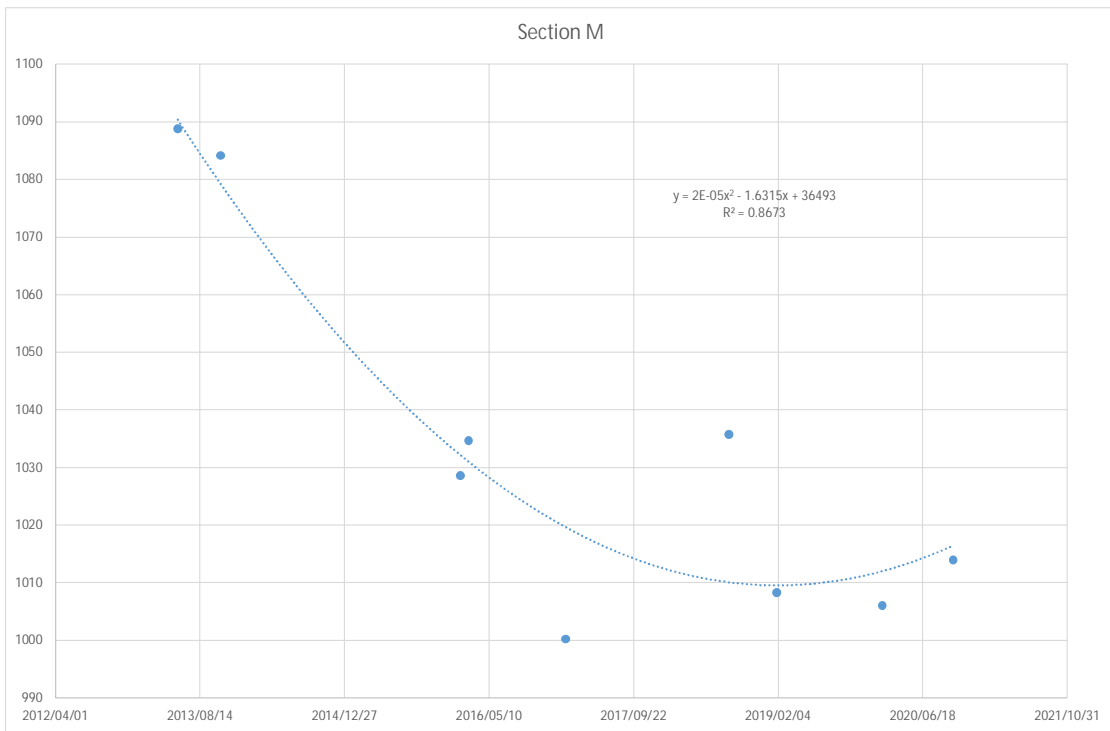
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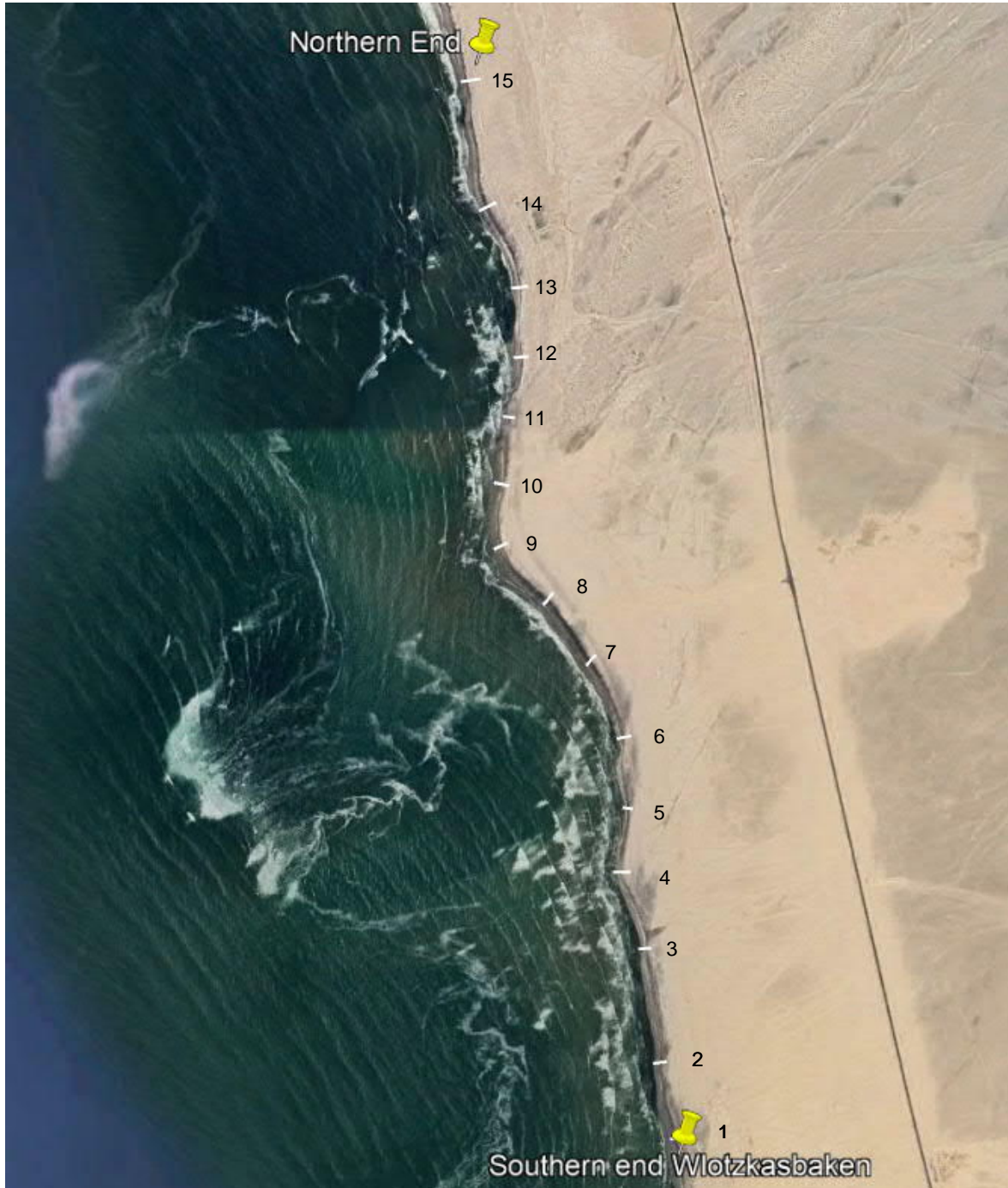
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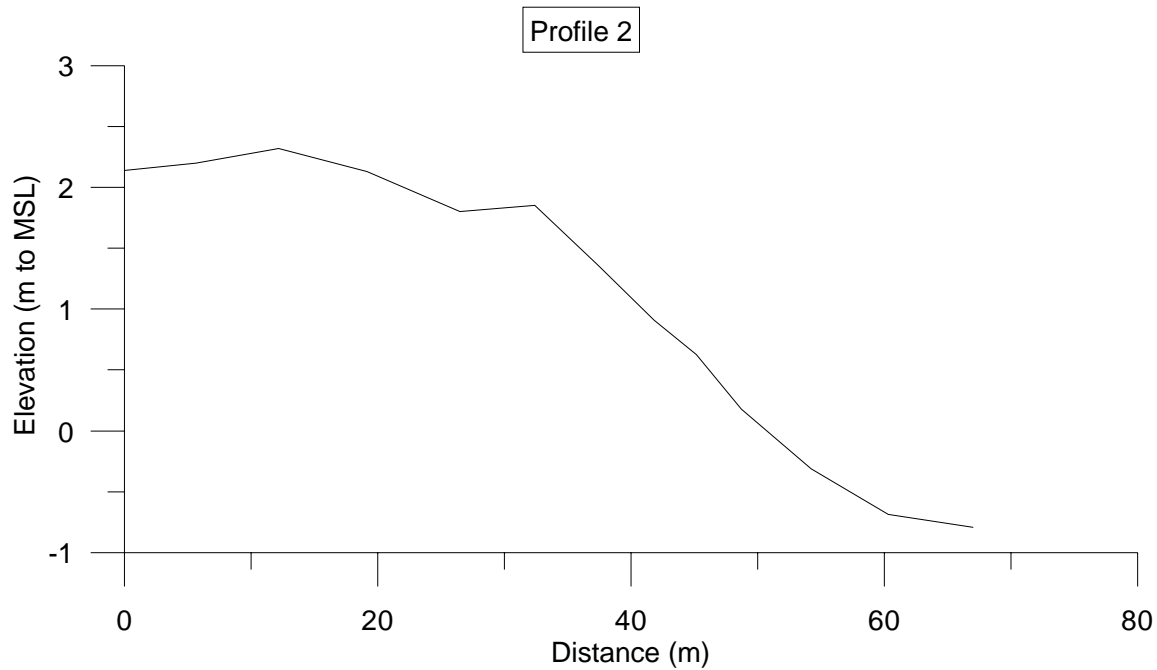
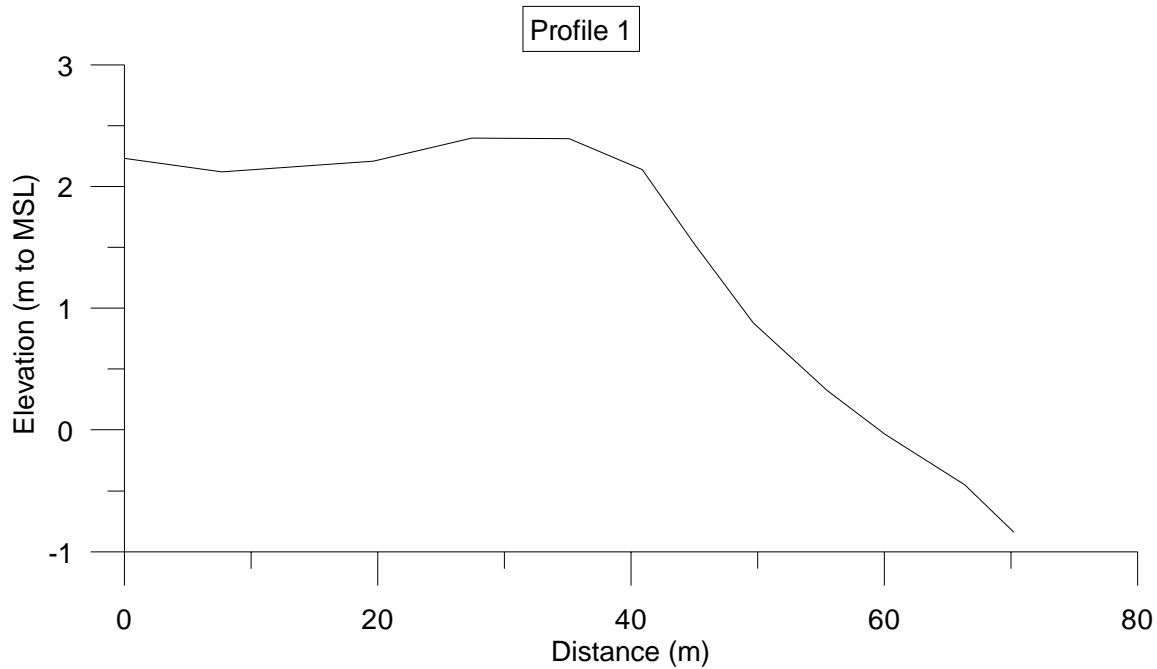


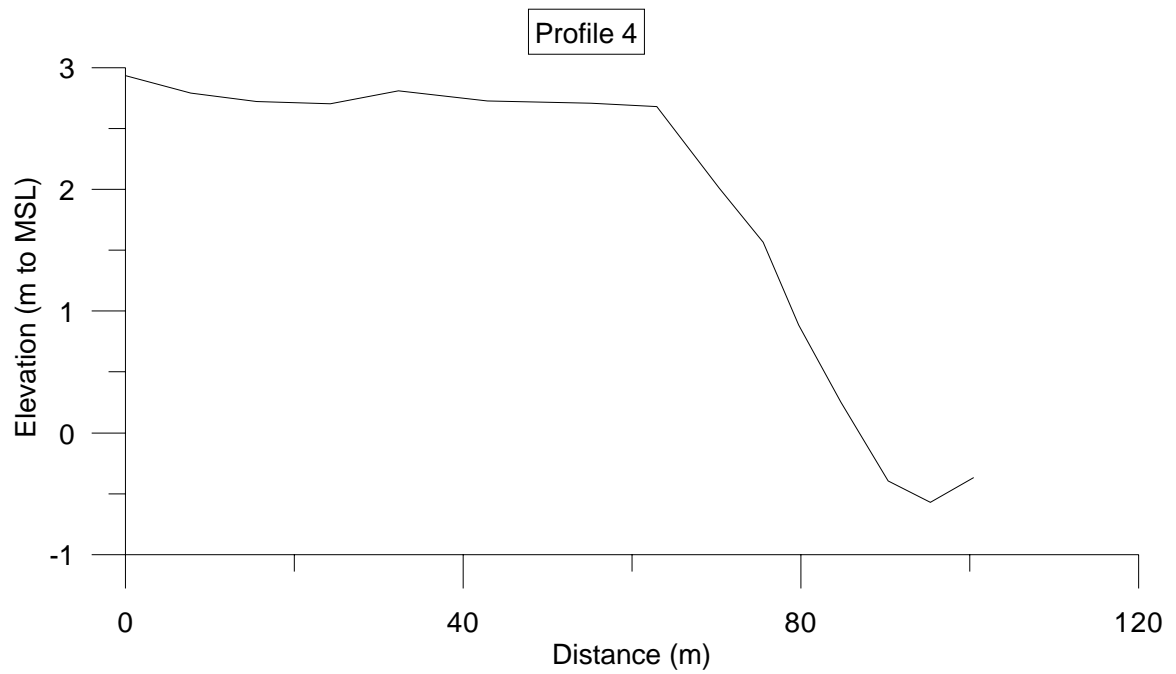
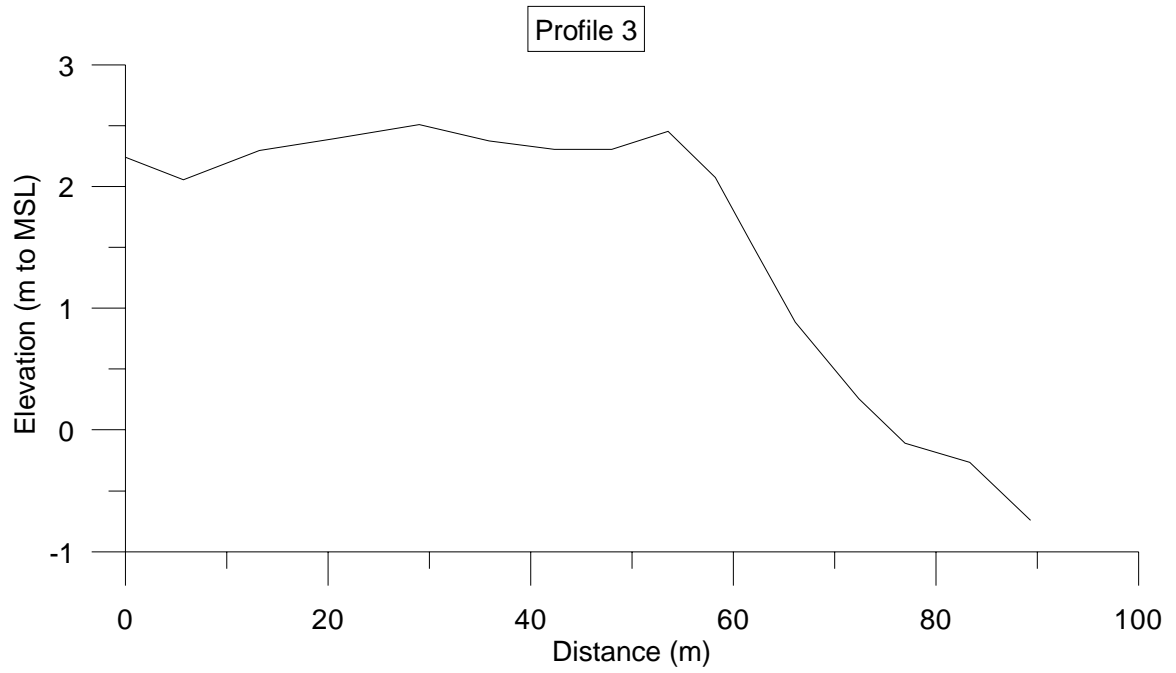
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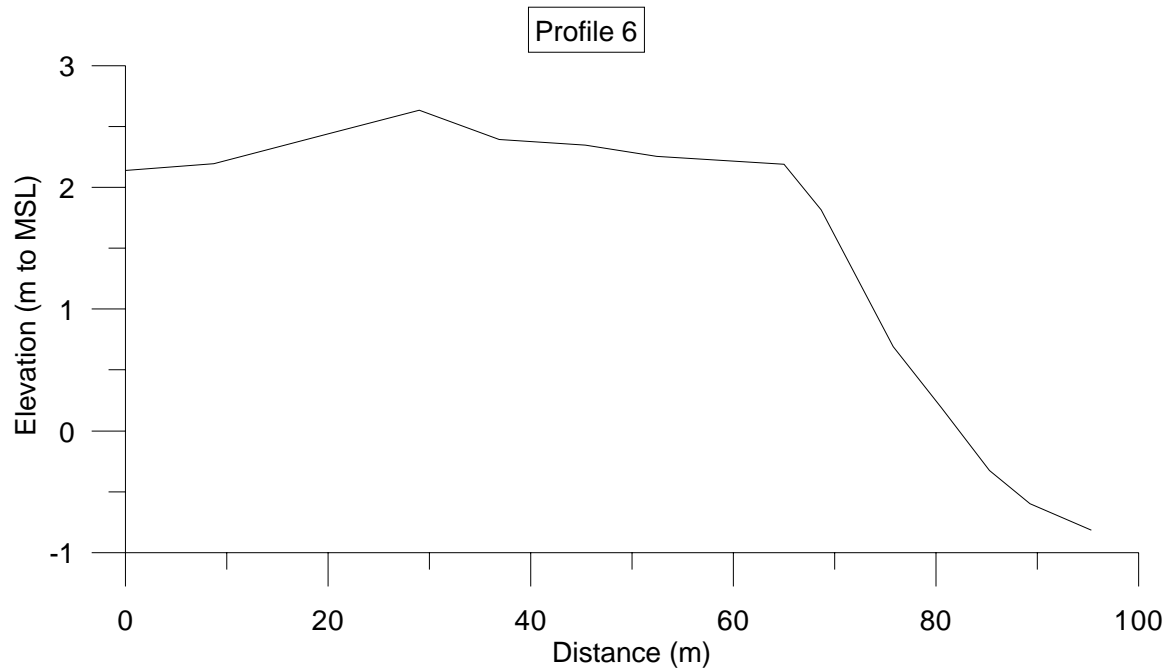
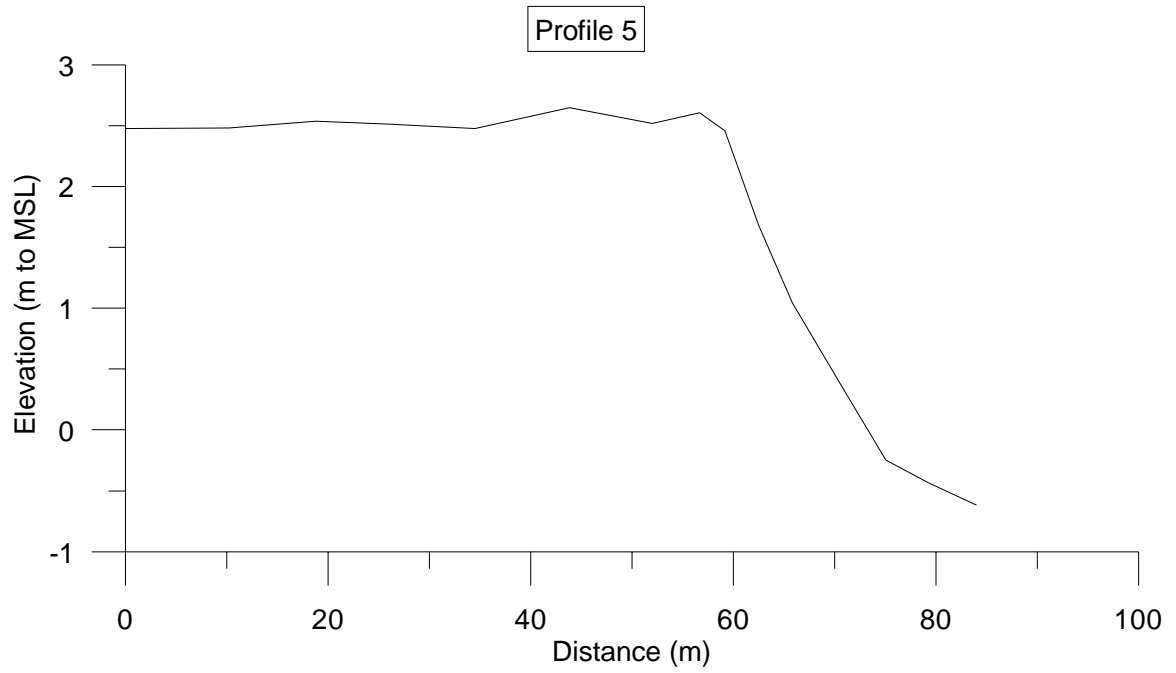
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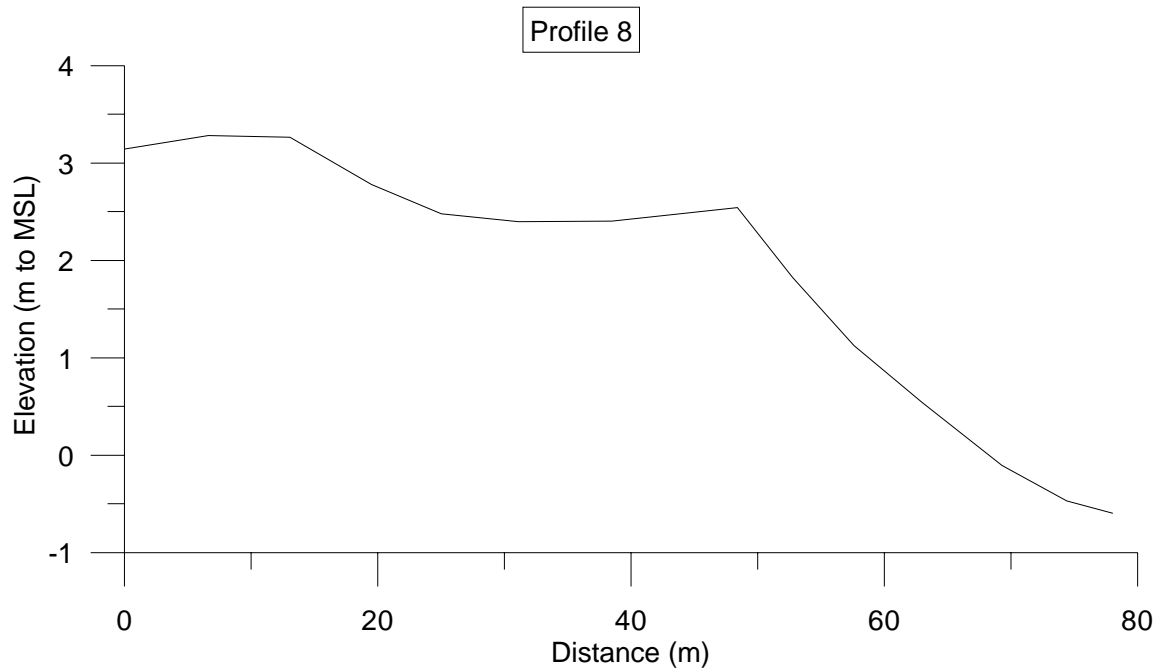
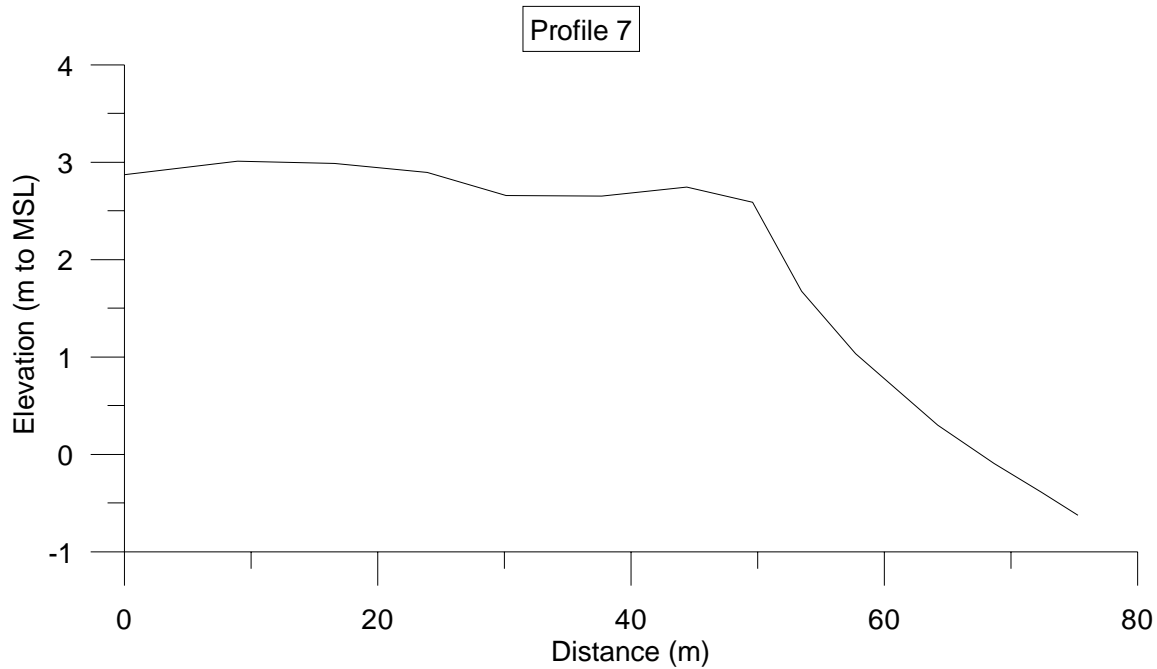
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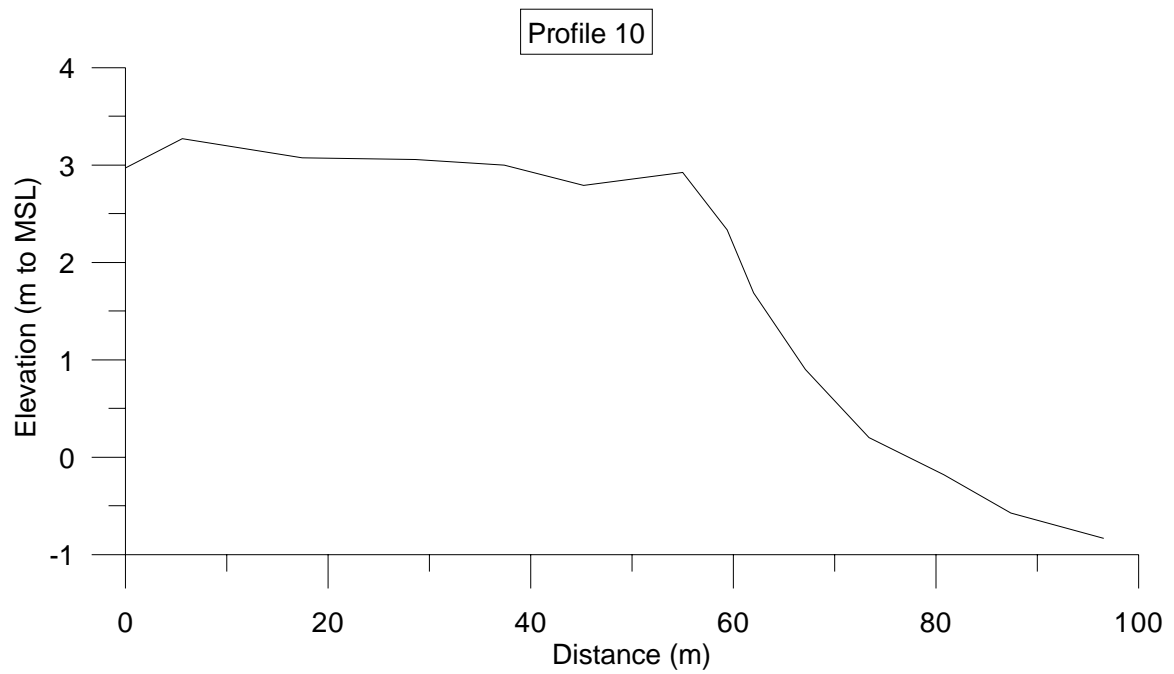
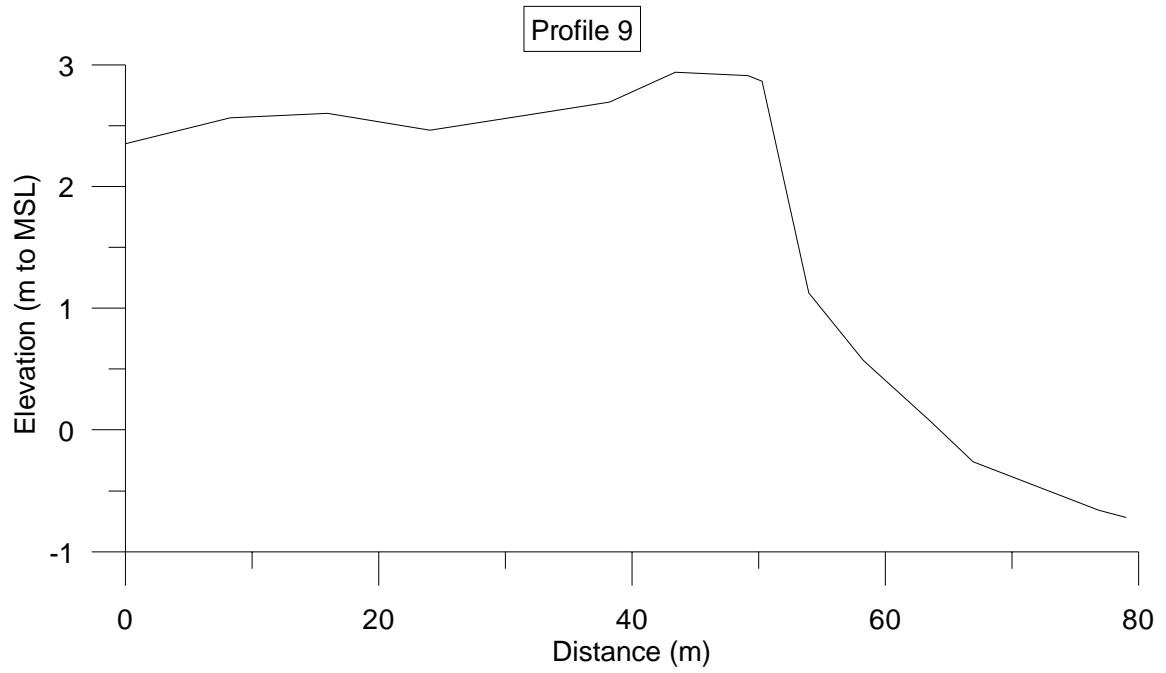


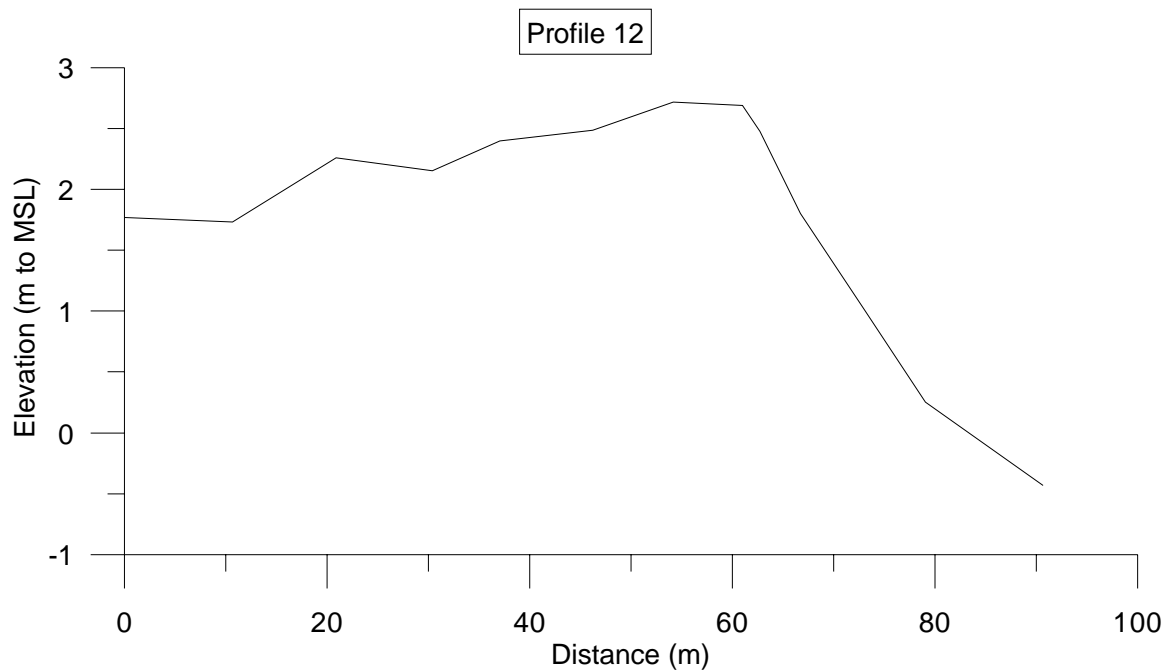
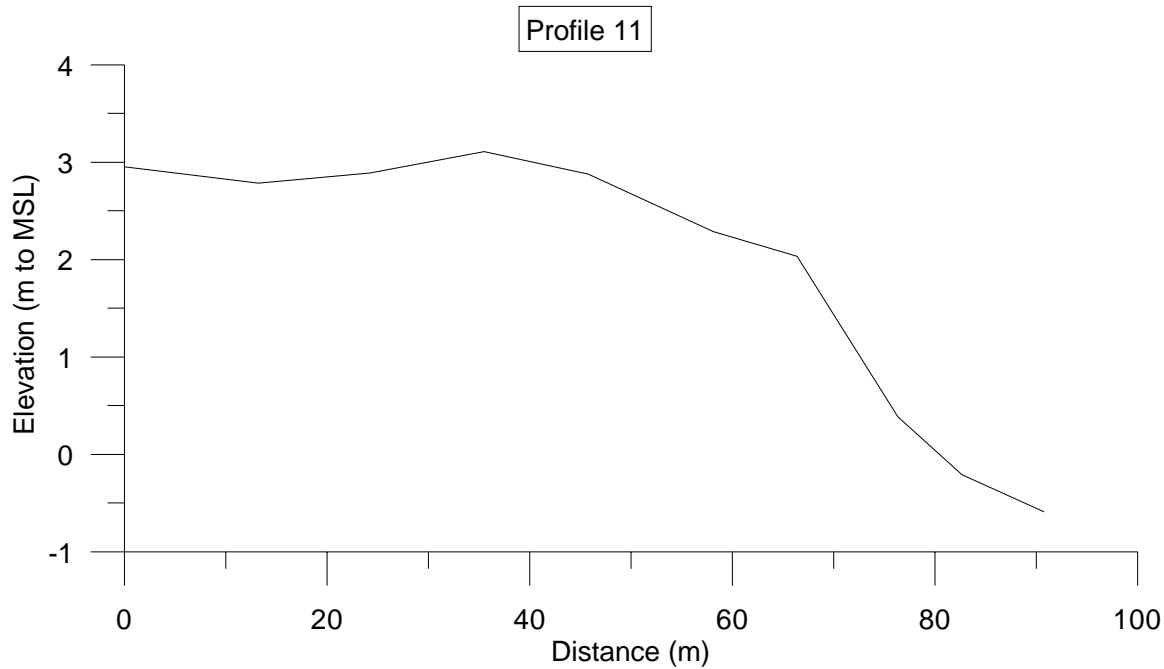


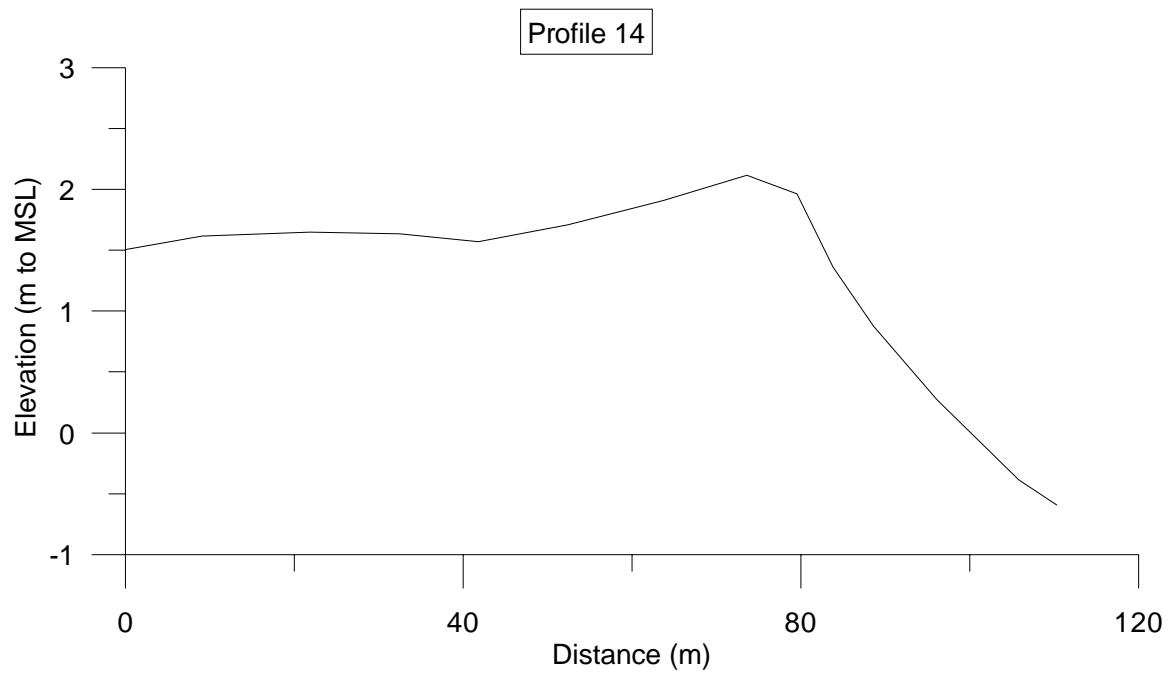
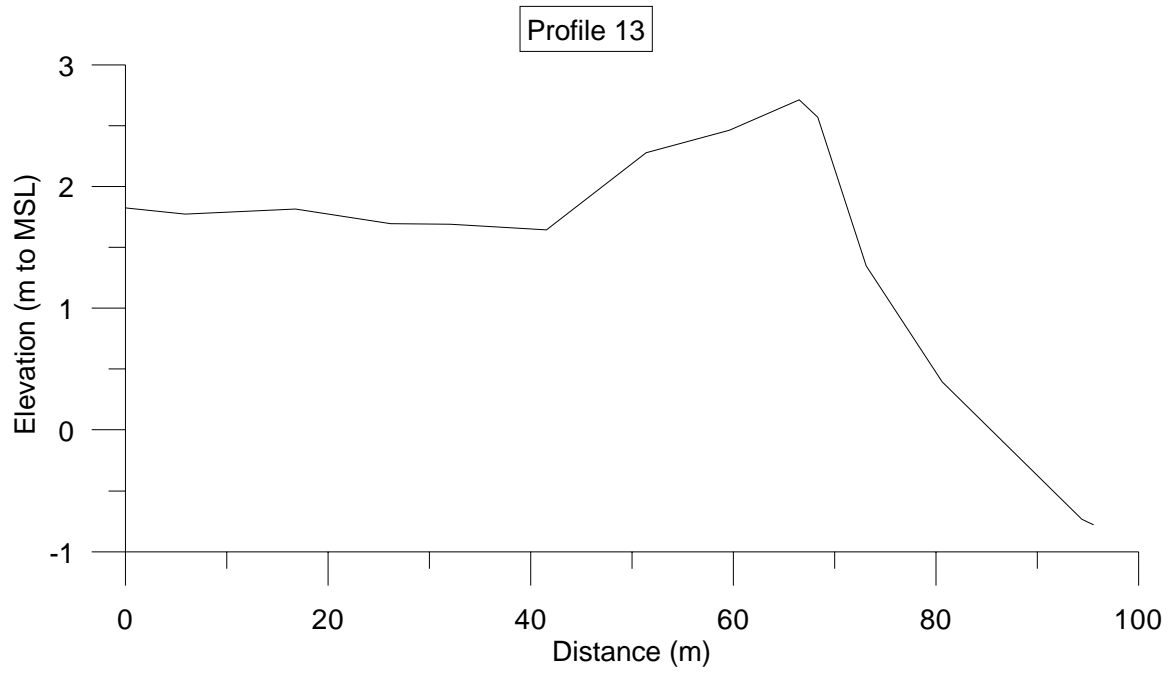


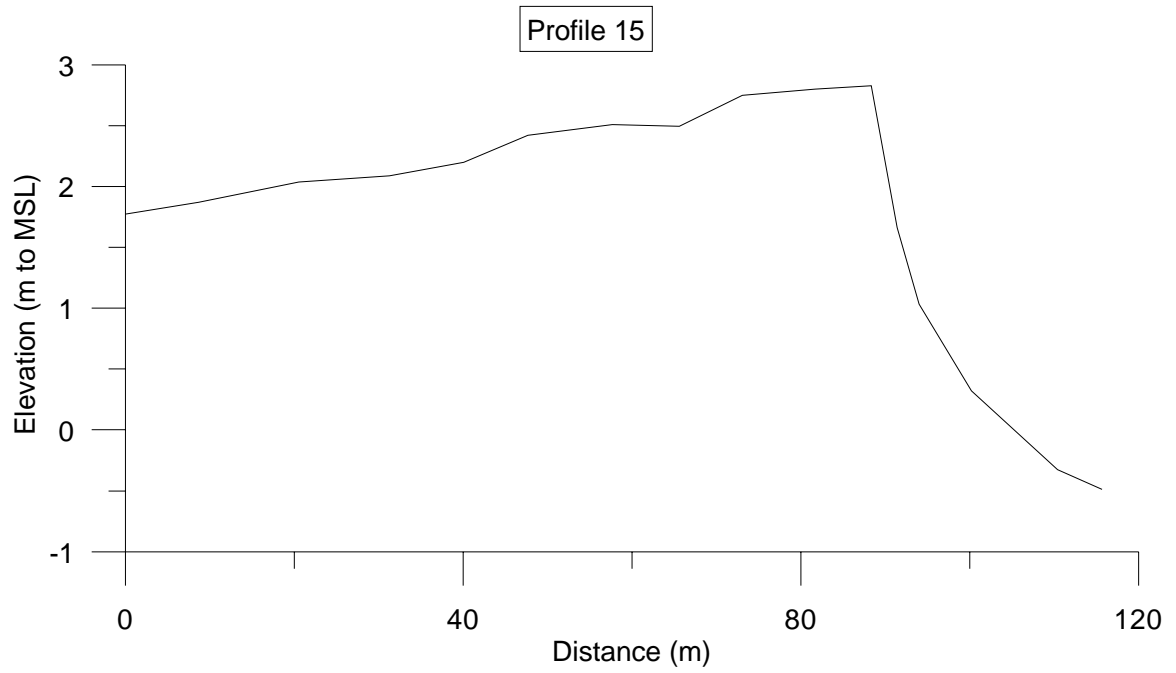












Appendix C Fauna Specialist Study

Terrestrial faunal study for the proposed Wlotzkasbaken Township Development

John Irish
10 May 2023



Image: Dolerite boulder ridge habitat adjacent to proposed development.

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Biodata
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Executive summary

The area of the proposed Wlotzkasbaken Township development was investigated to determine any potential issues related to the faunal biodiversity of the area.

The presence of four main habitats and at least 194 species that occur in the area was established. Habitats and species were evaluated for the expected impact the proposed development would have on them, taking into consideration aspects like overall habitat size, endemism, and both legal and conservation status of individual species. Issues of concern were identified. They clustered into three main concerns, and recommendations to address them were made:

1. The dolerite boulder ridge in the north of Extension 1 is a rare and unique habitat of very small extent that harbours at least one Endemic species that is found nowhere else on earth, and potentially many more. It is recommended that the commendable act of already nominally zoning the ridge within the development area as 'conservation' be pro-actively strengthened to actually benefit the habitat and the species:

- by extending the protection to the entire ridge and replacing it with some form of formal and official protective status
- by demarcating and delimiting the area to prevent inadvertent habitat destructive access
- by not planning or building any infrastructure in, on, or over the habitat in future
- by facilitating more detailed studies towards a management plan to ensure the continued future survival of the habitat and species.

The potential high tourism interest of the habitat and species and the consequent economic incentives to ensure its survival, were noted.

2. The coastal dune hummock belt is another habitat of very small extent that harbours many Endemics (at least 17 species just in the development area). Although zoned as 'public open space' there is a concern that increased human traffic from the residential development may negatively affect the habitat. Therefore it is recommended to:

- not plan or build any additional hard surface access roads to the beach beyond the one already existing
- exclude all-wheel drive vehicle access to the dune hummock belt and beach
- manage pedestrian access to the beach by the construction of wooden walkways across the hummock habitat.

3. The presence of brown hyaena in the area, and the planned residential area on the north side of the dolerite ridge that is located on an existing hyaena foraging route, has a high potential for human-wildlife conflict. By re-arranging the current land use plan the potential for conflict may be significantly reduced.

4. Although not a biodiversity matter *per se*, while considering one of our habitats, an ephemeral watercourse that traverses Extension 1, we noticed that no provision for flood water is reflected in the town planning. The developer may want to look at this.

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Introduction

The Erongo Regional Council wishes to develop extensions to the existing township of Wlotzkasbaken. Details are provided in the Background Information Document (GPT 2023). This report addresses the faunal biodiversity component of the requisite Environmental Impact Assessment in terms of the Environmental Management Act, Act No 7 of 2007. It considers the potential effect of removing a functional part of the Central Namib Desert that is embedded within a National Park and replacing it with an artificial urban area, on the constituent biodiversity and ecosystem functioning of that area and its immediate surroundings. It is exclusively concerned with terrestrial fauna and does not consider the adjacent marine environment below the high water mark.

Methodology

Location

The two proposed extensions are located about 2 km south of the current Wlotzkasbaken township, west of the Swakopmund – Hentiesbaai road, between the road and a predetermined coastal setback line. They are north-south contiguous and their combined total size is approximately 168 ha. (Figure 1).



Figure 1: Location and extent of proposed Wlotzkasbaken Extensions 1 and 2. Orange area denotes planned conservation zone. Black lines relate to possible options for recommended zoning changes aimed at reducing human-wildlife conflict (see text).

Data sources

Searches conducted on publicly accessible on-line resources, as well as privately accessible off-line sources, indicated that there are no significant biodiversity records available for the development area at all. However, the development area was previously included in an unpublished study (Irish 2013) that included an invertebrate survey of which multiple sampling sites were in close proximity (< 1 - 3 km) to the current development site, and in the same habitats. The latter study and its sources was therefore used as a baseline here, after first updating the taxonomy and conservation status of the different taxa to what is currently valid. The habitat map from that study was also partially updated by re-digitising coastal habitats to accommodate changes to the shoreline since 2013. Finally, everything was ground-truthed during a visit to the study area on 20 April 2023.

Results

Habitats

Four distinct habitats occur in the study area (Figure 2); they are discussed further below.



Figure 2: Habitats included in proposed Extensions 1 and 2, as follows: dolerite boulder ridge delineated in black, coastal dune hummocks in yellow, sandy washes in blue, gravel / lichen plains in remaining background. Note sharp difference in substrate colour east and west of main road, caused by substrate disruption to the west.

- Gravel / lichen plains
- Dolerite boulder ridge

- Coastal hummock belt
- Sandy washes

Gravel / Lichen plains (Figure 3)

The gravel plains cover the largest part of the proposed Development Area. The dominant plant species is *Arthroerua leubnitziae*. Elsewhere, the habitat is common in the Central Namib, within 30 - 40 km of the coast. It superficially resembles the gravel plains further (> 40 km) inland in the Central Namib, but is climatologically and faunistically distinct. Climatologically it is characterised by regular fog occurrences, practically no rainfall, and cooler temperatures than the eastern Namib. Many otherwise common interior Central Namib animals do not occur on the coast as a result of the climatological differences. Because of the steep east-west climatic gradient, east-west faunal turnover is abrupt and zones of overlap are insignificant.



Figure 3: Representative gravel / lichen plain habitat adjacent to study area (east of main road).

The lichen-plain habitat is extremely sensitive to habitat disruption. In the Development Area it has already been severely impacted by past land use. Aerial photos (Figure 2)

show a sharp demarcation between different sides of the Swakopmund – Hentiesbaai road, caused by vehicle traffic from recreational activities that have all but obliterated lichens from the west side of the road. On the east side they still survive, as evidenced by the darker substrate colour there. This indicates that the habitat, particularly the lichen component, is unlikely to be rehabilitatable once the substrate has been disrupted.

Dolerite boulder ridge (Figure 4)

Dolerite dyke swarms, trending northeast to southwest, are injected into the gravel plains habitat at irregular intervals throughout the Central Namib. Dolerite ridges present a different habitat compared to the surrounding plains. For most of the Namib, ridges are low with a narrow strip of relatively small (< 30 cm diameter) angular weathered dolerite blocks on the crest (Figure 5); the rocks provide shelter that is not available on the surrounding plains. Rarely, ridges consist of large (> 1 m diameter) rounded dolerite boulders (Figure 4) that additionally provide condensation surfaces for fog water and result in both the



Figure 4: Representative dolerite boulder ridge habitat, adjacent to proposed Extension 1, east of main road.

availability of water droplets for drinking, and run-off water to nurture gutter-plants that in turn provide food and shelter. For both low and boulder ridges their orientation with regard

to the daily passage of the sun ensures that slightly more shade is available on one or the other side of the ridge for part of the day. The physical ridges also trap windblown sand along their sides in places, creating sandy patches that provide habitat for sand-living taxa, that are less common on the surrounding plains.

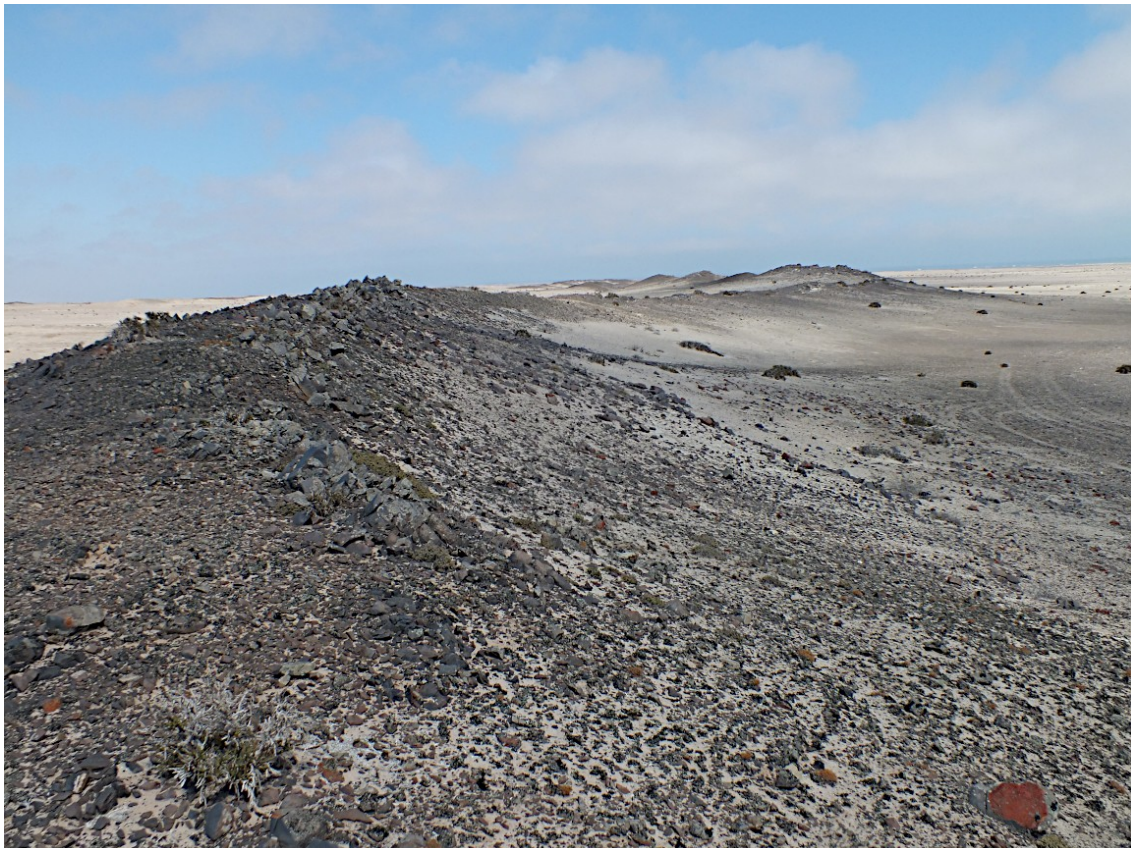


Figure 5: For comparison, dolerite ridge habitat as represented in the rest of the Central Namib. Photo taken about 4 km due east of Wlotzkasbaken along pipeline track.

In general, dolerite ridges provide more mesic habitat than the plains, and function as resource reservoirs. Biogeographically they harbour a mix of Central Namib Endemics, and marginal fauna from further inland that is benefiting from the slightly less harsh conditions.

The particular dolerite ridge to the south of Wlotzkasbaken, of which part is included in Extension 1, is one of only two dolerite boulder ridges in the entire Central Namib. The other is located about 7 km northeast. (Figure 6). They have a combined surface area of only 2.8 km², therefore represent an extremely range-restricted habitat and are extremely sensitive habitats. Because the physical habitat was created by geological processes over millennia, the dolerite ridge habitat is impossible to rehabilitate once disrupted.

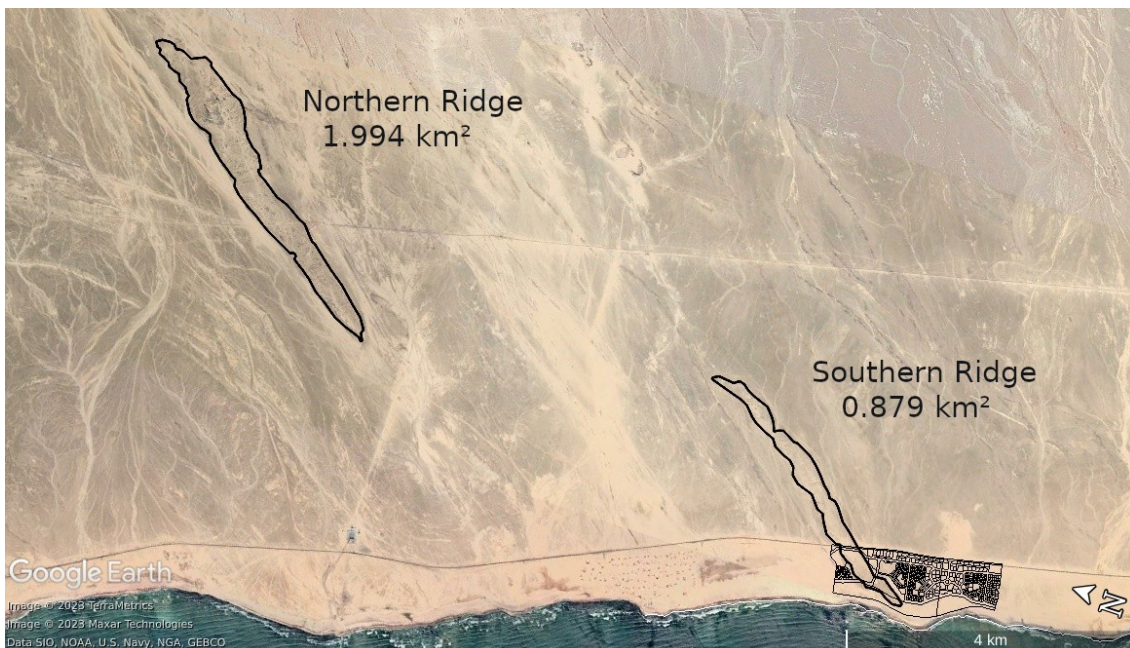


Figure 6: Total known extent of dolerite boulder habitat in Central Namib.

The southern ridge is the only known habitat of a boulder-associated Endemic reptile species (Appendix 1). Bioclimatic envelopes (see * below) were calculated for both ridges. The non-overlap of the two envelopes (Figure 7) suggest that environmental conditions at the northern ridge, which is located further inland in a steep climatic gradient, is sufficiently different from the southern ridge that it might not be suitable habitat for the reptile despite the presence of physically similar boulders.

[* A Bioclimatic Envelope is a particular kind of niche model. As used here it calculates an area with similar bioclimatic parameters to a provided core study area, and can be used to predict the occurrence of biodiversity similar to that in the core area. We used the envelope score algorithm, calculated with the open-source software openModeller (OpenModeller 2013) version 1.3.0, running under Fedora Linux 36. The resultant Bioclimatic Envelopes were clipped at conventional 75% similarity levels. The model was seeded with the BioClim environmental dataset, which is a subset the more comprehensive WorldClim dataset (WorldClim 2013), but includes only those climatic parameters that are important for living organisms. WorldClim, and hence BioClim, is a 30 x 30 arc-second resolution dataset that was derived by extrapolation from available point source weather station data (Hijmans *et al.* 2005).]

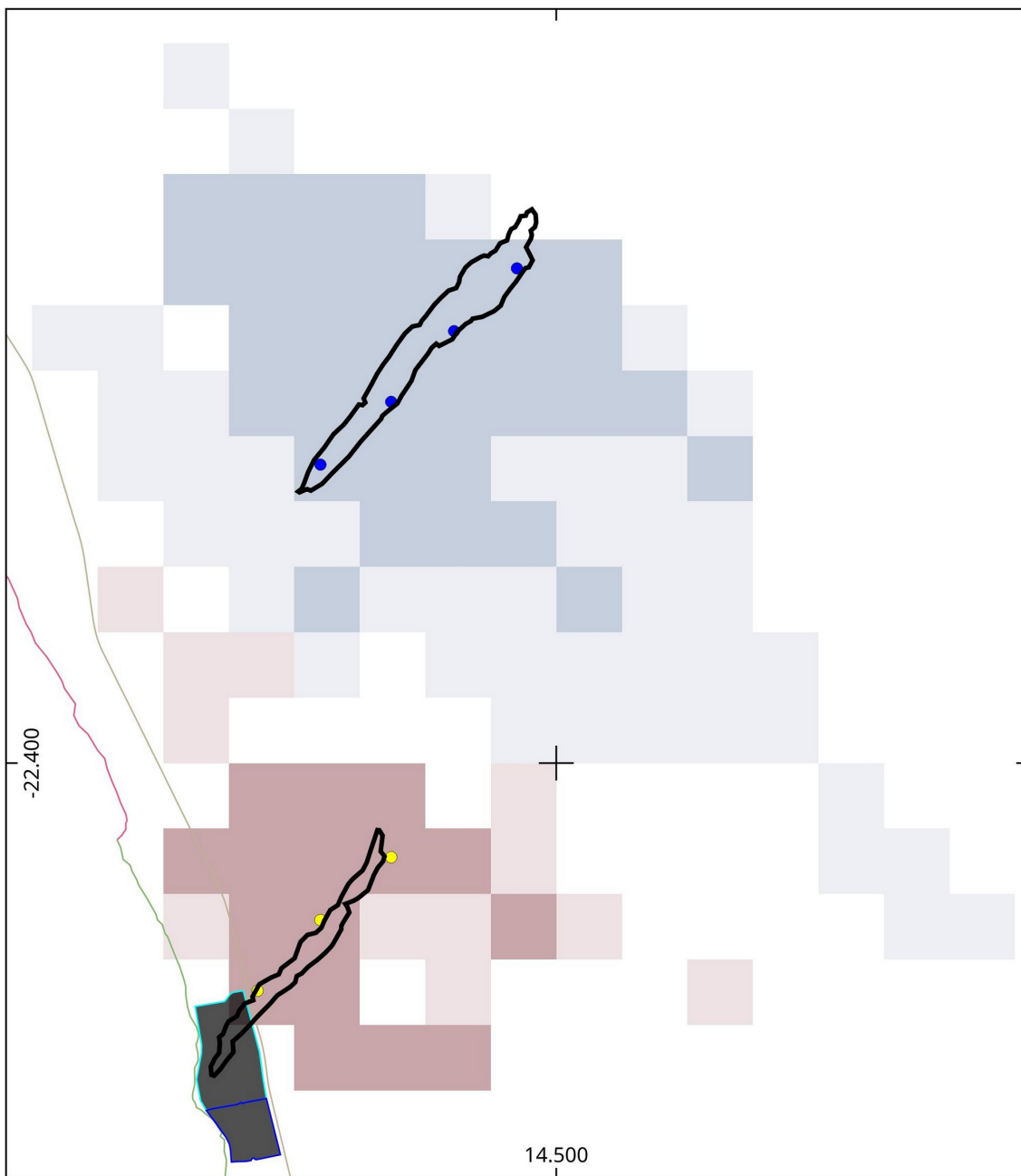


Figure 7: Calculated bioclimatic envelopes for the two boulder ridges in Figure 6. Darker grid in each case represents > 75% bioclimatic similarity, lighter grid = 50-75% similarity. Coloured dots are BioClim data points used for calculation.

Coastal hummock belt (Figure 8)

A narrow belt of coastal dune hummocks is located above the high water mark, parallel to the coast; the dominant vegetation is *Zygophyllum clavatum*. The hummock belt has a very distinctive fauna that exploits the favourable combination of vegetation, sand, regular fog and cooler temperatures that is found there. Beach-specific fauna is found in the belt of washed up kelp and other debris above the high-water mark. This is a rich source of food and shelter, and is located adjacent to and after spring tides also among the coastal hummocks.



Figure 8: Representative coastal dune hummock habitat, coast alongside Extension 1.

These littoral habitats harbour many Endemic taxa, all of which have very limited distributions. Although their habitat may extend for many kilometers along the coastline, it is very narrow and this results in most littoral Endemics having very small overall distribution ranges, making them and the habitat as a whole, very sensitive and very vulnerable. In the entire Namibia, the extent of this habitat is estimated at only about 15 km² (= 1500 km x 10 m average). This sensitivity is exacerbated by the fact that the habitat in the Central Namib is already heavily impacted by urban development and recreational use. Every time that a portion of the habitat is removed by a beach front development or a new access road to the beach, the populations of Endemic hummock invertebrates are

further fragmented and their ranges are reduced, interrupting gene flow and diminishing their ability to adapt and survive into the future.

On the other hand, the physical habitat is also quite robust. Shoreline changes have resulted in some places where this habitat was mapped ten years ago (Irish 2013) to now be in the ocean, but the habitat still exists along the current shoreline, indicating that it can re-establish relatively quickly following disruption.

Sandy washes (Figure 9)

Watercourses are also injected into the plains habitat. They carry more vegetation than the surrounding plains, sometimes representing the only higher vegetation in a particular area. Vegetation provides food and shelter for animals, and tends to concentrate animal occurrence. Washes also provide dispersal corridors, and many taxa from the interior range downstream along watercourses into areas where they would not otherwise be able to survive. This is especially prominent along major riverbeds, but is also evident on small scale in the minor watercourses such as are found in the Study Area.



Figure 9: Representative sandy wash habitat, adjacent to Extension 2.

In general, dry watercourses are relatively robust habitats, taking catastrophic natural events like flash floods in their stride and rapidly self-healing afterwards. The study area is traversed by only one significant watercourse, in the north. Even though this is a low rainfall desert area, experience has shown that even in the desert infrequent rain may cause flooding and damage. The Swakopmund – Hentiesbaai road adjacent to the study area accommodates this by having culverts at each watercourse crossing, but the currently available town plan does not seem to make similar provision for this watercourse.

Habitat comparison

A comparison of the different habitats (Table 1) shows both similarities and differences. All have relatively high levels of endemism (23 % – 31%), but the dolerite ridges and coastal hummocks have particularly high levels of habitat-specific Endemics (48% and 83% respectively). This means that not only do these habitats include many Endemic species, but also that those species only occur in those habitats, making them particularly vulnerable. Add to this the fact that in both cases the habitats are range-restricted, it follows that particular attention should be directed at the dolerite ridge and coastal hummock habitats to ensure minimal disruption during and following development.

Table 1: Taxon statistics for the respective habitats in the Study Area, based on data in Irish (2013). High levels of habitat-specificity marked in bold.

	Habitat							
	Plains		Ridges		Washes		Hummocks	
Number of taxa	105		77		111		77	
No. of habitat-specific taxa	21	20%	17	22%	17	15%	38	49%
No. of endemic taxa	33	31%	21	27%	25	23%	24	31%
No. of habitat-specific endemics	13	39%	10	48%	3	12%	20	83%
Shannon Index	1.4129		1.2931		1.5034		1.2238	
Evenness Index	0.7266		0.6814		0.7322		0.6678	
Dominance Index	0.0658		0.0967		0.0611		0.1305	

Taxa

A full listing of all animal taxa known or expected to occur in the study area and immediate surrounding can be found in Appendix 2, with a summary in Table 2 below. All species that are Endemic, that have Threatened IUCN status or Namibian legal status, are considered to be potential species of concern and are discussed in more detail below. 'Threatened' is defined as any IUCN category other than 'Least Concern'.

Table 2: Summary of taxa known or expected to occur in the Study Area and surroundings, showing number of species, number of Endemic species, number of species with Threatened IUCN status, number of species with Namibian legal status, and resultant number of species of concern.

Taxon	Species	Endemic	IUCN	Legal	Concern
Mammals	14	6	1	1	8
Birds	12	2	0	11	11
Reptiles	14	11	1	1	12
Invertebrates	154+	48	29	0	48
Total:	194+	67	31	13	79

Mammals

There are eight mammal species of potential concern, in three groups:

Six species are Endemic, but are not Threatened or Protected, and have wide distributions outside the study area. They will not be significantly impacted by the development and need not be considered further.

- *Cistugo seabrai*, Namibian Wing-gland Bat
- *Laephotis namibensis*, Namib Long-eared Bat
- *Petromyscus collinus*, Namibian Pygmy Rock Mouse
- *Gerbillurus setzeri*, Namib Brush-tailed Gerbil
- *Parotomys littledalei*, Solitary Whistling Rat
- *Macroscelides flavicaudatus*, Namib Round-eared Elephant Shrew

One species is neither Endemic nor Threatened, but has legal status. Since that status is 'Huntable Game' it is not relevant to the current study.

- *Antidorcas marsupialis*, Springbok

One species is neither Endemic nor Protected, but has both a conservation status of Near-Threatened and potential for human-wildlife conflict, and it will need to be considered further.

- *Hyaena brunnea*, Brown hyaena. There are no brown hyaenas resident in the area to be developed, but they do have burrows further inland, mainly among boulders on the dolerite boulder ridge. Tracks indicate that they travel towards the beach nightly to scavenge, and tend to do so along the northern side of the dolerite ridge – possibly an energy-saving behaviour considering that this keeps them in the wind shadow of the ridge protected from the generally cold and wet southerly winds for most of the way. The rocky beaches where the ridge meets the ocean alongside Extension 1 is a preferred foraging area. The new development has the **potential for increased human-wildlife conflict** by disrupting brown hyaena movement corridors and/or turning them into roadkill.

Birds

There are 11 birds of potential concern, in two groups.

Nine species are not Endemic, nor Threatened, but are legally Protected. All are widespread outside the study area. They will not be significantly affected by the development and need not be considered further

- *Calandrella cinerea*, Red-capped Lark
- *Motacilla capensis*, Cape Wagtail
- *Cercomela familiaris*, Familiar Chat
- *Cercomela trastrac*, Trastrac Chat
- *Oenanthe monticola*, Mountain Chat
- *Cinnyris fuscus*, Dusky Sunbird
- *Onychognathus nabouroup*, Pale-winged Starling
- *Bubo africanus*, Spotted Eagle Owl
- *Struthio camelus*, Ostrich

Two species are both Endemic and Protected, but not Threatened. Both are widespread outside the study area. They will not be significantly affected by the development and need not be considered further

- *Eupodotis rueppellii*, Rüppell's Korhaan
- *Ammomanopsis grayi*, Gray's Lark

Reptiles

There are 12 reptiles of potential concern, in three groups.

Ten species are Endemic, but neither Threatened nor Protected. All are widespread outside the study area. They will not be significantly affected by the development and need not be considered further.

- *Dipsina multimaculata*, Dwarf Beaked Snake
- *Psammophis namibensis*, Namib Sand Snake
- *Colopus kochii*, Koch's Thick-toed Gecko
- *Pachydactylus rangei*, Palmatogecko
- *Pachydactylus scherzi*, Scherz's Thick-toed Gecko
- *Ptenopus carpi*, Carp's Barking Gecko
- *Rhoptropus afer*, Common Namib Day Gecko
- *Rhoptropus bradfieldi*, Bradfield's Namib Day Gecko
- *Meroles reticulatus*, Reticulated Desert Lizard
- *Typhlacontias brevipes*, FitzSimons' Burrowing Skink

One species is neither Endemic nor Threatened, but it does have legal status. It is

widespread outside the study area, will not be significantly affected by the development and need not be considered further.

- *Chamaeleo namaquensis*, Namaqua Chameleon

One species is a highly range-restricted Endemic with a conservation status of Near-Threatened, but no legal status yet, that will need to be considered further.

- *Pachydactylus maraisi*, no common name. The species is reliably known only from the dolerite ridge south of Wlotzkasbaken, where it is closely associated with dolerite boulders (Figure 4). The species has never been found anywhere else, including not on the only other boulder ridge in the Central Namib, discussed above (Figure 6). It appears to be restricted to the Wlotzkasbaken southern dolerite ridge. The proposed development covers 21 % of the southern boulder ridge habitat and it will severely impact the known range of the species: regardless of whether the ridge is zoned for 'conservation' or not. Its proximity to construction noise and vibrations initially, the incessant disturbance associated with human habitation eventually, roadkills and perpetual predation by domestic cats, will all have a negative effect on the population. The IUCN evaluation of the species is reconsidered in Appendix 1, with the conclusion that a re-assessment taking into account the facts presented there will likely result in an evaluation of Critically Endangered. However, irrespective of the pedantics of exactly which IUCN assessment it has or does not have, the species remains **a range-restricted wholly Namibian Endemic of very high conservation concern that will be severely impacted by the proposed development.**

Invertebrates

There are 48 invertebrates of potential concern. Note that most invertebrate taxa are known from the area at family level only, so the true number of species present, and therefore species of concern, may be higher, albeit not knowable at present.

Nineteen species are Endemic, but widespread outside the study area, and not Threatened. They will not be significantly affected by the development and need not be considered further.

- *Parabuthus namibensis*, scorpion
- *Parabuthus stridulus*, scorpion
- *Solpugista bicolor*, solifuge
- *Hyomora porcella*, weevil
- *Damarus singularis*, spider beetle
- *Calosis amabilis*, toktokkie beetle
- *Epiphysa arenicola*, toktokkie beetle
- *Eustolopus octoseriatus*, toktokkie beetle
- *Gonopus angusticostis*, toktokkie beetle
- *Metriopus depressus*, toktokkie beetle
- *Pachynotelus machadoi*, toktokkie beetle

- *Physadesmia globosa*, toktokkie beetle
- *Ocymyrmex zekhem*, ant
- *Tetramorium rufescens*, ant
- *Quartinia tuberculiventroides*, pollen wasp
- *Miscophus sabulosus*, digger wasp
- *Lithidium desertorum*, grasshopper
- *Ctenolepisma penrithae*, fishmoth
- *Thermobia nebulosa*, fishmoth

Twelve species are both Endemic and Threatened, to various extents. All have relatively small distribution ranges in the Central Namib only. All of them live mainly on the gravel plains. Given that the gravel plains habitat in the development area (west of the road) has been extensively disrupted already, and probably irreparably so, the current development *per se* is not expected to exacerbate the Threatened status of these species more than it already is. They need not be considered further here.

- *Opisthophthalmus penrithorum*, scorpion, Vulnerable
- *Opetiopalpus fritzi*, chequered beetle, Vulnerable
- *Damarus magnus*, spider beetle, Endangered
- *Cauricara eburnea*, toktokkie beetle, Endangered
- *Occidentophosis damarina*, toktokkie beetle, Vulnerable
- *Monomorium mantazenum*, ant, Endangered
- *Quartinia pulawskii*, pollen wasp, Critically Endangered
- *Quartinia tuberculiventris*, pollen wasp, Vulnerable
- *Miscophus deserticolus*, digger wasp, Endangered
- *Namiscophus pilosus*, digger wasp, Endangered
- *Ctenolepisma namibensis*, fishmoth, Vulnerable
- *Ctenolepisma occidentalis*, fishmoth, Endangered

Seventeen species are both Endemic and Threatened. All are endemic to the coastal dune hummock habitat, and have Threatened status for the same reasons that their habitat is highly vulnerable and sensitive: namely **very small distribution ranges**. They will need to be considered further here, along with their habitat.

- *Cerome inerme*, solifuge, Critically Endangered
- *Trichotoma brunnea*, solifuge, Critically Endangered
- *Eurymorpha cyanipes*, tiger beetle, Critically Endangered
- *Lophyra damara*, tiger beetle, Critically Endangered
- *Brinckia debilis*, toktokkie beetle, Endangered
- *Carchares macer*, toktokkie beetle, Endangered

- *Cauricara brunripes*, toktokkie beetle, Endangered
- *Onychosis gracilipes*, toktokkie beetle, Endangered
- *Onymacris marginipennis*, toktokkie beetle, Critically Endangered
- *Pachyphaleria capensis*, toktokkie beetle, Critically Endangered
- *Neolophonotus albus*, assassin fly, Vulnerable
- *Asmeringa namibia*, shore fly, Critically Endangered
- *Neotherevella arenaria*, stiletto fly, Critically Endangered
- *Quartinia femorata*, pollen wasp, Critically Endangered
- *Arctiocossus danieli*, moth, Data Deficient
- *Arctiocossus gaerdesi*, moth, Data Deficient
- *Ctenolepisma arenicola*, fishmoth, Critically Endangered

Conclusions and recommendations

Several issues at both habitat and taxon level were identified above as requiring more attention. Some are interrelated and they may be combined into three main issues as follows:

Sensitive dolerite boulder habitat and endemic, range-restricted reptile of conservation concern

Given what we know of the extremely small size of the dolerite boulder habitat (< 1 km² for the southern ridge, 2.8 km² for both ridges combined), and the fact that at least one reptile species, *Pachydactylus maraisi*, only occurs there and nowhere else in the world, any destructive development on the Wlotzkasbaken dolerite boulder ridge would be *a priori* illegal under Namibian law, specifically contravening Article 95(l) of the Constitution of the Republic of Namibia and by extension any lesser laws supporting Article 95 as well. It would also be morally inexcusable.

Given what we know of the functioning of ecosystems in general, any one apex or apical predator, like *P. maraisi*, can be expected to be supported by an entire trophic pyramid, in this case comprising mainly invertebrates. Since we already know that Central Namib invertebrates tend to be highly range-restricted (Irish 2009), the implication is that besides *P. maraisi* there are numerous other species that are also only found on this one dolerite boulder ridge. We do not know what they are because they have simply not been studied yet.

The *a priori* designated land use of that portion of the dolerite ridge within the proposed Extension 1 as 'conservation' (GPT 2023) is therefore commendable and the Erongo Regional Council should be congratulated on its responsible approach to a development in a highly sensitive environment of global importance. However, a designation on paper has no real effect on a species in the field, and more concrete action will be needed to make it more effective.

It is therefore recommended that:

- The entire dolerite boulder ridge habitat within the Wlotzkasbaken Townlands (i.e.

the southern ridge on Figure 6) be declared a conservation area and that it be accorded official status on a cadastral level. This could be accomplished either by a gazetted re-incorporation of the ridge into the Dorob National Park, or by the Erongo Regional Council as the landowner or the Wlotzkasbaken Home-owners Association as a concerned group applying for the ridge to be proclaimed a Private Nature Reserve, as is allowed for under the Nature Conservation Ordinance 4 of 1974, section 22.

- The area be physically demarcated **prior to any construction activities on the proposed development commencing**, in order to prevent inadvertent habitat destruction by potentially uninformed or apathetic contractors, their employees and especially earthmoving machinery. An aesthetically non-intrusive but effective physical barrier like the cables surrounding lichen fields and seabird breeding sites in the vicinity and elsewhere in the Central Namib (Figure 10) has stood the test of time and is recommended here as well.
- Planning for supporting infrastructure and services for proposed Extensions 1 and 2 should include **no infrastructure of any kind to be located on the dolerite boulder ridge**. This means no water reservoirs, communications towers or linear infrastructure. While these aspects have been specifically excluded from the current study and will be subject to their own studies (GPT 2023), this study is hereby advising any subsequent studies of the imperative for a total lack of any additional disruption of the boulder ridge habitat.
- Further studies should be conducted to:
 - a) confirm the distribution range and habitat restriction of *Pachydactylus maraisi* and devise a Habitat and Species Management Plan that endeavours to ensure the continued health and survival of the population, and
 - b) determine the diversity of associated range-restricted endemic invertebrates in the dolerite boulder habitat and feed the information back into the Management Plan above.

These studies are to be conducted by suitably qualified Namibian professionals. Both initial studies will require specialised knowledge and experience and will not be possible for students, but once the baseline studies above have been done any less urgent follow-up work that is required would be very suitable for post-graduate thesis studies through a Namibian university.

Because of the urgent need for the studies and the known procedural delays and perpetual financial constraints suffered by all levels of Government, the studies would be best commissioned and financed by civil society. Possibly the Wlotzkasbaken Home-owners Association and their implied wide personal, professional, institutional and social networks, might be able to facilitate this through an environmental NGO.

Development need not be halted while the studies proceed, provided the area is already adequately conserved as recommended above.

Once the environmental imperative above has been achieved, the continued conservation of the dolerite boulder ridge and its endemic species is expected to provide important positive socio- and economic benefits for the area as well. The conservation area as such will increase the tourism attraction of the area, and entrepreneurs can be expected to

exploit this, resulting in wealth and employment creation, that will in turn motivate for and ensure the continued protection of the area. Given experience elsewhere in Namibia, close proximity to a conservation area is also likely to increase property values in the adjacent development.



Figure 10: Example of cable barrier that has been effective in preventing habitat disruption elsewhere in the Central Namib. This one is protecting lichen fields north of Wlotzkasbaken.

Sensitive coastal dune hummock habitat and endemic, range-restricted invertebrates of conservation concern

Given what we know of the small habitat size, high endemism and resultant extreme sensitivity of the dune hummock habitat, it is imperative that the current development not also destroy its adjacent hummock habitat as some other townships have already done.

Currently the habitat is zoned as 'public open space'. There is a concern that eventual recreational traffic to and from the beach will disrupt the hummock habitat regardless of its zoning status. It is therefore recommended that:

- no additional hard surface access roads to the beach be constructed, apart from the

existing one on the border between Extensions 1 and 2.

- no vehicle access to the beach be allowed, and all-wheel drive vehicle access to the hummock habitat be restricted by demarcating the eastern edge of the dune hummock habitat by a cable similar to that recommended above (Figure 10)..
- pedestrian access to and from the beach be encouraged and facilitated by the construction of regularly spaced and slightly (ca. 15 cm) raised wooden walkways across the dune hummock habitat that will prevent excessive physical disruption of the habitat by pedestrian traffic while allowing free movement of small species underneath the walkways.

Human-wildlife conflict potential with brown hyaena, a species of conservation concern

The presence of a large carnivore in close proximity to human habitation, especially human habitation that limits their former access to preferential feeding areas, has the potential for human-wildlife conflict. The isolated small, high density residential area proposed to be developed along the northern edge of Extension 1, north of the dolerite boulder ridge, is located on a current brown hyaena habitual transit route to a preferred foraging area on the beach, and presents the highest risk area for human-wildlife conflict.

It is recommended that either:

- the proposed land use for the isolated northern residential area be changed to one that has no or limited human presence during the night when hyaenas are active. Suitable 'day-only' uses could be 'Institutional' or 'Local authority'. By e.g. exchanging the northern residential area with the similarly sized 'Institutional' allocation that has been demarcated centrally in Extension 1, the overall land use allocation for the development can remain unchanged while wildlife conflict is reduced (Figure 1).
- alternatively, what is otherwise an incongruous and isolated residential area could be eliminated from its current location altogether, and an equivalent number of residences rather be added to the south of Extension 2. Doing so would also eliminate the need for the currently planned access road that problematically crosses the highly sensitive dolerite boulder ridge, besides being partially planned in an ephemeral watercourse. **From a purely ecological and conservation viewpoint, this second option would be the preferred one.**

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Appendix 1. Comment on the conservation status of *Pachydactylus maraisi*.

Pachydactylus maraisi was described by Heinicke *et al.* (2011). The latter is the only source cited for the assessment of the species as Near-Threatened by IUCN in 2019 (<https://www.iucnredlist.org/species/110214003/110214006>). Unfortunately the assessment process suffered from original misinformation and subsequent misinterpretation.

Geographical range and habitat

Heinicke *et al.* (2011) describe the habitat of the species as exclusively associated with dolerite boulders, and list it from the following localities:

- '2.7 km S Wlotzkasbaken'. If measured from the approximate centre of Wlotzkasbaken, this is the dolerite ridge south of the town, as confirmed by the published photograph (figure 4 in Heinicke *et al.* 2011) of the type locality.
- '29.0 km N of Swakopmund' with coordinates 22°25'38"S, 14°27'53"E. This is the same place, with the coordinates being on the dolerite ridge about 400 m east of the main road. The distance by road from the centre of Swakopmund to the dolerite ridge is indeed 29 km.
- 'Wlotzkasbaken'. Specimens with National Museum of Namibia catalogue number NMN 175. Inspection of the catalogue show that the material was collected by museum staff in 1965. Given that there is no suitable habitat (dolerite boulders) in town, and that locality labels at the time more often meant 'in the vicinity of' than 'precisely at' a place, on habitat grounds it is likely that the material also came from the dolerite ridge south of Wlotzkasbaken. This is confirmed by other NMN 'Wlotzkasbaken' material from the same time frame and collectors that includes other rock associated reptiles that are also unlikely to have been collected in town. Note that Heinicke *et al.* (2011) mapped the three preceding as three different localities even though they are the same.
- 'Swakopmund'. NMN 1725, collected by museum staff in 1972. Given the absence of naturally occurring dolerite boulders in or near Swakopmund, it is unlikely on habitat grounds that the material actually came from the town itself. Associated material is again the same petrophilous taxa as with NMN 175. It should be noted that labels of older NMN material like this gave more prominence to the magisterial district in larger bold letters than to the actual locality. Wlotzkasbaken is in Swakopmund district. It may also be noted that Heinicke *et al.* (2011) did not map this locality, without providing a reason, but suggesting that they also had doubts as to its validity.
- 'Mile 66'. Material in the Ditsong Museum, South Africa, collected by entomologist Charles Koch in 1954. It was not originally labelled 'Mile 66'. The same batch of material included the holotype of *Pachydactylus kochii*, and that was published by FitzSimons (1959) with the locality given as 'Sextoo (or Sextus), a few miles south of Cape Cross'. The ambiguous primary place name indicates some measure of illegibility on what was presumably a handwritten label. There is of course no such

place, definitely not near Cape Cross, and strangely, the collector himself never mentions such a place in any of his very many own publications on Tenebrionidae beetles of the Namib. The locality later was changed in the Ditsong Museum catalogues from 'Sextoo/Sextus' to 'Mile 66' by the late W. Haacke (Mashinini & Mahlangu 2013). The way in which 'Sextoo' came to be regarded as 'Mile 66' was related to me by the late S. Endrödy-Younga while I was a student worker at the Ditsong Museum in 1981: 'Sextoo' = 'Six-two' = 'two sixes' = '66' = 'Mile 66'. Under the old system where places on the Central Namibian coast were named for their distance in miles north of Swakopmund, Mile 66 would indeed have been a few miles south of Cape Cross. However, besides being incredibly contrived and convoluted, this explanation has other problems. It does not explain why Koch did not simply label the material 'Mile 66' to begin with, nor why he himself never mentioned either Sextoo/Sextus or Mile 66 in his own work. In any case, every mile along the coast was not named, only specific ones (e.g. Mile 4, Mile 14, Mile 72, Mile 108: names that still survive today); 'Mile 66' was never a place. And lastly, if we take 'Mile 66' as having been 6 miles / 9.6 km south of present day Mile 72, we find that the area is a flat gravel plain without rocks, and definitely without boulders, i.e. not suitable habitat for *Pachydactylus maraisi*. Given the confusion surrounding the locality, we can not be sure that the specimen of *P. maraisi* labelled 'Mile 66' actually came from there. We have no clues as to where else it may have come from, either, and are left with the dolerite ridge south of Wlotzkasbaken as the only confirmed locality for the species.

Heinicke *et al.* (2011) stated that the *P. maraisi* is known from 'a few localities immediately adjacent to the Namibian coast between Swakopmund and Cape Cross', and this is repeated verbatim in the IUCN assessment, which additionally states: 'The currently known range spans about 105 km along the coast.' The latter statement probably relates to 105 km being equal to 66 miles. As we saw above, some of the purported localities are problematic and the species is reliably known from only one place.

In cases where no population studies have been done on a species, as is the case for *Pachydactylus maraisi*, IUCN evaluations rely heavily on the number of known localities as well as the implied distribution range of the species. More localities and larger ranges merit less conservation concern, and in the case of *P. maraisi* both were taken to be more extensive than actual evidence would suggest.

Population detail

The IUCN assessment stated: 'The species exists as a series of small, widely separated subpopulations that occur where there is suitable habitat. The abundance is fairly high in each subpopulation.'

This statement is problematic. It equates historical locality records with the existence of both suitable habitat and subpopulations at those places. We know that there is no suitable habitat at most of the purported localities, which is part of the reason for not considering them to be accurate in the first place. And even if they were accurate regardless, it is still not clear how a confident statement on population abundance can be derived from a few museum specimens.

The number of subpopulations, and the health of each, are important considerations in IUCN assessments. The current assessment paints a rosy picture that is not backed up by

reality either.

Protection

Heinicke *et al.* (2011) are apparently ignorant of the actual extent of Wlotzkasbaken Townlands when they state that all areas to the east of the coastal road are included in the Dorob National Park, and the entire range of *P. maraisi* is, according to them, therefore in a Protected Area. This is repeated in the IUCN assessment. (It is difficult not to notice that both sources use a different definition of 'entire range' here than they did before when they were considering distribution.)

In truth the entire confirmed range of *P. maraisi* (i.e. the entire southern dolerite boulder ridge) lies within the Wlotzkasbaken Townlands and outside the Dorob National Park. Existing protection measures are an important consideration for IUCN assessment, and here again the assessment for *P. maraisi* suggests protection that is in fact not there, and accordingly treat the species with less concern than it deserves.

Conclusion

If the IUCN assessment for *P. maraisi* were to be repeated, taking into account that it is reliably known from a single population with a probable range extent of < 1 km², in unprotected townlands, with 21 % of the range already included in a planned development, strict application of IUCN assessment guidelines (IUCN 2000) would likely result in a conservation status of Critically Endangered.

Appendix 2. Summary lists of taxa

Mammals

Table 3: Mammal taxa previously recorded, observed, or expected to occur in the Study Area and immediate surroundings, based on Irish (2013). Occasional vagrants, or animals that may temporarily move into the area following rains, were not considered. Marine mammals (whales, dolphins, seals) are excluded.

Key:

End. = Endemism. **100%** = only found in Namibia. **100%** = only found in the Central Namib Desert. Other percentages = near-endemic to Namibia, ranging marginally into neighbouring countries, indicating the approximate percentage of the overall distribution range that is within Namibia.

IUCN = conservation status categories, as follows: **CR** = Critically Endangered, **EN** = Endangered, **VU** = Vulnerable, **NT** = Near Threatened, **LC** = Least Concern, **DD** = Data Deficient, no value = not evaluated (as per IUCN Red List 2022.2, accessed 2023-05-05).

CITES = the number of the Appendix in which the species is listed, if any.

NCO = legal status as defined in the Nature Conservation Ordinance, no. 4 of 1975, as amended: **PG** = Protected Game, Schedule 4. **SP** = Specially Protected Game, Schedule 3. **HG** = Huntable Game, Schedule 5

The grounds for considering certain species to be potential taxa of concern have been marked in bold type in the **End.**, **IUCN**, **CITES** and **NCO** columns.

Habitat = habitats in which the species is expected to occur in the Study Area: **L** = Lichen plains, **D** = Dolerite ridges, **W** = Washes, **H** = Coastal hummocks.

Source = literature reference to occurrence in Study Area, **O** = observed (animal or signs), **E** = expected on habitat grounds.

Order	Family	Species	Common name	End.	IUCN	CITES	NCO	Habitat				Source
								L	D	W	H	
CHIROPTERA	Vespertilionidae	<i>Cistugo seabrai</i>	Namibian Wing-gland Bat	80%	LC				X			(Irish 2013)
		<i>Laephotis</i>	Namib Long-eared	90%	LC				X			(Irish 2013)

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Order	Family	Species	Common name	End.	IUCN	CITES	NCO	Habitat				Source
								L	D	W	H	
		<i>namibensis</i>	Bat									
LAGOMORPHA	Leporidae	<i>Lepus capensis</i>	Cape Hare		LC				X			(Irish 2013)
RODENTIA	Muridae	<i>Petromyscus collinus</i>	Namibian Pygmy Rock Mouse	90%	LC			X				(Irish 2013)
		<i>Gerbillurus paeba</i>	Pygmy gerbil		LC		X		X	X		E; (Griffin 1990)
		<i>Gerbillurus setzeri</i>	Namib Brush-tailed Gerbil	95%	LC		X		X			(Irish 2013)
		<i>Desmodillus auricularis</i>	Short-tailed Gerbil		LC		X		X			E; (Griffin 1990)
		<i>Rhodomys pumilio</i>	Three-striped Mouse		LC				X	X		(Irish 2013)
		<i>Parotomys littledalei</i>	Solitary Whistling Rat	75%	LC				X	X		(Irish 2013)
CARNIVORA	Herpestidae	<i>Suricata suricatta</i>	Suricate		LC		X		X			(Irish 2013)
	Hyaenidae	<i>Hyaena brunnea</i>	Brown Hyaena		NT		X	X	X	X		(Irish 2013)
	Canidae	<i>Canis mesomelas</i>	Black-backed Jackal		LC		X	X	X	X		(Irish 2013)
ARTIODACTYLA	Bovidae	<i>Antidorcas marsupialis</i>	Springbok		LC		HG	X		X		(Irish 2013)
MACRO-SCELIDEA	Macroscelididae	<i>Macroscelides flavicaudatus</i>	Namib Round-eared Elephant Shrew	100%	LC		X	X	X			(Irish 2013)

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Birds

Table 4: Bird taxa previously recorded, observed, or expected to occur in the Study Area. Occasional vagrants, fly-overs, or birds that may temporarily move into the area following rains, were not considered. Marine birds are excluded.

Key:

End. = Endemism. 100% = only found in Namibia. 100% = only found in the Central Namib Desert. Other percentages = near-endemic to Namibia, ranging marginally into neighbouring countries, indicating the approximate percentage of the overall distribution range that is within Namibia.

IUCN = conservation status categories, as follows: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, DD = Data Deficient, no value = not evaluated (as per IUCN Red List 2022.2, accessed 2023-05-05).

CITES = the number of the Appendix in which the species is listed, if any.

NCO = legal status as defined in the Nature Conservation Ordinance, no. 4 of 1975, as amended: PG = Protected Game, Schedule 4. SP = Specially Protected Game, Schedule 3. HG = Huntable Game, Schedule 5

The grounds for considering certain species to be taxa of concern have been marked in bold type in the End., IUCN, CITES and NCO columns.

Habitat = habitats in which the species is expected to occur in the Study Area: L = Lichen plains, D = Dolerite ridges, W = Washes, H = Coastal hummocks.

Source = literature reference to occurrence in Study Area, O = observed (animal or signs), E = expected on habitat grounds.

Order	Family	Species	Common Name	End.	IUCN	CITES	NCO	Habitat				Source
								L	D	W	H	
GRUIFORMES	Otididae	<i>Eupodotis rueppellii</i>	Rüppell's Korhaan	80%	LC	II	PG	X		X		(Irish 2013)
PASSERIFORMES	Alaudidae	<i>Ammomanopsis grayi</i>	Gray's Lark	80%	LC		PG	X		X		(Irish 2013)
		<i>Calandrella cinerea</i>	Red-capped Lark		LC		PG	X		X		(Irish 2013)
	Corvidae	<i>Corvus albus</i>	Pied Crow		LC			X	X	X		(Irish

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Order	Family	Species	Common Name	End.	IUCN	CITES	NCO	Habitat				Source
								L	D	W	H	
												2013)
	Motacillidae	<i>Motacilla capensis</i>	Cape Wagtail		LC		PG				X	(Irish 2013)
	Muscicapidae	<i>Cercomela familiaris</i>	Familiar Chat		LC		PG	X		X		(Irish 2013)
		<i>Cercomela tracterac</i>	Tracterac Chat		LC		PG	X		X		(Irish 2013)
		<i>Oenanthe monticola</i>	Mountain Chat		LC		PG		X			(Irish 2013)
	Nectariniidae	<i>Cinnyris fuscus</i>	Dusky Sunbird		LC		PG		X	X		(Irish 2013)
	Sturnidae	<i>Onychognathus nabouroup</i>	Pale-winged Starling		LC		PG		X			(Irish 2013)
STRIGIFORMES	Strigidae	<i>Bubo africanus</i>	Spotted Eagle Owl		LC	II	PG		X			(Irish 2013)
STRUTHIONIFORMES	Struthionidae	<i>Struthio camelus</i>	Ostrich		LC		PG	X		X		(Irish 2013)

Reptiles

Table 5. Reptile taxa previously recorded, observed, or expected to occur in the Study Area. Marine reptiles (turtles, sea snakes) are excluded.

Key:

End. = Endemism. 100% = only found in Namibia. 100% = only found in the Central Namib Desert. Other percentages = near-endemic to Namibia, ranging marginally into neighbouring countries, indicating the approximate percentage of the overall distribution range that is within Namibia.

IUCN = conservation status categories, as follows: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, DD = Data Deficient, no value = not evaluated (as per IUCN Red List 2022.2, accessed 2023-05-05).

CITES = the number of the Appendix in which the species is listed, if any.

NCO = legal status as defined in the Nature Conservation Ordinance, no. 4 of 1975, as amended: PG = Protected Game, Schedule 4. SP = Specially Protected Game, Schedule 3. HG = Huntable Game, Schedule 5

The grounds for considering certain species to be taxa of concern have been marked in bold type in the End., IUCN, CITES and NCO columns.

Habitat = habitats in which the species is expected to occur in the Study Area: L = Lichen plains, D = Dolerite ridges, W = Washes, H = Coastal hummocks.

Source = literature reference to occurrence in Study Area, O = observed (animal or signs), E = expected on habitat grounds.

Order	Family	Species	Common Name	End.	IUCN	CITES	NCO	Habitat				Source
								L	D	W	H	
SQUAMATA	Colubridae	<i>Dipsina multimaculata</i>	Dwarf Beaked Snake	75%	LC			X		X		(Irish 2013)
		<i>Psammophis namibensis</i>	Namib Sand Snake	75%	NE			X		X		E; (GBIF 2022)
	Viperidae	<i>Bitis caudalis</i>	Horned Adder		LC			X		X		E; (GBIF 2022)
	Chamaeleonidae	<i>Chamaeleo</i>	Namaqua		LC	II		X		X		(Irish 2013)

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Order	Family	Species	Common Name	End.	IUCN	CITES	NCO	Habitat				Source
								L	D	W	H	
		<i>namaquensis</i>	Chameleon									
	Gekkonidae	<i>Colopus kochii</i>	Koch's Thick-toed Gecko	100%	LC				X			(Irish 2013)
		<i>Pachydactylus maraisi</i>		100%	NT				X			(Heinicke <i>et al.</i> 2011)
		<i>Pachydactylus rangei</i>	Palmatogecko	80%	LC						X	(Irish 2013)
		<i>Pachydactylus scherzi</i>	Scherz's Thick-toed Gecko	100%	LC			X	X	X		(Irish 2013)
		<i>Ptenopus carpi</i>	Carp's Barking Gecko	100%	LC			X		X		(Irish 2013)
		<i>Rhoptropus afer</i>	Common Namib Day Gecko	95%	LC				X			(Irish 2013)
		<i>Rhoptropus bradfieldi</i>	Bradfield's Namib Day Gecko	100%	LC				X			(Irish 2013)
	Lacertidae	<i>Meroles reticulatus</i>	Reticulated Desert Lizard	80%	LC			X		X		(Irish 2013)
	Scincidae	<i>Trachylepis variegata</i>	Variiegated Skink		LC				X			E; (GBIF 2022)
		<i>Typhlacontias brevipes</i>	FitzSimons' Burrowing Skink	100%	LC						X	(Irish 2013)

Invertebrates

Table 6: Invertebrate taxa previously recorded, observed, or expected to occur in the Study Area. Marine invertebrates (Crustacea, Mollusca, Cnidaria etc.) are excluded.

Key:

End. = Endemism. **100%** = only found in Namibia. **100%** = only found in the Central Namib Desert. Other percentages = near-endemic to Namibia, ranging marginally into neighbouring countries, indicating the approximate percentage of the overall distribution range that is within Namibia. ~ = endemism indeterminate for larger groups.

Cons. = IUCN conservation status equivalent categories, derived as explained in text, as follows: **CR** = Critically Endangered, **EN** = Endangered, **VU** = Vulnerable, **NT** = Near Threatened, **LC** = Least Concern, **DD** = Data Deficient, no value = not evaluated or cannot be evaluated for larger groups (as per IUCN Red List 2022.2, accessed 2023-05-05, or preliminary assessments as per Irish (2013)).

The grounds for considering certain species to be taxa of concern have been marked in bold type in the End. and Cons. columns.

Habitat = habitats in which the species is expected to occur in the Study Area: **L** = Lichen plains, **D** = Dolerite ridges, **W** = Washes, **H** = Coastal hummocks.

Source = literature reference to occurrence in Study Area, **O** = observed (animal or signs), **E** = expected on habitat grounds.

Phylum	Class	Order	Family	Species	Common Name	End.	Cons.	Habitat				Source
								L	D	W	H	
Arthropoda	Arachnida	Acari			Mites	~		X	X	X	X	(Irish 2013)
					Ticks	~		X	X	X	X	(Irish 2013)
		Araneae	Gnaphosidae		Ground spiders	~		X	X	X	X	(Irish 2013)
			Oonopidae		Goblin spiders	~		X	X	X		(Irish 2013)
			Palpimanidae		Palp-footed spiders	~		X		X		(Irish 2013)
			Philodromidae		Small huntsman spiders	~		X		X	X	(Irish 2013)
			Salticidae		Jumping spiders	~		X	X	X	X	(Irish 2013)

Phylum	Class	Order	Family	Species	Common Name	End.	Cons.	Habitat				Source
								L	D	W	H	
			Sicariidae		Six-eyed crab spiders	~		X				(Irish 2013)
			Sparassidae		Huntsman spiders	~		X	X	X		(Irish 2013)
			Theridiidae		Cob web spiders	~		X				(Irish 2013)
		Pseudoscorpiones			False scorpions	~		X	X	X	X	(Irish 2013)
		Scorpiones	Buthidae	<i>Parabuthus namibensis</i>	Scorpions	100%	LC	X	X	X		(Irish 2013)
				<i>Parabuthus stridulus</i>		100%	LC				X	(Irish 2013)
				<i>Parabuthus villosus</i>				X	X	X		E; Lamoral (1979)
			Scorpionidae	<i>Opisthophthalmus penrithorum</i>		100%	VU	X				(Irish 2013)
		Solifugae	Ceromidae	<i>Ceroma inerme</i>	Solifuges	100%	CR				X	(Irish 2013)
			Daesiidae			~			X	X		(Irish 2013)
			Gylippidae	<i>Trichotoma brunnea</i>		100%	CR				X	(Irish 2013)
			Hexisopodidae	<i>Hexisopus moisei</i>		100%	EN	X		X		(Irish 2013)
			Melanoblossidae			~		X		X		(Irish 2013)
			Solpugidae	<i>Solpugista bicolor</i>		100%	LC	X		X		(Irish 2013)
	Chilopoda	Scolopendrida		<i>Trachycormocephalus</i> sp.	Centipedes	~	DD	X	X			(Irish 2013)
	Insecta	Blattodea	Blaberidae		Cockroaches	~		X				(Irish 2013)
			Blattellidae			~		X	X	X		(Irish 2013)

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Phylum	Class	Order	Family	Species	Common Name	End.	Cons.	Habitat				Source
								L	D	W	H	
			Blattidae			~		X		X		(Irish 2013)
		Coleoptera	Carabidae	<i>Crepidogastrini</i>	Ground beetles	~				X		(Irish 2013)
				<i>Trienogenius</i> sp.		~		X	X	X		(Irish 2013)
			Cicindelidae	<i>Eurymorpha cyanipes</i>	Tiger beetles	80%	CR				X	(Irish 2013)
				<i>Lophyra damara</i>		100%	CR				X	(Irish 2013)
			cf. Clambidae			~				X		(Irish 2013)
			Cleridae	<i>Opetiopalpus fritzi</i>	Chequered beetles	100%	VU			X		(Irish 2013)
			Curculionidae	<i>indet.</i>	Weevils	~		X	X	X	X	(Irish 2013)
				<i>Cleoninae</i> sp.		~					X	(Irish 2013)
				<i>Hyomora porcella</i>		100%	LC		X			(Irish 2013)
				<i>Ocladius</i> sp.		~				X	X	(Irish 2013)
			Dermestidae		Museum beetles	~				X		(Irish 2013)
			Histeridae		Hister beetles	~		X	X	X	X	(Irish 2013)
			Meloidae		Blister beetles	~		X		X		(Irish 2013)
			Melyridae		Flower beetles	~				X		(Irish 2013)
			Nitidulidae		Sap beetles	~					X	(Irish 2013)
			Ptinidae	<i>Damarus magnus</i>	Spider beetles	100%	EN	X	X	X	X	(Irish 2013)
				<i>Damarus singularis</i>		100%	LC		X	X		(Irish 2013)
				<i>Stethomezium nooitgedag</i>				X				(Irish 2013)

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Phylum	Class	Order	Family	Species	Common Name	End.	Cons.	Habitat				Source
								L	D	W	H	
				<i>Ptininae</i> spp.		~			X	X	(Irish 2013)	
			Staphylinidae	<i>Aleochara salsipotens</i>	Rove beetles					X	(Irish 2013)	
			Tenebrionidae	Alleculinae sp.	Toktokkies	~				X	(Irish 2013)	
				<i>Brinckia debilis</i>		90%	EN			X	(Irish 2013)	
				<i>Calosis amabilis</i>		80%	LC	X	X	X	(Irish 2013)	
				<i>Carchares macer</i>		100%	EN			X	(Irish 2013)	
				<i>Cauricara brunripes</i>		100%	EN			X	(Irish 2013)	
				<i>Cauricara eburnea</i>		100%	EN	X	X	X	(Irish 2013)	
				Drosochrini		~		X	X	X	(Irish 2013)	
				<i>Epiphysa arenicola</i>		99%	LC	X		X	(Irish 2013)	
				<i>Eurychora</i> sp.		~		X	X	X	(Irish 2013)	
				<i>Eustolopus octoseriatus</i>		100%	LC		X		(Irish 2013)	
				<i>Geophanus</i> sp.		~		X	X	X	(Irish 2013)	
				<i>Gonopus angusticostis</i>		100%	LC	X	X	X	(Irish 2013)	
				<i>Metriopus depressus</i>		85%	LC	X	X	X	(Irish 2013)	
				<i>Occidentophosis damarina</i>		100%	VU	X	X	X	(Irish 2013)	
				<i>Onychosis gracilipes</i>		95%	EN			X	(Irish 2013)	
				<i>Onymacris marginipennis</i>		85%	CR			X	(Irish 2013)	
				<i>Pachynotelus machadoi</i>		75%	LC			X	(Irish 2013)	

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Phylum	Class	Order	Family	Species	Common Name	End.	Cons.	Habitat				Source
								L	D	W	H	
				<i>Pachyphaleria capensis</i>		60%	CR				X	(Irish 2013)
				<i>Palpomodes</i> spp.		~		X	X	X		(Irish 2013)
				<i>Phanerotomeina</i> sp.		~			X	X	X	(Irish 2013)
				<i>Physadesmia globosa</i>		100%	LC			X		(Irish 2013)
				<i>Rhammatodes</i> sp.		~			X			(Irish 2013)
				<i>Stips dohrni</i>			LC	X	X	X	X	(Irish 2013)
				<i>Trachynotidus</i> sp.		~		X	X	X		(Irish 2013)
		Collembola	Entomobryidae		Springtails	~		X	X	X		(Irish 2013)
		Diptera	Anthomyiidae	<i>Fucellia capensis</i>	Kelp fly						X	(Irish 2013)
			Asilidae	<i>Neolophonotus albus</i>	Robber flies	100%	VU		X		X	(Irish 2013)
			Calliphoridae	<i>Lucilia sericata</i>	Blow flies						X	(Irish 2013)
			Cecidomyiidae		Gall midges	~		X	X	X		(Irish 2013)
			Chloropidae		Shootflies	~					X	(Irish 2013)
			Conopidae		Thick-headed flies	~		X		X		(Irish 2013)
			Dolichopodidae	<i>Hydrophorus praecox</i>	Long-legged flies		LC	?	?	?		(Irish 2013)
			Ephydriidae	<i>Asmeringa namibia</i>	Shore flies	100%	CR				X	(Irish 2013)
			Heleomyzidae			~				X	X	(Irish 2013)
			Muscidae		House flies	~				X		(Irish 2013)
			Pipunculidae		Big-headed flies	~		X				(Irish 2013)
			Sarcophagidae		Flesh flies	~		X	X	X	X	(Irish 2013)
			Sphaeroceridae	<i>Thoracochaeta securis</i>	Dung flies						X	(Irish 2013)

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Phylum	Class	Order	Family	Species	Common Name	End.	Consa.	Habitat				Source
								L	D	W	H	
			Tachinidae			~		X	X	X		(Irish 2013)
			Tephritidae		Fruit flies	~				X		(Irish 2013)
			Tethinidae	<i>Afrotethina persimilis</i>							X	(Irish 2013)
				<i>Afrotethina stuckenbergi</i>							X	(Irish 2013)
				<i>Horaismoptera microphthalma</i>							X	(Irish 2013)
			Therevidae	<i>Neotherevella arenaria</i>	Stiletto flies	100 %	CR				X	(Irish 2013)
		Hemiptera	Coccoidea		Scale insects	~		X			X	(Irish 2013)
			Cydnidae		Burrowing bugs	~				X	X	(Irish 2013)
			Miridae		Plant bugs	~					X	(Irish 2013)
			Reduviidae		Assassin bugs	~		X			X	(Irish 2013)
		Hymenoptera	Aphelinidae			~					X	(Irish 2013)
			Apidae	<i>Apis mellifera</i>	Honey Bee			X	X	X	X	(Irish 2013)
			Bethylidae			~		X	X	X	X	(Irish 2013)
			Braconidae			~				X		(Irish 2013)
			Chalcididae			~			X	X		(Irish 2013)
			Chalcidoidea			~		X	X	X	X	(Irish 2013)
			Colletidae		Plasterer bees	~					X	(Irish 2013)
			Cynipoidea			~		X	X	X		(Irish 2013)
			Eupelmidae			~		X				(Irish 2013)
			Formicidae	<i>Camponotus</i> spp.	Ants	~		X	X	X		(Irish 2013)
				<i>Lepisiota</i> spp.		~		X	X	X	X	(Irish 2013)

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Phylum	Class	Order	Family	Species	Common Name	End.	Consi.	Habitat				Source
								L	D	W	H	
				<i>Monomorium</i> spp.		~		X	X	X	X	(Irish 2013)
				<i>Monomorium mantazenum</i>		100%	EN	?				(Irish 2013)
				<i>Ocymyrmex</i> sp.		~					X	(Irish 2013)
				<i>Ocymyrmex zekhem</i>		100%	LC	?				(Irish 2013)
				<i>Pheidole tenuinodis</i>					X	X		(Irish 2013)
				<i>Tetramorium rufescens</i>		100%	LC			X		(Irish 2013)
			Halictidae		Sweat bees	~		X	X	X	X	(Irish 2013)
			Ichneumonidae			~				X		(Irish 2013)
			Masaridae	<i>Quartinia</i> spp.	Pollen wasps	~					X	(Irish 2013)
				<i>Quartinia femorata</i>		100%	CR				X	(Irish 2013)
				<i>Quartinia minima</i>		100%	LC				?	(Irish 2013)
				<i>Quartinia poecila</i>			LC				?	(Irish 2013)
				<i>Quartinia propinqua</i>			LC				?	(Irish 2013)
				<i>Quartinia pulawskii</i>		100%	CR	?				(Irish 2013)
				<i>Quartinia tuberculiventris</i>		100%	VU	?				(Irish 2013)
				<i>Quartinia tuberculiventroides</i>		100%	LC	?				(Irish 2013)
			Megachilidae		Leafcutter bees	~		X				(Irish 2013)

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Phylum	Class	Order	Family	Species	Common Name	End.	Consa.	Habitat				Source
								L	D	W	H	
			Melittidae	<i>Meganomia binghami</i>								2007_43,
			Mutillidae		Velvet ants	~				X		(Irish 2013)
			Mymaridae		Fairy wasps	~				X		(Irish 2013)
			Platygasteridae			~			X			(Irish 2013)
			Plumariidae			~		X	X	X		(Irish 2013)
			Pompilidae		Spider wasps	~		X	X	X		(Irish 2013)
			Proctotrupidae			~		X	X	X	X	(Irish 2013)
			Scelionidae			~				X		(Irish 2013)
			Scoliidae			~				X	X	(Irish 2013)
			Sphecidae	Nyssoninae	Digger wasps	~			X			(Irish 2013)
				<i>Miscophus deserticolus</i>		100%	EN	?				(Irish 2013)
				<i>Miscophus sabulosus</i>		100%	LC	?				(Irish 2013)
				<i>Namiscophus pilosus</i>		100%	EN	?				(Irish 2013)
			Tiphiidae			~		X			X	(Irish 2013)
		Lepidoptera	Indet		Butterflies, moths	~		X	X	X	X	(Irish 2013)
			Cossidae	<i>Arctiocossus danieli</i>		100%	DD				X	(Irish 2013)
				<i>Arctiocossus gaerdesi</i>		100%	DD				X	(Irish 2013)
		Mantodea			Praying mantids	~	LC	X		X		(Irish 2013)
		Orthoptera	Acrididae	Lithidiinae spp.		~		X	X	X		(Irish 2013)

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Phylum	Class	Order	Family	Species	Common Name	End.	Cons.	Habitat				Source	
								L	D	W	H		
				<i>Lithiopsis carinatus</i>			LC	?				?	
				<i>Lithidium desertorum</i>			100 %	?	?			?	
			Mogoplistidae				~		X	X		(Irish 2013)	
			Schizodactylidae	<i>Comicus capensis</i>			LC		X	X		(Irish 2013)	
		Phthiraptera			Lice		~					(Irish 2013)	
		Psocoptera			Booklice		~		X	X	X	X	(Irish 2013)
		Siphonaptera	Chimaeropsyllidae		Fleas		~				X	X	(Irish 2013)
		Thysanoptera					~		X	X	X	X	(Irish 2013)
		Thysanura	Lepismatidae	<i>Ctenolepisma arenicola</i>			100 %	CR				X	(Irish 2013)
				<i>Ctenolepisma namibensis</i>			100 %	VU	X				(Irish 2013)
				<i>Ctenolepisma occidentalis</i>			100 %	EN	X				(Irish 2013)
				<i>Ctenolepisma penrithae</i>			100 %	LC	X				(Irish 2013)
				<i>Monachina stilifera</i>					X		X		(Irish 2013)
				<i>Thermobia nebulosa</i>			100 %	LC		X			

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Appendix D Flora Specialist Study

Vegetation study for the proposed Wlotzkasbaken Township Extension

May 2023



Prepared for: Geo Pollution Technologies Namibia

Prepared by: Coleen Mannheimer (manfam@iafrica.com.na)

Wlotzkasbaken May 2023

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EXECUTIVE SUMMARY

To inform any future environmental impact studies, a specialist vegetation scoping study was done to identify potential impacts on the Namibian flora of a proposed new township south of Wlotzkasbaken, which lies between Swakopmund and Hentie's Bay. A study area greater than that proposed for the project was investigated

The Namib Desert harbours numerous endemic and near endemic plant species, of which many are of restricted distribution or habitat. This makes them extremely vulnerable to disturbance. The lichen fields and biological soil crust of the Namib are also very vulnerable to destruction. Recovery in this extremely arid zone is slow, and often damage may be regarded as permanent.

Much of the study area has previously experienced a high level of degradation due to vehicle tracks, but two habitats of high concern occur within the area – the coastal hummock zone and a large dolerite ridge. These two habitats, which are both of a very limited total extent within Namibia, harbour endemic and protected species with limited to highly restricted areas of occurrence.

Recommendations have been made to avoid and/or minimise negative impacts on plants and habitats of conservation concern. The most effective of these would be to move the northern part of Development A, which lies north of the dolerite ridge, to south of Development B, which lies in a habitat of low concern, thus obviating the need for the access road over the ridge.

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1. INTRODUCTION

1.1 Background

The Erongo Regional Council proposes to undertake a proposed Township Development of Wlotzkasbaken, on the west coast of Namibia. Several options have been proposed for the layout and location of the extension/s, and all will be evaluated in the Environmental Impact Assessment. In this vegetation study the area encompassing all possibilities was included, but only the two most likely zones (A and B in Figures 2 & 3) were assessed in detail, taking the proposed town plan into consideration.

1.2 Terms of Reference

Bottom line outcome: Determine whether there are any plant taxa or habitats of concern present in the proposed development area.

Taxonomic scope: Terrestrial plants.

Terms of reference:

- Prepare a habitat/vegetation classification of the study area through a combination of satellite imagery and ground truthing during a field visit.
- Research historical literature and biological collection data to determine the taxa previously recorded from the study area.
- Conduct a plant survey of the study area, guided by the prior vegetation classification and concentrating on potential taxa of concern. Identify all taxa recorded to lowest level possible.
- Prepare, label and process all collected specimens that may require such deposition to herbarium / museum standards.
- Summarise results in a report. Analyse data and highlight taxa of particular concern.

1.3 Methodology

Review of literature sources (e.g. Giess 1971/1998, Hachfeld 2000, Schultz 2006, Jürgens *et al* 2013) and known plant species distribution according to the National Herbarium Database (BRAHMS) and the Namibian Tree Atlas Project (TAP) database as well as species and area conservation status. Two quarter degree squares, 2214 AD and 2214BC were queried. There were minimal existing records found, and the fieldwork resulted in a far more comprehensive plant list (Appendix 1). The tree atlas records for the latter were found to be from far further east and were discarded.

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A site visit and field surveys of the study area was undertaken (2 May 2023), concentrating on the area from just north of Wlotzkasbaken to just north of the Windpomp 14 development to the south (Figure 1). The surveys were done by means of walked and driven transects to identify plant species of conservation concern and where they are concentrated.

Preparation of report.

Nomenclature largely follows Klaassen & Kwembeya (eds) 2013, with updates from more recent literature. All the plant species found were identified in the field, so no specimens were collected.

All locality data are cited in WGS84.

1.4 Assumptions and limitations

I am not a lichen specialist, so information on the lichens is based largely on existing literature sources.

Due to patchy and very unpredictable precipitation in the central Namib, it was not possible to ensure that fieldwork was undertaken after good rains. This probably does not limit this study because the species list of 36 taxa derived from field work and collecting records from the National Herbarium falls near the average for most of the rest of the central Namib (this average is discussed in more detail later), indicating that most species have probably been considered, and Hachfeld (2000) found no relationship between species diversity and rainfall amount near the coast in the central Namib Desert. Her work was done slightly further inland but can still be applied in this area that is even closer to the coast.

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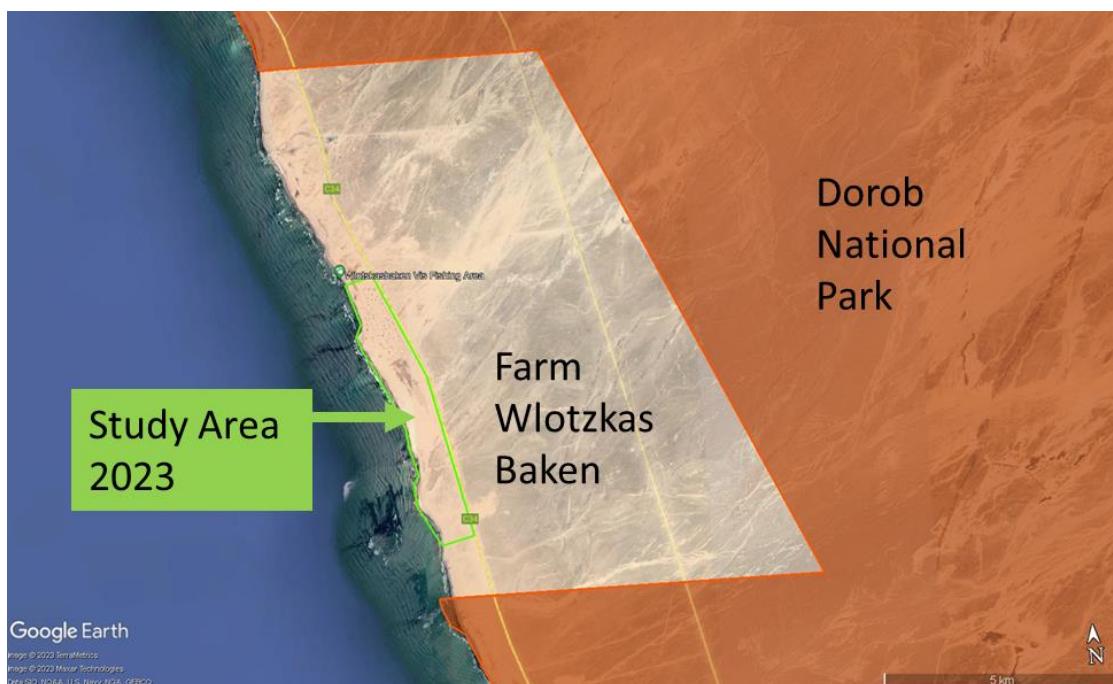


Figure 1: The study area lies along the coast in the south-east of Farm Wlotzkas Baken.

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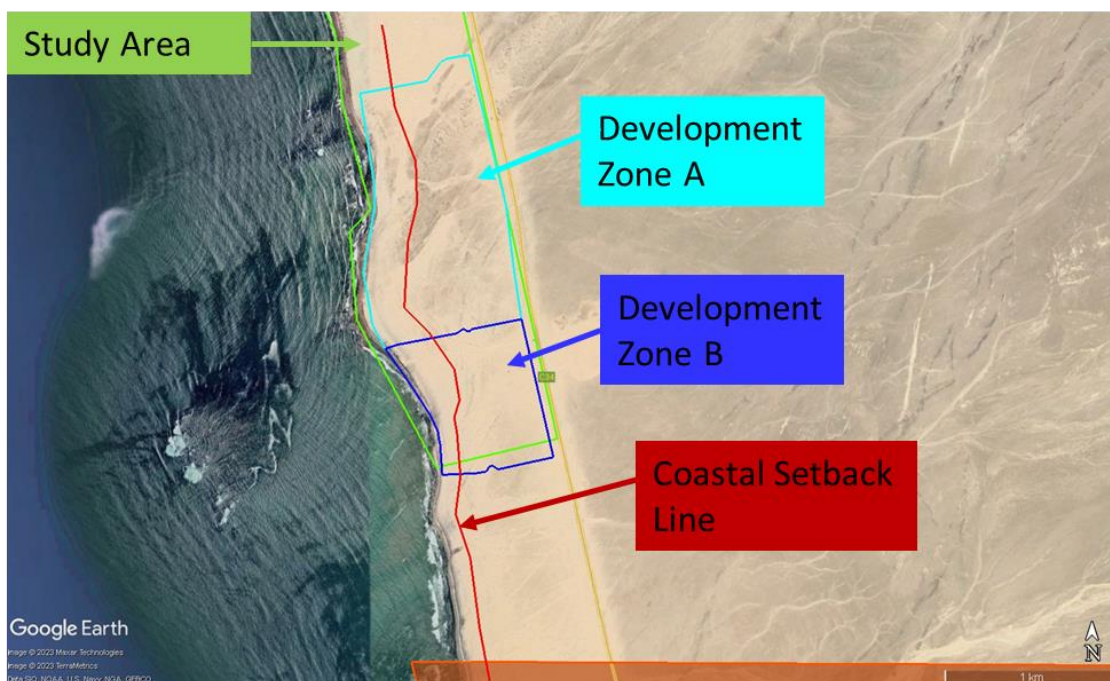


Figure 2: The two proposed zones for development in the south of the study area. The red line depicts a setback that was put in place after a coastal erosion study.

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Figure 3: Proposed township development plans. Green areas represent conservation areas (dark green) and public open space (light green).

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2. AFFECTED ENVIRONMENT

2.1 General location

The study area (Figure 1) and project area (Figures 2 & 3) are situated in the central Namib Desert, in the Erongo Region of Namibia, north of Swakopmund and just south of Wlotzkasbaken. It lies entirely in the Wlotzkasbaken townlands, an enclave within the Dorob National Park, a formally protected area that should be exempt from all but essential impacts.

The central Namib lies between the ephemeral Ugab and Kuiseb rivers, and is bounded by the Atlantic Ocean in the west and the escarpment in the east. It falls into the Desert Biome of Irish (1994).

2.2 Climate

2.2.1 Temperature

According to Mendelsohn et al. 2022, average daily temperatures vary between a minimum of 10° C in the coldest month and a maximum of 24° C in the warmest month in the area although temperatures as low as 2° C have been recorded (Jürgens *et al* 2013). Due to coastal proximity frost is probably rare.

2.2.2 Wind

Southerly, westerly, and south-westerly winds are prevalent, and are usually strongest between late afternoon and early evening (Atlas of Namibia Team, 2022).

2.2.3 Moisture

Rainfall in the Namib Desert is highly variable, unpredictable, and patchy. It varies from 0 to approximately 100 mm p.a. (Atlas of Namibia Team, 2022), increasing from west to east. In the west, where precipitation from rain is lowest, fog that is carried inland by wind passing over the cold Benguela current of the Atlantic Ocean is a vital source of moisture for many desert organisms. The number of fog days p.a. decreases eastwards (Olivier 1995). According to Mendelsohn *et al* 2002, the study area may experience more than 100 fog days annually, indicating that fog probably provides a high proportion of the moisture available.

2.3 Vegetation

2.3.1 General

According to Giess (1971/1998), the most widely used classification of Namibian vegetation to date, the study area falls into the Central Namib vegetation zone, where he describes a narrow coastal strip of hummock dunes formed around *Zygophyllum clavatum*, *Psilicaulon salicornioides* and *Salsola* sp. and, just inland from there, gravel flats with lichens and scattered individuals of *Zygophyllum stapfii* and *Arthroa leubnitziae*. In his work on the biomes of Wlotzkasbaken May 2023

Namibia, Irish (1994) found that vegetation borders in the preliminary map of Giess were not always consistent with observations in the field. Importantly, he also discusses in detail an east-west zonation in the desert with the western-most section bounded by the 20 mm rainfall isohyet. This zone, where average annual fog precipitation usually exceeds rainfall, is dominated fog-dependent chamaephytes (dwarf or low-growing shrubs), specifically *Arthraerua leubnitziae* and *Zygophyllum* spp., with the occurrence even of annuals limited by extremely low rainfall, and it is within this zone, corresponding to the two habitats described by Giess, that the study area lies.

2.3.2 Diversity

Recorded species diversity for all quarter-degree squares in the central Namib, excluding exceptionally diverse squares, ie: 2114 AB and BA (Brandberg) and 2214 BD, DA, DB, 2215 AC, CA (those that include the Rössing Mountain and the Swakop and Khan River canyons), stands at around 38 taxa. As may be expected many, if not most, of the species are adapted to the extreme conditions of the Namib, with a high proportion of annual species that rapidly germinate, grow, produce seed, and die in a very short space of time after rain, and also many succulent and geophyte species. Several species are restricted, or largely restricted, to koppies, ridges, drainage lines and rivers.

2.3.3 Endemicity

While approximately 16% of the Namibian flora is thought to consist of endemic species (Craven & Vorster 2006), over 30% of plants that occur in the Namib Desert in Namibia are believed to be endemic to that area. This is a remarkably high figure, but in the context of this project it is important to note that the areas of highest plant endemicity in the Namib are the Kaokoveld and the southern Namib, both regarded as major centres of endemicity in Namibia (Maggs et al, 1998). Levels of plant endemicity are comparatively lower in the central Namib, which is not generally regarded as a 'hotspot' of endemics restricted to that zone.

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3. RESULTS

Parts of the study area have previously experienced a high level of degradation due to the historic establishment of the existing Wlotzkasbaken settlement and carelessly driven vehicle tracks, although there are extensive patches where little or no disturbance is evident.

3.1 Habitats

Based mainly on perennial woody and succulent species, the following four habitats were distinguished in the study area (Sections 3.1.1 to 3.1.4). The two sensitive habitats, i.e. The coastal hummock belt and the large dolerite ridge are outlined in Figure 4, left hand side. The middle shows both developments (A and B) overlaid, with the northern part of Development A and its access road impinging on the areas of concern. The right-hand side of the figure shows the overlap of the northern section of Development A and its access road with those two habitats. The other areas of overlap are designated as Conservation areas or Public Open Space, which will cause less damage if access and use is managed properly.

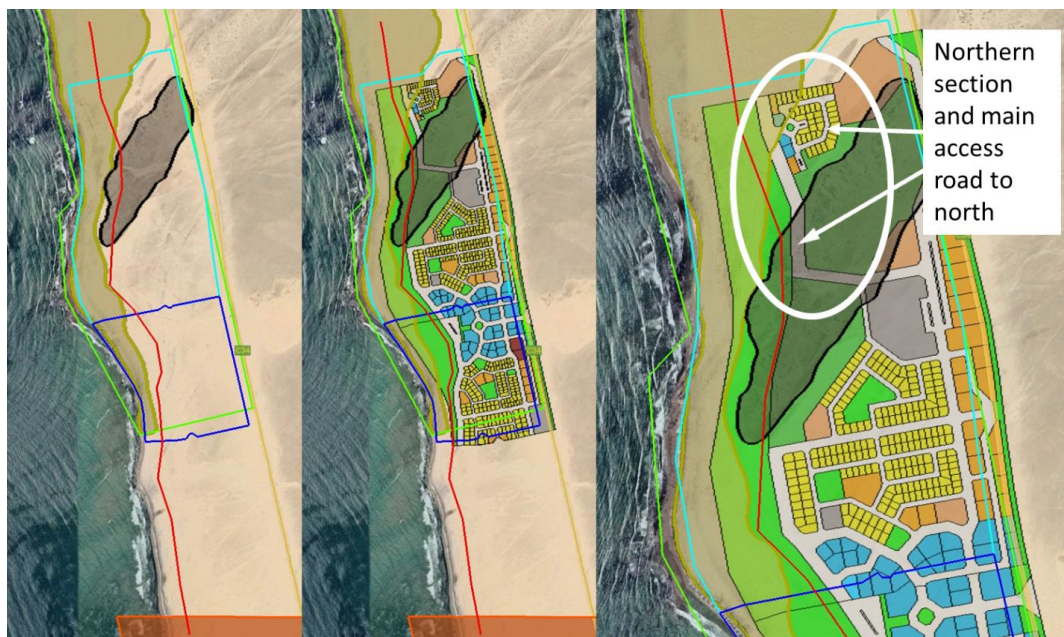


Figure 4: Left-hand side showing mapped sensitive zones – Olive green = Coastal Hummock Belt; Black = Large Dolerite Ridge. Middle showing both proposed developments overlaid. Right-hand side showing overlap of the northern part of Development A and its access road with the sensitive areas. Red = coastal setback line.

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3.1.1 *Zygophyllum clavatum* coastal hummock belt

This hummocky habitat is restricted to a coastal belt directly inland from the littoral zone in the study area and represents the first line of vegetation (Figure 5). Characteristic species are *Zygophyllum clavatum*, *Brownanthus kuntzei* and *Arthroerua leubnitziae* (which are dominant), and *Zygophyllum stapfii*. This habitat is badly degraded in some parts of the study area, due to human and vehicle impact (Figure 6).



Figure 5: The coastal hummock belt, which lies west of the Swakopmund-Henties Bay road, directly adjacent to the beach. This image shows an area that is still in good condition, relatively untouched by careless driving.

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Figure 6: There are severely degraded coastal hummock areas directly south of the existing Wlotzkasbaken settlement and towards the southern edge of the proposed development area B. In between there are parts that are partly damaged, and some that are still in very good condition, as seen in Figure 4.

No plant species of high conservation concern was found in this habitat. *Zygophyllum clavatum* is restricted to a narrow coastal strip but it occurs right down into South Africa and is not regarded as threatened at present.

The coastal hummock belt is a highly restricted habitat because it is so narrow, and is not present along the entire coastline. The substrate in this zone is more consolidated than in the surrounds, many burrowing animals occur here, and the plants provide food, shelter, and nesting places for many species of insects and vertebrates. Its total area is probably less than 100km². Because it has already been affected by mining and infrastructural projects, as well as tourism developments such as Mile 14 and human impacts such as vehicle tracks, in future cumulative damage may become a problem to endemic and near-endemic plant and animal species that are restricted to this habitat.

Sensitivity: HIGH

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3.1.2 Dolerite ridges

These ridges vary from a well-developed area with species-diverse succulent vegetation and large boulders that offer numerous microhabitats unavailable elsewhere in the study area (Figure 6), to lower, less developed ridges (Figure 7) that gradually taper off into low, dark, gravelly areas only slightly higher than the surrounding plains. Besides harbouring endemic and protected plant species, some of restricted distribution, they very often carry well-developed lichen communities as well. Taken as a whole, the cumulative area of these ridges within the central Namib is extremely limited, making them a habitat of high concern.



Figure 7: Because the substrate in this zone is more consolidated than in the surrounds, many burrowing animals occur here, and the plants provide food, shelter, and nesting places for many species of insects and small vertebrates.

Characteristic species, of which many are endemic and at least one protected, include *Euphorbia giessii*, *Euphorbia lignosa*, *Jamesbrittenia maxii*, *Kleinia longiflora*, *Heliotropium oliveranum*, *Eberlanzia sedoides*, *Pelargonium otaviense*, and *Sarcocaulon marlothii* with *Brownanthus kuntzei*, *Zygophyllum stapffii*, *Tetragonia reduplicata*, *Drosanthemum luederitzii*, and *Arthraerua leubnitziae* dominant. *Hoodia pedicellata* occurs occasionally.

The higher diversity found here can be ascribed in part to greater niche diversity as well as higher moisture levels due to fog collection. These factors are also likely to account for the occurrence of disjunct species such as *Euphorbia giessii* and *Hoodia pedicellata*. Regardless of whether there may or may not be other equally diverse ridges in the central Namib this is an exceptionally large and important ridge, and an 'island' of high plant diversity in the study area.

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In the study area some of these ridges are poorly developed (Figure 8) and carry a depauperate species complement, mainly *Arthroerua leubnitziae*, *Drosanthemum luederitzii*, *Zygophyllum stapfii* and *Tetragonia reduplicata* (i.e. the dominant species on the ridges in general) as well as many lichens.



Figure 8: There are several smaller dolerite ridges in the area that are less developed and harbour lower plant diversity than the big one.

Sensitivity: Large Ridge – VERY HIGH, smaller ridges – LOW.

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3.1.3 *Arthroerua*-Lichen plains

This habitat is dominated by *Arthroerua leubnitziae*, an endemic but common and relatively widespread succulent shrub (Figure 9). *Tetragonia reduplicata*, *Zygophyllum stapffii* and *Drosanthemum luederitzii* are occasionally present.

Diversity is very low on these plains, and no species of high concern was found.

Sensitivity: LOW



Figure 9: The plains are characterised by a dominance of *Arthroerua leubnitziae*, an endemic species with a reasonably wide distribution in the central Namib.

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3.1.4 Saline pans

There are a number of saline depressions present within the study area. They are characterised by fine, dark sand of an 'oily' consistency and often have crusty surface salt deposits. Those remote from regular inflow from the sea are almost always without any vegetation whatsoever. Those that lie closer to the sea and always contain standing water, or get regular inflow, usually carry quite dense marginal stands of a single species, *Sarcocornia natalensis*, a low-growing halophytic succulent. However, *Zygophyllum clavatum* and *Z. stapfii* are usually also present close by.

No plant species of high conservation concern occur in this habitat.

Sensitivity: LOW

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3.2 Species and their occurrence

3.2.1 Plants

The study site and surrounds fall into the fog-dependent zone of the central Namib, as described by Irish (1994). Thirty-five species are recorded for the area, or were seen during the fieldwork (Appendix 1). The proportion of the species listed in Appendix 1 that are endemic, near endemic and/or protected is 44%.

Endemic species, i.e. those that are thought only to occur within the political boundaries of Namibia are generally regarded as conservation priorities and may, *inter alia*, be used to determine habitat sensitivity. However many of these are reasonably widespread, occurring well beyond the central Namib and are thus of less concern than species that have a more limited extent of occurrence. Endemic and near-endemic species that are restricted to specific, and often limited, habitats or exhibit very disjunct distribution are of additional concern.

Because endemic and Red Data species, in particular those of restricted extent of occurrence, are regarded as useful biodiversity indicators in the central Namib (Burke et al 2008), those found in the study area are discussed in Table 1 below, together with several other endemic, near endemic and protected species considered to be of concern for the reasons listed. Those thought to be of high concern (3 species) are listed in red. All three of them were only found on the large dolomite ridge. They are all largely restricted to such habitats, greatly reducing their potential area of occurrence in the central Namib.

Table 1: Overview of restricted-range endemic species, protected species and near-endemic species of concern found in the study area.

Species	Longevity	Habitat in central Namib	Most recent conservation status (Nature Conservation Ordinance No. 4 of 1975 and red Data status)	Habitats in study area where species occurs	Habitats in Development areas A & B where species occurs	Notes
Endemic species known from the central Namib and one other vegetation zone only						
<i>Senecio engleranus</i>	annual	Grows in a variety of habitats	LC	All, except saline depressions.	All, except saline depressions.	A very common species, widespread in the fog zone of the central Namib. Establishes easily in disturbed

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						areas.
<i>Stipagrostis namibensis</i>	annual	Grows in depressions on sandy plains	LC	Not seen.	Not seen.	Locally common in places.
Endemic species known from the central Namib and more than one other vegetation zone						
<i>Arthraerua leubnitziae</i>	perennial, long-lived	Depressions, drainage lines, gulleys, plains, hills, rocky outcrops and inselbergs	LC	All, except saline depressions.	All, except saline depressions.	Fog-dependent, potentially impacted by several uranium developments. A common species.
<i>Euphorbia giessii</i>	perennial	Only occurs on rocky ridges, commonly seen on dolerite ridges in study area	LC	Large dolerite ridge only.	Large dolerite ridge.	Possibly fog-dependent, restricted to the desert biome, with the majority of records from the central Namib or just beyond into the northern Namib.
<i>Hermbstaedtia spathulifolia</i>	perennial	Occurs along drainage lines and runnels.	LC	Shallow Washes.	Shallow Washes.	A common species, reasonably widespread.
<i>Jamesbrittenia barbata</i>	perennial	Occurs on gravel and stony plains and in sandy or gravelly watercourses.		Not seen.	Not seen.	A common species, reasonably widespread.
<i>Zygophyllum stapfii</i>	perennial, long-lived	Drainage lines, rivers, rocky slopes, shallow	LC	All, except saline depressions.	All, except saline depressions.	Fog-dependent, potentially impacted by

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		depressions on plains				several uranium developments. A common species.
Near-endemic, protected species not mentioned above						
<i>Hoodia pedicellata</i>	perennial	Marble and other rocky ridges and slopes	Protected, R	Large dolerite ridge only.	Large dolerite ridge.	Occurs exclusively on rocky ridges in the coastal fog zone of the Namib desert. Main threat at present thought to be illegal collection.
<i>Larryleachia marlothii</i>	perennial	Marble and other rocky ridges and slopes	Protected, LC	Large dolerite ridge only.	Large dolerite ridge.	Reasonably widespread, but sparsely distributed and cumulative impacts due to mining of concern.
For the purposes of this study herbarium records of taxa of conservation concern from the National Herbarium of Namibia (WIND) and the National Herbarium Pretoria (PRE) as well as distributions from Merxmüller (1966-1972), Hilliard 1994, Bruyns 2014 and own observations were compared to the vegetation map of Atlas of Namibia Team (2022) to assess their extent of occurrence.						
Red Data Categories						
LC = Least concern; NT = Near threatened; R = Rare						
Sources: S. Loots (Red Data Officer, National Botanical Research Institute) <i>pers. comm.</i> , Klaassen & Kwembeya 2013.						

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4. Discussion and recommendations

Due to careful planning and thoughtful placement of the Conservation and Public Open Space areas, much of the proposed Development Areas A and B avoid the two sensitive habitats. However, the main access road to the small residential section north of the dolerite ridge in Development A will cause substantial damage to the ridge due to the road itself, the collateral damage during construction, and traffic of vehicles and people after development.

This area should preferably be moved south of Development B, where the habitat is not sensitive. If this is not done, then the road should not be built, and the one parallel to the main road north should be used or, alternatively, a route as shown in Figure 10 below would be preferable. In addition, the Local Authority and Institutional Zones directly to the south of the Dolerite Ridge are too close and should be moved elsewhere or reduced in size. The small area allotted to parking for these two installations will likely result in areas of the ridge being damaged by random parking.

No entity, whether public or private, including developers, should be permitted to remove material such as rock or sand from the hummocks or the ridge for any purpose whatsoever.

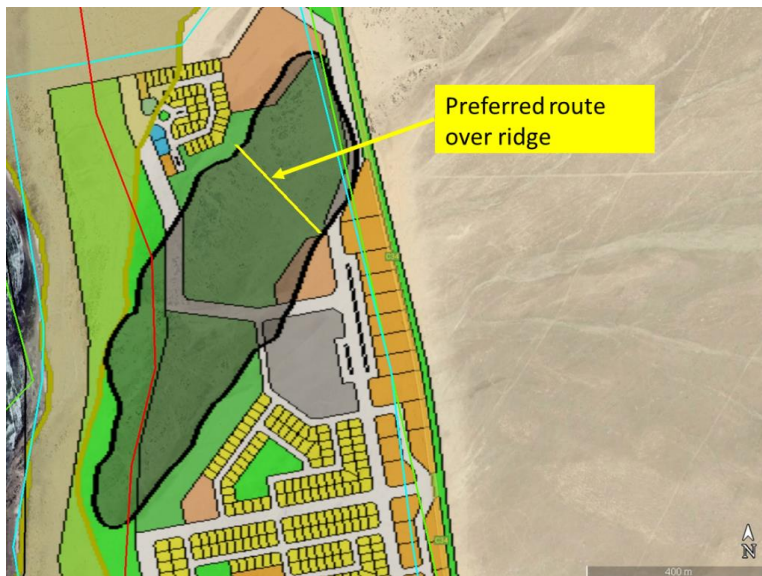


Figure 10: If there must be a road over the ridge, this would be a preferred route.

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5. Conclusions

Moving the northern part of Development A to south of Development B would absolutely minimise the damage likely to be done by this proposed project and result in negligible impact on plants and habitats of conservation concern.

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- Tree Atlas of Namibia (TAP) Database.

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Appendix 1: Species list for Study Area.

Species	Protected by Nature Conservation Ordinance	Red Data	Seen in study area	Seen in core area	Comments
Aizoanthemum galenioides (Fenzl ex Sond.) Friedrich		LC	1		
Amphibolia rupis-arcuatae (Dinter) H.E.K.Hartmann	P	LC			Reasonably widespread, coastal only
Arthroerua leubnitziae (Kuntze) Schinz		LC	1	1	Common, widespread
Brownanthus kuntzei (Schinz) Ihlenf. & Bittrich			1	1	
Cyperus laevigatus L.					
Drosanthemum luederitzii (Engl.) Schwantes			1	1	
Eberlanzia sedoides (Dinter & A.Berger) Schwantes	P		1		Relatively common and widespread, although restricted range and habitat in central Namib.
Euphorbia giessii L.C.Leach		LC	1		Restricted range and habitat.
Euphorbia lignosa Marloth		LC	1		Common, widespread.
Galenia africana L.		LC			
Galenia procumbens L.f.			1	1	
Heliotropium oliveranum Schinz			1	1	
Hermstaedtia spathulifolia (Engl.) Baker		LC	1	1	
Hoodia pedicellata (Schinz) Plowes	P	R	1		Uncommon, restricted range and habitat.
Hypertelis caespitosa Friedrich			1		
Jamesbrittenia barbata Hilliard					Relatively common and widespread.
Jamesbrittenia maxii (Hiern) Hilliard			1	1	
Kleinia longiflora DC.			1		
Larryleachia marlothii (N.E.Br.) Plowes	P	LC	1		Widespread but uncommon and restricted habitat.

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<i>Limeum argute-carinatum</i> Wawra ex Wawra & Peyr. var. <i>argute-carinatum</i>		LC			
<i>Lycium decumbens</i> Welw. ex Hiern		DD	1	1	
<i>Mesembryanthemum cryptanthum</i> Hook.f.			1	1	
<i>Odyssea paucinervis</i> (Nees) Stapf					
<i>Pelargonium otaviense</i> R.Knuth		LC	1		
<i>Psilocaulon salicornioides</i> (Pax) Schwantes		LC	1	1	Common, widespread, readily colonises disturbed places.
<i>Sarcocaulon marlothii</i> Engl.		LC	1		Reasonably widespread and common, but restricted to rocky ridges.
<i>Sarcocornia natalensis</i> (Bunge ex Ung.-Sternb.) A.J.Scott			1	1	
<i>Senecio engleranus</i> O.Hoffm.		LC	1	1	Common annual, produces a lot of seed and readily colonises disturbed places.
<i>Sesuvium sesuvioides</i> (Fenzl) Verdc. var. <i>angustifolium</i> (Schinz) Gonç.			1	1	
<i>Stipagrostis hermannii</i> (Mez) De Winter		LC	1		
<i>Stipagrostis hirtigluma</i> (Steud. ex Trin. & Rupr.) De Winter subsp. <i>hirtigluma</i>		LC			
<i>Stipagrostis namibensis</i> De Winter		LC			Restricted range, but common where it occurs.
<i>Tephrosia dregeana</i> E.Mey. var. <i>dregeana</i>					
<i>Tetragonia reduplicata</i> Welw. ex Oliv.			1	1	
<i>Zygophyllum clavatum</i> Schltr. & Diels		LC	1	1	Common, widespread, although cumulative impacts could be problematic in future.
<i>Zygophyllum simplex</i> L.		LC	1	1	
<i>Zygophyllum stapffii</i> Schinz		LC	1	1	Common, widespread, although cumulative impacts could be problematic in future.
Red Data status from Klaassen & Kwembeya (2013) and S. Loots (Red Data Officer, NBRI), <i>pers. comm.</i> DD = Data deficient LC = Least concern R = Rare					
			25	16	

Wlotzkasbaken May 2023

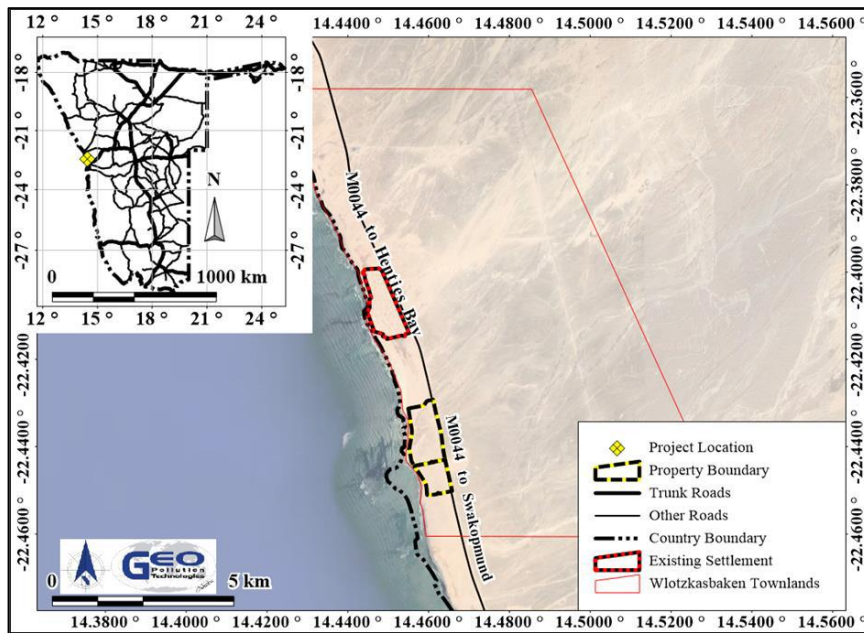
Endemic					
Near-endemic					

Wlotzkasbaken May 2023

Appendix E Avifauna Specialist Study

Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, Namibia

Avifauna baseline/scoping and assessment



Prepared by:

African Conservation Services cc



Prepared for:

Geo Pollution Technologies (Pty) Ltd



31 July 2023

Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, Namibia
 Avifauna baseline/scoping and assessment (31 July 2023)

Name of project	Environmental Impact Assessment for the proposed Wlotzkasbakn Township Development Extension, Erongo Region, Namibia Avifauna baseline/scoping and assessment
Principal client	Erongo Regional Council
Lead Environmental Assessment Practitioner	Geo Pollution Technologies (Pty) Ltd PO Box 11073, Windhoek, Namibia www.thenamib.com Tel: +264 61 257 411 / +264 816 934822 E-mail: wkotzkaT@thenamib.com; quzette@thenamib.com Representative: Quzette Bosman
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Report version and date	Draft 1: 3 July 2023 Draft 2: 31 July 2023

Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, Namibia
Avifauna baseline/scoping and assessment (31 July 2023)

Expertise and declaration of independence

We, African Conservation Services cc, as the appointed independent avifauna specialist for the Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, hereby declare that we:

- have acted as the independent specialist in this Environmental Clearance Certificate application;
- have expertise and experience in conducting the avifauna specialist report relevant to this application;
- have performed the work relating to the application in an objective manner;
- regard the information contained in this report as it relates to our specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the EIA;
- declare that there are no circumstances that may compromise our objectivity in performing such work;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- have no vested interest in the proposed activity proceeding;
- undertake to disclose to the applicant and the competent authority all material information in our possession that reasonably has or may have the potential of influencing the decision of the competent authority; and that
- all the particulars furnished by us in this specialist input/study are true and correct.

Name of specialist: African Conservation Services cc

Representatives:



HA Scott

RM Scott

Date: 31 July 2023

Executive summary

Geo Pollution Technologies (Pty) Ltd (GPT) was appointed by the Erongo Regional Council (the Proponent) to undertake **an environmental impact assessment (EIA)** for their proposed Wlotzkasbaken Township Development Extension 1 and 2. Spatial planning required for the intended development of the township includes consideration of biophysical features, social structures and economic opportunities. The establishment of the township is an ongoing process facilitated by WinPlan Town and Regional Planning Consultants. In terms of the Environmental Management Act, Act No 7 of 2007, the proposed township development requires an environmental clearance certificate (ECC). A scoping environmental assessment report and a draft environmental management plan, to accompany an application for the ECC, have therefore been commissioned. The purpose thereof is to determine the impacts the proposed township development will have on the environment. The present avifauna baseline/scoping and assessment forms part of the above EIA.

The **study site** lies within the Namib Desert Biome, characterised by extreme aridity. The vegetation type in the coastal study area is classed as Central Desert, with the dominant structure comprising sparse shrubs and (further inland) grasses. Lichen species are well represented on the coast.

The proposed development site is situated on the coast of the Atlantic Ocean. The inland habitat is mainly flat, sandy-gravel plains with sparse vegetation. The open gravel plains near the coast are an important breeding habitat for the Damara Tern, one of the priority species. The above flat areas are broken by a striking rocky outcrop with boulders, and sparse low shrubs (known as Black Rocks). The near-endemic, nomadic Gray's Lark was observed in these habitats in 2023. The species also makes use of the ephemeral drainage lines further inland. The coast at the township development site is mixed rocky and sandy. The coastal network of aquatic habitats in the surrounding areas has a high protected status and is associated with a rich birdlife, with frequent bird movements among sites. However, much of this fragile desert habitat has been degraded, mainly by offroad driving and associated tracks.

According to the baseline and scoping of bird habitats and species, the study area is potentially **sensitive** for certain bird species, especially when viewed in the broader context of adjacent protected habitats, including two nationally protected areas and a chain of coastal wetlands (with a Ramsar site and several Important Bird Areas).

A total of 110 bird species has been recorded for the study area and surrounds, representing 16% of the 676 species currently recorded in Namibia. This **species richness** is regarded as relatively high for such a limited area, and emphasises the importance of aquatic habitats in the greater, arid area. These include coastal wetlands such as Mile 4 Saltworks, some 19 km to the south of the proposed development site, where waterbirds are concentrated.

The above checklist includes a total of 20 species (18%) with Red Data status. Of these, 15 species (75%) are also Globally Threatened. The checklist also includes three species (3%) that are near-endemic to Namibia, and at least 29 species (34%) with some form of migrant status. Breeding for Damara Tern is confirmed in the greater study area (south of the development site) for 2022-2023, and in the area north of the desalination plant intake site in 2021-2022. Breeding is also suspected for Gray's Lark in the greater area (2023).

Risk assessment and mitigation efforts are directed towards priority species, namely those that have a high biological significance, i.e. primarily Red Data species (including those with migrant status) and/or endemic or near-endemic species.

Seventeen priority bird species have been short-listed from a total of 44 potential priority species, as a focal group identified, on the basis of local abundance, as being at higher risk to potential

impacts resulting from the proposed project. The emphasis for assessment should be on groups of birds likely to be at risk, rather than on individual species; and the precautionary principle should prevail.

The 17 short-listed priority species comprise the following:

Five Red Data species (four of which are also Globally Threatened)

Aquatic species

- **Damara Tern** (Near Threatened, Globally Vulnerable; breeding Namibian near-endemic [breeding in greater area 2021-22 (N) and 2022-23 (S)], intra-African migrant)
- Lesser Flamingo (Vulnerable; Globally Near Threatened; nomadic, [partial] intra-African migrant)
- *Greater Flamingo (Vulnerable; nomadic, [partial] intra-African migrant)
- Curlew Sandpiper (Near Threatened, Globally Near Threatened; Palearctic migrant)
- African Oystercatcher (Near Threatened, Globally Near Threatened; resident, juveniles disperse)

Two species near-endemic to Namibia (90% of population)

- **Damara Tern** (also included under Red Data species above)
- ***Gray's Lark** (nomadic; suspected breeding in greater study area, see Figure 42 below)

Ten other (non-Red Data) migrant species

- Common Greenshank (Palearctic migrant)
- Common Ringed Plover (Palearctic migrant)
- *Grey Plover (Palearctic migrant)
- Sanderling (Palearctic migrant)
- Common Tern (Palearctic migrant)
- Sandwich Tern (Palearctic migrant)
- *Greater Crested (Swift) Tern (local migrant)
- Ruddy Turnstone (Palearctic migrant)
- *Eurasian Whimbrel (Palearctic migrant)
- *Red-capped Lark (resident, nomadic, intra-African migrant)

Species with the potential to cause impacts

Examples are provided of species with the potential to cause impacts, including on infrastructure and with the potential to be attracted as scavengers.

The above 17 priority bird species are potentially at risk to the following two main impacts, rated as follows:

- **Physical/human disturbance of birds, including noise impacts, road mortality and poaching, and light disturbance**
 - Construction: -2: A less negative impact
 - Daily operations: -2: a less negative impact
 - Indirect impacts: -1: a reduced negative impact
- **Direct and indirect modification/loss/ destruction of bird habitat**
 - Construction: -2: A less negative impact
 - Daily operations: 0: no alteration
 - Indirect impacts: -2: A less negative impact

Recommendations are made for mitigation and monitoring for the Environmental Monitoring Plan. An adaptive approach to mitigation is recommended, dependent on the feeding of the results of ongoing monitoring into management strategies. The effective application of the above mitigation should help reduce the impacts of the proposed development. However, ongoing monitoring is considered essential, both during construction and post-construction, with periodic evaluation of monitoring results.

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Abbreviations, acronyms and glossary of terms

AEWA	African-Eurasian Migratory Waterbird Agreement
CBD	Convention on Biological Diversity
CMS	Convention on Migratory Species
DEA	Department of Environment Affairs
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EIS	Environmental Information Service
EMA	Environmental Management Act
EMP	Environmental Management Plan
Endemic	Occurring within a restricted range
Endemic status categories	
	E = endemic, NE = near-endemic, SA = southern Africa, Nam = Namibia
IBA	Important Bird Area
IUCN	International Union for the Conservation of Nature
IUCN Red List categories	
LC	Least Concern
NT	Near Threatened
VU	Vulnerable
EN	Endangered
CE	Critically Endangered
EW	Extinct in the Wild
EX	Extinct
G	Global status
MEFT	Ministry of Environment, Forestry and Tourism
Pentad	A 5-minute x 5-minute coordinate grid super-imposed over the continent for spatial reference; nine pentads make up one Quarter Degree Square
QDS	quarter degree square
Residency categories	
	R = resident, N = nomadic, M = migrant, V = vagrant; Ra = rare
SABAP	Southern African Bird Atlas Project (SABAP1 & SABAP2)

1 Background

1.1 Introduction

Geo Pollution Technologies (Pty) Ltd (GPT) was appointed by the Erongo Regional Council (the Proponent) to undertake an environmental impact assessment (EIA) for their proposed Wlotzkasbaken Township Development Extension 1 and 2 (BID for the project: Geo Pollution 2023). Figure 1 presents the proposed township development in relation to the existing Wlotzkasbaken Township (Wlotzkasbaken Proper). Spatial planning required for the intended development of the township includes consideration of biophysical features, social structures and economic opportunities. The establishment of the township is an ongoing process facilitated by WinPlan Town and Regional Planning Consultants.

In terms of the Environmental Management Act, Act No 7 of 2007, the proposed township development requires an environmental clearance certificate (ECC). A scoping environmental assessment report and a draft environmental management plan, to accompany an application for the ECC, have therefore been commissioned. The purpose thereof is to determine the impacts the proposed township development will have on the environment. The present avifauna baseline/scoping and assessment forms part of the above EIA.

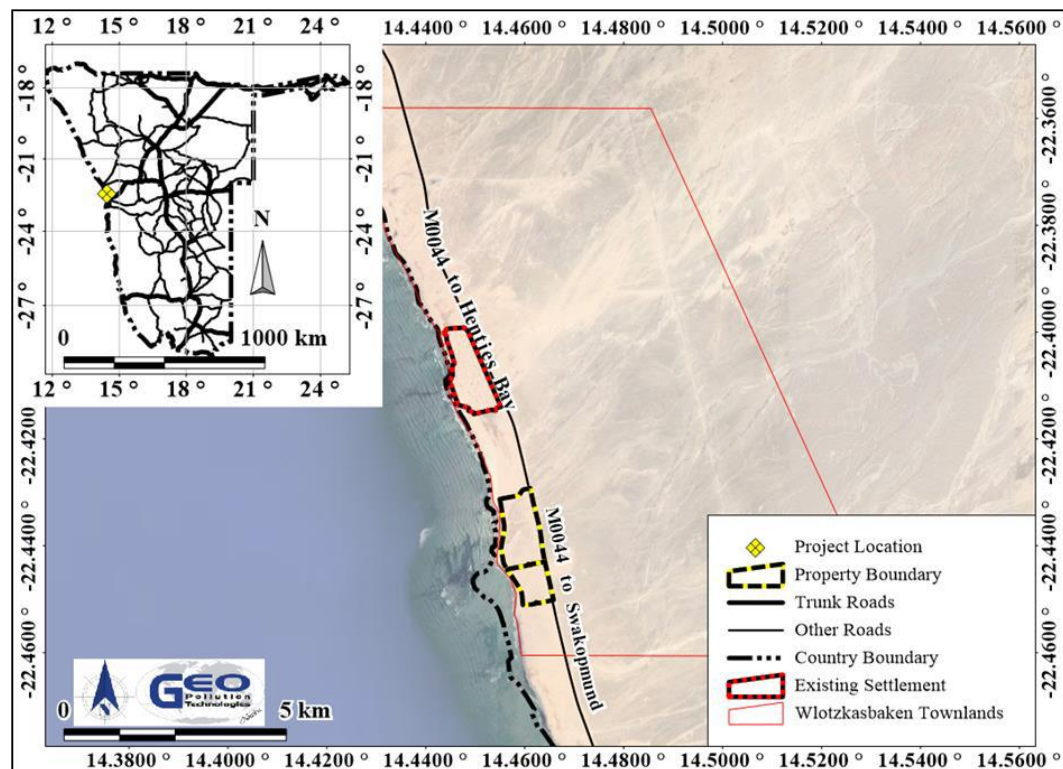


Figure 1. Project location for the proposed Wlotzkasbaken Township Extension Project, Erongo Region, showing the existing settlement and the proposed new township extension (map Geo Pollution Technologies).

1.2 Current status of Wlotzkasbaken and proposed township development (

According to the BID for the project (Geo Pollution Technologies 2023), Wlotzkasbaken was proclaimed a settlement area in 1993, known as the Wlotzkasbaken Village (Wlotzkasbaken Proper). There are currently 258 erven in the village, of which some are vacant. Along with the proclamation, a townlands area was demarcated around the settlement. The Townlands of Wlotzkasbaken is known as Wlotzkasbaken Town and Townlands No. 221. Although located inside of the Dorob National Park, the Townlands area is excluded from the park. In addition, a considerable portion of the Townlands is undevelopable due to biophysical sensitivities.

As part of the Erongo Regional Council's strategic planning, the coastal area of Wlotzkasbaken was identified as an area to accommodate additional coastal development. Therefore, the Erongo Regional Council initially embarked on the development of a township adjacent to the existing settlement. The locality of the proposed township development has since changed to an area approximately 2 kilometres south of the existing Wlotzkasbaken Proper.

A draft structure plan was developed through a matrix consideration of bio-physical and conservation constraints and existing amenities such as the water pipeline, and the existing village. Three main options for future township establishment were considered. Known as Option 1, Option 2 and Option 3, the various alternatives were presented to the Erongo Regional Council to consider. Ultimately the Erongo Regional Council resolved that Option 2 deems to be the most favourable option, to not only incorporate the known constraints from an environmental perspective, but this option also offers the opportunity for future growth (which is limited in the areas surrounding Wlotzkasbaken Proper). Option 1 and option 3 for the proposed township will be considered as alternatives in the environmental assessment.

Township components

As part of the development mandate received from the Erongo Regional Council, the proposed township development will include the provision of approximately 522 erven of varying land use and zoning. The proposed layout of these erven was based on various site visits and township development guidelines. As such, a new central business district, residential areas, institutional areas and public open space were tailored within proposed township layout. The layout makes provision for two extensions, Extension 1 (Figure 2) and Extension 2 (Figure 3).

The spatial form of the layout plans was dominated by the desire to establish a local authority area that will ultimately provide a variety of choice for future inhabitants, whilst also focusing on the provision of social services, a defined business area and possibilities for future growth. In addition to this, the layout proposal incorporates known environmental limitations. The rocky outcrop/ridge area (known as Black Rocks) has been incorporated in the layout proposal under the zoning "conservation". This implies that no development may take place on the erven as indicated.

As a direct result of known coastal erosion in the coastal areas where the above development is proposed, a coastal degradation study was conducted and consequently a coastal setback line was proposed for the study area. The recommendations of this study was incorporated in the layout proposals for Extension 1 and 2. The Township layout components for Extension 1 is presented in Figure 4-1 and the layout proposal for Extension 2 depicted in Figure 4-2.

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Figure 2. Detail of Extension 1 (the northern section) of the proposed new Wlotzkasbaken Township Extension (map Geo Pollution Technologies).



Figure 3. Detail of Extension 2 (the southern section) of the proposed new Wlotzkasbaken Township Extension (map Geo Pollution Technologies).

Most services associated with the township development will be provided by the Proponent. These include water supply, sanitation, waste removal, road and related infrastructure maintenance, public open space management, etc. Some of these services will require the establishment of large infrastructure components such as bulk water supply lines and effluent treatment plants. Such infrastructure components will for the most part be located outside of the proposed township footprint and will be subject to separate environmental assessments, which will have to consider component specific aspects in relation to its ultimate location or route. All things remaining equal, such services will be provided as follows:

- Bulk electricity supply to be provided by Erongo Red as sourced from NamPower (via an overhead power line to a distribution point at the township).
- Bulk water supply to be provided by NamWater from their existing and planned bulk water supply lines (via a reservoir(s) and bulk supply pipeline up to a distribution point at the township).
- Wastewater treatment facilities and services by the Proponent (via sewers to an effluent treatment plant via a bulk sewage line).
- General waste management by the Proponent (collection, transportation and disposal of household waste to a registered landfill site).

For services provision within the proposed township footprint itself, the following was proposed and will be included in the environmental assessment:

- The provision of potable water to each erf via an underground and metered reticulation system.
- Sewer lines from each erf via an underground sewer system.
- General waste removal services for domestic waste via a collection system (garbage trucks).
- The provision of electricity via underground cable systems to each erf.

1.3 Preliminary identified impacts

It is foreseen that the establishment of the township will make a positive contribution to Namibia's Gross Domestic Product and will create much needed employment opportunities in especially the construction sector which, in the recent past, has suffered some decline. The development will increase tax revenues and will also bring about improvements for basic service delivery such as water and sanitation. During the environmental assessment, all elements of the environment will be considered and those foreseen to be significantly affected will be highlighted and related specialist assessments conducted. Sensitive environmental aspects include, but are not limited to, the following:

- Geology and soil,
- Land use and tourism potential,
- Habitats for sensitive fauna and flora species; in this regard the present avifauna assessment was therefore requested,
- Air quality (dust),
- Noise,
- Settlement and community character,
- Archaeological resources,
- Road management and traffic incidents,
- Social ills and deviance due to in-migration,
- Economic resilience, diversification and development,
- Groundwater (aquifer contamination), and
- Surface water (run-off and contamination).

2 Approach and methodology

2.1 General approach

The aim of the avifauna baseline/scoping and assessment study is to identify and assess potential environmental impacts of the proposed township development in terms of avifauna, and to make mitigation, management and monitoring recommendations for the Environmental Management Plan (EMP). In particular, possible negative impacts on Damara Tern (Near Threatened, Globally Vulnerable) and its habitat should be investigated.

The study includes a baseline scoping of the project area, some 26 km north of Swakopmund, on the northern coast of Namibia (Figure 1). A desk-top study was supported by short site visits on 14 April 2023 and 15 May 2023.

Two sources of bird distribution data were used (Brooks et al. 2022). The primary data, for the first Southern African Bird Atlas Project (SABAP1; Harrison et al. 1997), were gathered during 1987-1992. This information is available on the Environmental Information Service (EIS; www.the-eis.com; EIS 2023). SABAP1 data are recorded on a quarter degree square (QDS) basis and are extremely comprehensive, although the information dates back to 1992.

A follow-up Southern African Bird Atlas Project (SABAP2) was initiated in South Africa in 2007 and in Namibia in 2012 (<http://sabap2.adu.org.za>). This information comprises more recent distribution data on a finer scale (in units termed pentads, or 5-minute x 5-minute coordinates; nine pentads make up one QDS). Although the distribution data are at a finer scale, the data collected to date for Namibia are still patchy and not yet as extensive as those for SABAP1; in particular, the study area is poorly atlased in parts, and the results should be interpreted with caution. It is therefore advisable to use a combination of SABAP1 and SABAP2 data.

The bird checklist for the present study (Appendix 1) is based on both SABAP1 data for one quarter degree square (QDS 2214AD), and SABAP2 data for two pentads (2220_1425, 2225_1425) that fall within the above QDS (Figure 4). For the above SABAP1 and SABAP2 sources, as well as for observations made in the field (April-May 2023), presence/absence of species is indicated (Appendix 1).

Other sources of information include the Environmental Information Service (see above), and the Atlas of Namibia (Mendelsohn et al. 2002; Atlas of Namibia Team 2022; <https://atlasofnamibia.online/>); the Red Data Book for Birds in Namibia (Simmons et al. 2015), other published sources (e.g. Hockey et al. 2005), the global International Union for the Conservation of Nature (IUCN) Red Data list for birds (www.iucnredlist.org; IUCN 2023); discussions with local birders; and both the authors' 35+ years of experience of working together on and observing birds in southern Africa, including in Namibia. The above sources were used to compile one combined checklist for the study area.

Several recent EIA studies in the greater area pertain to the present study area, and relevant information was incorporated in the present study (with updates as necessary), namely:

- Environmental Impact Assessment for the Proposed Desalination Project at Mile 6, near Swakopmund, Namibia. Final EIA Report (CSIR & Enviro Dynamics 2009).
- Social and Environmental Impact Assessment for the Proposed Rössing Uranium Desalination Plant, near Swakopmund, Namibia (Aurecon & SLR Environmental Consulting 2014).
- Social and Environmental Impact Assessment for the Proposed Rössing Uranium Desalination Plant, near Swakopmund, Namibia: avifauna study (African Conservation Services for Aurecon & SLR Environmental Consulting 2014b).

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- Social and Environmental Impact Assessment for the Proposed Rössing Uranium Desalination Plant, near Swakopmund, Namibia: additional avifauna study: Monitoring of Damara Terns at Mile 4 Salt Works, summer 2014/2015 (African Conservation Services for Aurecon & SLR Environmental Consulting 2014a).

Potential sensitivities of the avifaunal environment were assessed according to standard criteria, i.e. in the context of protected area status; major topographical features and vegetation habitats; and wetland habitats including ephemeral rivers and associated wetlands (EIS 2023). Avifaunal habitats that are limited in the present context were identified.

Potential sensitivities of the bird species were assessed in terms of criteria identified for "priority species" that include bird species diversity (according to recorded distribution data, see above); the most recent Red Data status, both on a national scale (Simmons et al. 2015; and an update by Brown et al. 2017) and global scale (IUCN 2023; see above); uniqueness or endemism/near-endemism to Namibia (i.e. having $\geq 90\%$ of their global population in this country) (Simmons et al. 2015; Brown et al. 2017); residency/migrant status (for Red Data species); an indication of local abundance, based on presence/absence for the above sources; any recorded breeding in the area (focusing on Red Data and endemic species); and other ecological aspects.

The methodology for the assessment of impacts is outlined below (Section 2.2).

Gaps in baseline data were identified where applicable, and an indication of the confidence levels is provided. Recommendations were made for future work in terms of the EIA process.

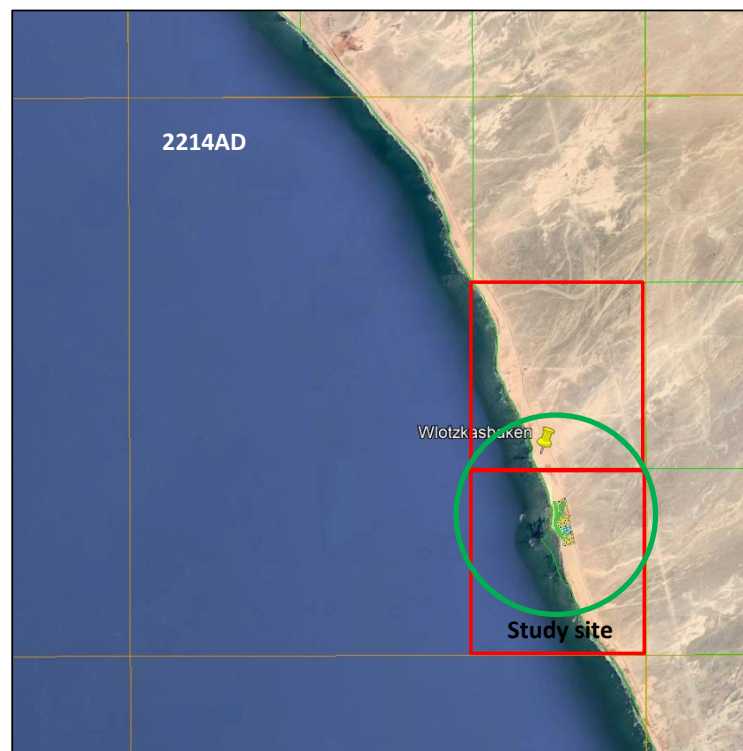


Figure 4: The bird atlas data for the study site is based on SABAP1 data for one quarter degree square (QDS 2214AD; brown block), and SABAP2 data for two pentads (2220_1425, 2225_1425; red blocks) that fall within the above QDS.

Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, Namibia
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2.2 Impact assessment methodology

The impact assessment was done according to the methodology of Geo Pollution Technologies (Pty) Ltd (Table 1).

For each impact, an environmental classification was determined based on an adapted version of the Rapid Impact Assessment Method (Pastakia 1998; Table 2). Assessment of impacts is based on the following categories: importance of condition (A1); magnitude of change (A2); permanence (B1); reversibility (B2); and cumulative nature (B3).

The environmental classification is calculated as follows:

$$\text{Environmental classification} = A1 \times A2 \times (B1 + B2 + B3)$$

The environmental classifications of impacts and the respective classes are provided in Table 2.

The probability ranking refers to the probability that a specific impact will happen following a risk event. These can be improbable (low likelihood); probable (distinct possibility); highly probable (most likely); and definite (impact will occur regardless of prevention measures).

Table 1. Assessment criteria.

Criteria	Score
Importance of condition (A1) – assessed against the spatial boundaries of human interest it will affect	
Importance to national/international interest	4
Important to regional/national interest	3
Important to areas immediately outside the local condition	2
Important only to the local condition	1
No importance	0

Magnitude of change/effect (A2) – measure of scale in terms of benefit / disbenefit of an impact or condition	
Major positive benefit	3
Significant improvement in status quo	2
Improvement in status quo	1
No change in status quo	0
Negative change in status quo	-1
Significant negative disbenefit or change	-2
Major disbenefit or change	-3
Permanence (B1) – defines whether the condition is permanent or temporary	
No change/Not applicable	1
Temporary	2
Permanent	3
Reversibility (B2) – defines whether the condition can be changed and is a measure of the control over the condition	
No change/Not applicable	1
Reversible	2

7

Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, Namibia
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Irreversible	3
Cumulative (B3) – reflects whether the effect will be a single direct impact or will include cumulative impacts over time, or synergistic effect with other conditions. It is a means of judging the sustainability of the condition – not to be confused with the permanence criterion.	
Light or No Cumulative Character/Not applicable	1
Moderate Cumulative Character	2
Strong Cumulative Character	3

Table 2. Environmental classification (Pastakia 1998).

Environmental Classification	Class Value	Description of Class
72 to 108	5	Extremely positive impact
36 to 71	4	Significantly positive impact
19 to 35	3	Moderately positive impact
10 to 18	2	Less positive impact
1 to 9	1	Reduced positive impact
0	-0	No alteration
-1 to -9	-1	Reduced negative impact
-10 to -18	-2	Less negative impact
-19 to -35	-3	Moderately negative impact
-36 to -71	-4	Significantly negative impact
-72 to -108	-5	Extremely Negative Impact

2.3 Approach to mitigation

According to international best practice, a hierarchical approach to mitigation is recommended, comprising four steps in sequence (Bennun *et al.* 2021). Implementing this hierarchy is an iterative (rather than a linear) process, that involves ongoing monitoring, incorporating the feedback into adaptive management where necessary. Avoidance and minimisation measures prevent or reduce impacts, whereas restoration and offset measures attempt to remedy impacts that have already taken place.

The mitigation hierarchy can be applied throughout a project's life cycle, from early planning and design, through to construction, operations and eventual decommissioning and repowering.

The mitigation hierarchy comprises the following steps:

- **Avoidance** is based on measures to anticipate and prevent the creation of impacts. Biodiversity risks need to be identified early in the project planning stages. Effective avoidance can occur through site selection (to ensure projects are not located in areas of high risk), project design (to locate infrastructure and select designs that avoid impacts) and scheduling (to ensure the timing of project activities is favourable for biodiversity).
- **Minimisation** refers to measures taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided, as far as is practically feasible. Potential

minimisation measures can be identified during early planning, and when developing design alternatives to be considered. Measures to minimise impacts can be applied throughout the project cycle.

Minimisation actions fall into three broad categories:

- **Physical controls:** adapting the physical design of project infrastructure to reduce potential impacts such as reducing habitat fragmentation through the installation of culverts or installing bird flight diverters on power lines.
- **Operational controls:** measures taken to manage and regulate the actions of people, including project staff and contractors, such as restricting access to sensitive sites within the project area.
- **Abatement controls:** steps taken to reduce levels of pollutants (e.g. light, noise, gases or liquids) that could have negative biodiversity impacts.
- **Restoration** refers to measures that aim to repair specific biodiversity features or ecosystem services damaged by project impacts that could not be completely avoided or minimised. Restoration is typically undertaken either during construction, or towards the end of a project as part of decommissioning and/or repowering.
- **Offsets** are measures to compensate for significant adverse residual impacts that cannot be avoided, minimised or restored. Offsets involve positive conservation interventions to generate biodiversity gains either through **avoided loss** (addressing threats to prevent predicted biodiversity loss) or **restoration** (for example, improving the quality of degraded habitat). Offsets can be complex and expensive to implement. Fortunately, solar projects can usually avoid the need for offsets through careful siting and effective minimisation measures that reduce residual impacts to negligible levels.

2.4 Limitations and assumptions

Limitations

- A major limitation to the assessment and mitigation of potential impacts from the development is that the site visits took place outside the breeding season of Damara Tern (i.e. October-March), once the species had completed its annual migration northwards. This limitation is addressed by the recommendation to conduct additional surveys of the species during the coming summer season. In addition, the available results of a separate Damara Tern study in the greater area from the start of the present breeding season (2022-2023) and the previous season (2021-2022; M Boorman pers. comm.) were incorporated, as well as the findings of a previous monitoring study for the species in the same (Mile 4) area (African Conservation Services for Aurecon & SLR Environmental Consulting 2014a, b).

Assumptions

- Combined SABAP1 and SABAP2 and other data used in this report provide a representative indication of the bird species likely to occur in the study area throughout the seasonal and inter-annual cycles.
- It is assumed that the cumulative levels of disturbance from existing developments in the area, including at the present township as well as the Erongo Desalination Plant, will be maintained at the present level (or an increased level) for the life of the project, which could potentially act as a deterrent for some bird species in the area.

In all the above respects, the precautionary principle should therefore apply.

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3 Legislation and international conservation agreements

The avifauna impact assessment is conducted in accordance with, and ensuring compliance with, the following legal requirements, agreements, and best practice standards and guidelines (Table 3).

Table 3. Legislation, conservation agreements, best practice standards and guidelines for the avifauna impact assessment.

3.1 Namibian environmental legislation	
Namibian Constitution, 1990	<p>Environmental conservation is entrenched in the Namibian Constitution (1990, Article 95, Promotion of the Welfare of the People), in terms of which the State shall actively promote and maintain the welfare of the people by adopting, <i>inter alia</i>, policies aimed at the following:</p> <p>(l) 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 ...</p> <p>The above description would include the promotion of sustainable energy developments.</p>
Namibian Environmental Management Act, 2007 (Act no. 7 of 2007)	<p>The Environmental Impact Assessment (EIA) process in Namibia is governed and controlled by the Environmental Management Act (EMA), 2007 and the EIA Regulations 30 of 2012 (Anon. 2012), which are administered by the office of the Environmental Commissioner through the Department of Environment Affairs (DEA) of the Ministry of Environment, Forestry and Tourism (MEFT).</p> <p>The above Act requires the full consideration of biodiversity (including birds), habitat and landscape parameters, values and criteria as part of the environmental assessment processes. The present avifauna scoping and assessment study forms part of the above process.</p> <p>Under this legislation, activities that may not be undertaken without an Environmental Clearance Certificate (ECC) include energy generation, transmission and storage activities.</p>
Namibian Nature Conservation Ordinance of 1975	<p>The study area does not fall within an officially protected area proclaimed under the above Nature Conservation Ordinance of 1975. However, it does lie fairly close to two officially protected areas proclaimed under the Nature Conservation Ordinance of 1975, namely the Waterberg Plateau Park to the south-east, with the Etosha National Park to the north-west.</p> <p>The conservation of terrestrial birds in Namibia is governed by the Nature Conservation Ordinance of 1975. It is envisaged that the above Ordinance will eventually be replaced by the (draft) Parks and Wildlife Management Bill (2005). The list of Specially Protected Birds according to this Bill is based on the Namibian Red Data Book (Simmons et al. 2015), and the Namibian Red Data categories in the latter document are used in the present report, together with those of a recent update (Brown et al. 2017).</p>

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3.2 International conservation agreements	
Convention on Biological Diversity (CBD) Post-2020 Biodiversity Framework	Namibia is a signatory to the international Convention on Biological Diversity (CBD). The CBD is the overarching multilateral environmental agreement for biodiversity, with 196 Parties comprising nearly all the world's countries (Bennun et al. 2021). The CBD's post-2020 global biodiversity framework will build on the Strategic Plan for Biodiversity 2011–2020 and sets out an ambitious plan to implement broad-based action to bring about a transformation in society's relationship with biodiversity and to ensure that, by 2050, the shared vision of living in harmony with nature is fulfilled.
Convention on the Conservation of Migratory Species of Wild Animals (CMS)	The Convention on the Conservation of Migratory Species of Wild Animals (CMS 2011) is an intergovernmental treaty with global remit (Bennun et al. 2021). A number of relevant agreements and memorandums under the CMS umbrella include the Agreement on the Conservation of African-Eurasian Migratory Birds (AEWA) and the Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MOU). Namibia is classed as a range state for AEWA but, although guided by its principles, is not yet a contracting party to this international agreement.
United Nations Sustainable Development Goals (SDGs)	Seventeen United Nations Sustainable Development Goals (SDGs) were adopted by all UN Member States in 2015, as part of the 2030 Agenda for Sustainable Development, which set out a 15-year plan to achieve the Goals (Bennun et al. 2021). Namibia has been a member state of the United Nation since 1990. SDGs relevant to energy and biodiversity include: GOAL 7: Affordable and Clean Energy - Ensure access to affordable, reliable, sustainable and modern energy GOAL 13: Climate Action - Take urgent action to combat climate change and its impacts GOAL 15: Life on Land - Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss
United Nations Framework Convention on Climate Change (UNFCCC)	Since 1995, Namibia has been a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) as a Non-Annex I party (NAI). As party to the convention, Namibia is obliged to prepare and submit National Communications (NCs) and in addition Biennial Updated Reports (BURs) (http://www.met.gov.na/services/national-communications-and-biennial-update-reports/238/). The adoption of the Paris Climate Change Agreement (2015; under the above convention) has also brought home the need for low-carbon development based on environmentally-friendly technologies.
Important Bird and Biodiversity Areas (IBAs)	The BirdLife International Important Bird and Biodiversity Area (IBA) Programme aims to identify, monitor and protect a global network of IBAs for the conservation of the world's birds and other wildlife (Barnes 1998; Simmons et al. 1998b; Simmons et al. 2001; Kolberg 2015). These areas were initially known as Important Bird Areas. IBAs are thus sites of international significance for the conservation of birds at the Global, Regional (Continental) or Sub-regional (southern African) level, selected according to a set of four criteria based on globally threatened

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	<p>species, restricted-range species, biome-restricted species and congregations (Kolberg 2015). However, not all IBAs receive official protection.</p> <p>Namibia has 21 IBAs. The nearest IBA to the study site are the Mile 4 Saltworks; with five other IBAs in the vicinity (see Section 4.1.3 below).</p>
Wetlands of International Importance (Ramsar 1971)	<p>Ramsar sites receive special protection status in terms of the Convention on Wetlands of International Importance, 1971 (Ramsar; https://www.ramsar.org/). To date five Ramsar sites have been proclaimed in Namibia. These include the Walvis Bay wetlands, and Sandwich Harbour, both on the coast.</p>
3.3 Best practice standards and guidelines for birds and energy	
<p>World Bank Environmental and Social Framework (World Bank 2016); International Finance Corporation Performance Standards on Environmental and Social Sustainability (IFC 2012)</p>	<p>The World Bank Environmental and Social Framework (ESF) sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards (ESS) that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity.</p> <p>The ESF includes the Environmental and Social Standards, which set out the requirements that apply to Borrowers. These include:</p> <p><i>ESS1 Assessment and Management of Environmental and Social Risks and Impacts:</i> sets out the Borrower's responsibilities for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of a project supported by the Bank through Investment Project Financing (IPF), in order to achieve environmental and social outcomes consistent with the Environmental and Social Standards (ESSs).</p> <p><i>ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources:</i> recognises that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development; it recognises the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support. The objectives include:</p> <ul style="list-style-type: none"> • To protect and conserve biodiversity and habitats; • To apply the mitigation hierarchy and the precautionary approach in the design and implementation projects that could have an impact on biodiversity; and • To promote the sustainable management of living natural resources. <p>The World Bank Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).</p> <p>The World Bank Group Environmental, Health and Safety Guidelines are endorsed by the International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (https://www.ifc.org/; IFC 2012) and by the Equator Principles (July 2020), a global financial industry benchmark for determining, assessing and managing environmental and social risk in projects (www.equator-principles.com).</p>

4 Potential sensitivities

4.1 Avifaunal environment

4.1.1 Climate

The coastal study site lies within the Namib Desert Biome (Mendelsohn et al. 2002; Atlas of Namibia Team 2022), characterised by extreme aridity.

The average annual rainfall is at the extreme low end of the scale, namely <50 mm. Coastal fog is thus a crucial source of water for many plants and animals throughout the year.

Average annual temperatures in this desert environment are also relatively low (>18°C), due to the influence of the cold Benguela Current and the South Atlantic Anticyclone (Mendelsohn et al. 2002).

The dominant wind direction is from the south, with wind speeds averaging 10-30 km per hour (Mendelsohn *et al.* 2002). Hot and dry east winds blow occasionally, with much dust at times.

4.1.2 Major topographical features and avifauna habitats

The dominant landscape in the study area is classed as Coastal Plain. The Namib land surface in this area consists mostly of flat, slightly undulating gravel plains, with occasional ridges. The dominant soil types are petric gypsisols and petric alcisols (Mendelsohn et al. 2002; Atlas of Namibia Team 2022).

Falling within the Namib desert biome, the vegetation type in the coastal study area is classed as Central Desert, with the dominant structure comprising sparse shrubs and (further inland) grasses (Mendelsohn et al. 2002). Lichen species are well represented on the coast.

The proposed development site is situated on the coast of the Atlantic Ocean (Figure 1, 2 & 3). The inland habitat is mainly flat, sandy-gravel plains with sparse vegetation. The open gravel plains near the coast are an important breeding habitat for the Damara Tern, a priority species (see below).

The above flat areas are broken by a striking rocky dolerite ridge with boulders, and sparse low shrubs (known as Black Rocks; Figure 5). The near-endemic, nomadic Gray's Lark was observed in these habitats in 2023. The species also makes use of the ephemeral drainage lines further inland.

The coast at the township development site is mixed rocky and sandy. To the north, the major avifauna habitats include the Cape Cross wetlands/salt pans and guano platforms some 85 km away. The nearest coastal wetland, the Mile 4 Saltworks and its associated wetlands and other habitats lies 19 km to the south; followed by the Swakop River mouth, with a small/varying waterbody; a 30 km rocky/sandy beach backed by a dune belt; further bird guano platforms; and (some 63 km south of the development area) the extensive Walvis Bay Lagoon and associated wetland habitats on the Kuiseb River Delta.

The above network of aquatic habitats has a high protected status (see below) and is associated with a rich birdlife, with frequent bird movements among sites. However, much of this fragile desert habitat has been degraded, mainly by offroad driving and associated tracks (Figure 5).

"Critical Habitats" are defined as areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes (IFC 2012).

Although the coastal study site itself is not regarded as a critical habitat/habitat of significant importance in terms of the above definition, for species such as Damara Tern or Gray's Lark, these

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areas are nevertheless sensitive in terms of providing potential limited (breeding) habitats for such species that are already subject to cumulative habitat loss impacts.



Figure 5 a-f. Flat, sandy-gravel habitats with sparse vegetation within the proposed township development area (top; a-b); rocky dolerite ridge with boulders, and sparse low shrubs (known as Black Rocks; centre; c-d); and mixed rocky-sandy coastline (bottom left; e), showing habitat destruction caused by off-road driving (bottom right; f).

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Figure 6 a-d. Coastal habitats in the greater study area, showing breeding habitat for Damara Tern on gravels plains at Mile 4 Saltworks (top, left; a) and just north of the intake for the Erongo Desalination Plant site (top right; b); and extensive pan habitats and guano platforms at Mile 4 Saltworks, with many aquatic species (below; c-d).

4.1.3 Protected area status

The coastal study site lies adjacent to the Dorob National Park in the north, east and south, with the Namib-Naukluft Park 32 km to the south (Figure 7).

Several Important Bird and Biodiversity Areas (IBAs; Simmons et al. 1998, 2001; Kolberg 2015; Figure 7) are an important component of the avian habitats in the greater study area (see above). Formerly known as Important Bird Areas, IBAs are sites of international significance for the conservation of birds at the Global, Regional (Continental) or Sub-regional (southern African) level (Kolberg 2015; see above). IBAs are home to a large number of bird species and individuals, with regular movements among such habitats.

The closest IBA, the Mile 4 Saltworks (IBA N012; Figure 6, 7; see above) lies 19 km to the south of the township development area. Five other IBAs lie within the vicinity of the study area, including another four on the coast: some 40 km further to the south, the 30 Km-Beach: Walvis-Swakopmund (N013); Walvis Bay (N014; 63 km to the south); and, further to the south, Sandwich Harbour (N015). The Namib-Naukluft Park is also an IBA (N011). The Cape Cross Lagoon IBA (N010) lies 85 km to the north of the study site.

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The Mile 4 Saltworks coastal IBA comprises a private nature reserve of 400 ha (Panther Bake), proclaimed in terms of Ministry of Environment, Forestry and Tourism (MEFT) regulations, and a salt works (Simmons et al. 1998; Figure 7). The habitat has been extensively modified to create and maintain numerous shallow evaporation ponds of varying salinity. A large wooden commercial bird guano platform covering 30 000 m² has been built in one of the northern pans.

The Mile 4 Saltworks IBA is regarded as a wetland avifaunal habitat of regional and national significance, with populations of priority species that are of regional or national significance, i.e. (in 1998) Globally Threatened species (Lesser Flamingo [883-1,996 individuals], Black Oystercatcher [21-34], Damara Terns [12-88]; >1% of Cape Cormorant [45,400-700,000 individuals], Greater Flamingo [1,306-2,688] and Kelp Gull [372-706] populations; and >0.5% of Chestnut-banded Plover [50-200] populations, with breeding recorded for all but African Oystercatcher; this includes once-off breeding for Lesser Flamingo (40 pairs) and Greater Flamingo (64 pairs; Simmons et al. 1998), and again of Lesser Flamingo in 2019 (Scott et al. 2019).

The Walvis Bay IBA was also designated as a Ramsar site, or Wetland of International Importance, in 1995 (Kolberg undated, 2015; Figure 7; see above). Ramsar sites receive special protection status in terms of the Convention on Wetlands of International Importance, 1971 (Ramsar; <https://www.ramsar.org/>; Kolberg undated). To date, five Ramsar sites have been proclaimed in Namibia. The Walvis Bay site covers 12,600 ha and conforms to five of the eight Ramsar criteria.

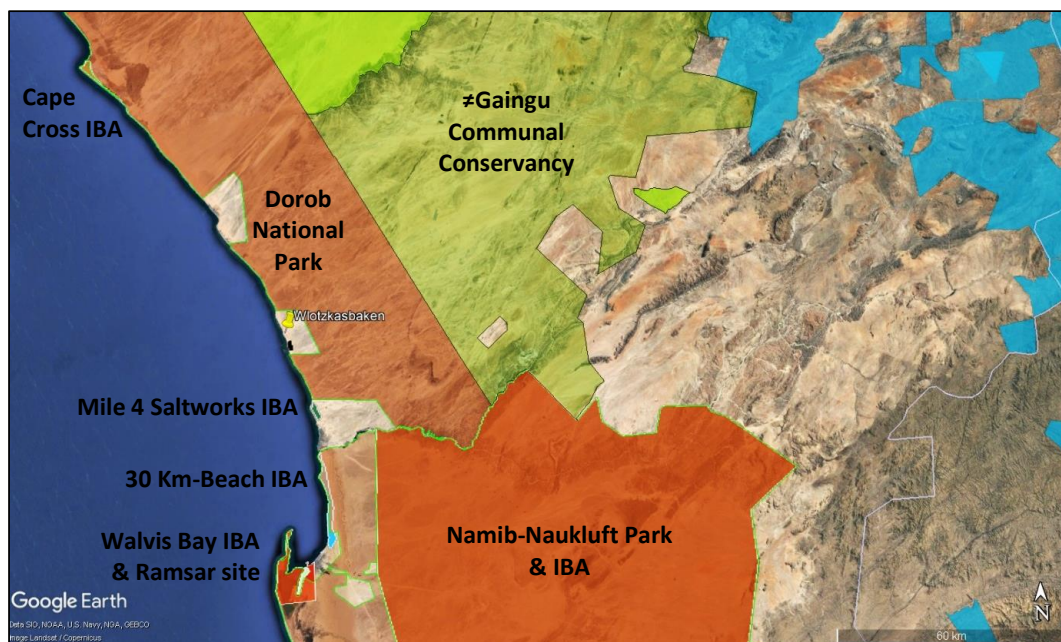


Figure 7. Protected areas (national parks, communal conservancies, freehold conservancies, Important Bird Areas [IBAs] and a Ramsar site) in the vicinity of the study area (EIS 2023).

4.2 Sensitivities in terms of bird species

4.2.1 Introduction

Sensitivities of the bird species in the area are discussed below, according to relevant criteria.

Risk assessment and mitigation efforts are directed towards priority bird species, defined as species that have a high biological significance, i.e. primarily Red Data species (including those with migrant status) and/or species endemic or near-endemic to Namibia. However, non-priority species may also be affected by impacts. An initial list of potential priority species is provided in Table 4 (below). This list is further refined, on the basis of likelihood of occurrence in the study area at present (see Section 4.3 below). Species confirmed during recent site visits (2023) are indicated by an asterisk.

4.2.2 Bird species richness and abundance

Species richness refers to the numbers of species in a community.

A total of 110 bird species has been recorded in the one QDS/two pentads for the coastal study site (SABAP1 and SABAP2 data; see Figure 4 Appendix 1). This number represents 16% of the 676 species currently recorded in Namibia (Brown *et al.* 2017). The above species richness is regarded as relatively high for such a limited sampling area, and emphasises the importance of aquatic habitats in the greater arid area. Within this area, species richness is variable, with the birds predominantly making use of aquatic (both coastal and marine) habitats and, to a more limited extent, of the terrestrial habitats inland.

Some of the main species discussed in terms of this coastal area are illustrated in Figure 8 below.

There are no coastal wetlands in close proximity to the proposed site itself, and the bird species richness at the site is relatively low, with an emphasis on coastal and marine birds using the coastal habitats.

At Mile 4 Saltworks, 19 km to the south of the proposed township development site, waterbirds are concentrated at a group of coastal wetlands (also see Section 4.1.3 above). This IBA occasionally supports very large numbers of birds, and in particular the guano platform has supported up to 700,000 Cape Cormorants in the past; an average of 45,000 cormorants was recorded at the turn of the century (Simmons *et al.* 1998). These habitats may also support more than 50,000 other waterbirds, including large numbers of Greater Flamingo and Lesser Flamingo, lower numbers of African Oystercatcher, and up to 100,000 Common Tern. Up to 1998, bi-annual wetland counts have yielded up to 93,000 birds of c 35 species.

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Figure 8 a-f. Typical bird species using coastal/marine habitats in the study area:

Top: Damara Tern (Near Threatened, also Globally Vulnerable; breeding Namibian near-endemic; intra-African migrant; left; a); Lesser Flamingo (Vulnerable; also Globally Near Threatened; partial intra-African migrant, with juvenile on the left; right; b);

Centre: Cape Cormorant (Endangered, also Globally Endangered; left; c); Hartlaub's Gull (Vulnerable; right; d)

Bottom: Palearctic migrant species - Grey Plover (left; e); and terrestrial Namibian near-endemic - Gray's Lark (right; f).

Although ongoing annual counts have not been conducted at the saltworks, more recent available counts (excluding cormorants) range from 3,056 birds (27 species) in January 2010 to 5,845 (21 species) in July 2014 and 2,930 birds (18 species) in July 2018 (African Waterbird Census: M Boorman in litt. in Anon. 2014). Counts are generally relatively higher in summer than in winter.

Some 80 km to the north lies Cape Cross IBA, with similar concentrations of waterbirds. As mentioned above, regular movements of birds take place along the coast.

4.2.3 Threatened status

The checklist for the coastal study area (110 species; Appendix 1) includes a total of 20 Namibian Red-listed species (18%; Simmons *et al.* 2015; Brown *et al.* 2017; Kolberg 2022), mostly aquatic (95%) and representing 26% of the 78 species currently on the Namibian Red List. Fifteen species (75%) are also Globally Threatened (IUCN 2023).

Especially relevant with regard to the greater study area, around 75% of Namibia's Red Data birds fall into one or more of the following groups (Simmons *et al.* 2015):

- Wetland birds (20 spp.)
- Coastal/marine birds (19 spp.)
- Birds impacted by power lines (10 spp.)
- Scavenging birds (10 spp.)

Of the above 20 threatened species in the study area, nine occur in sufficient numbers to have the potential to be impacted in some way by the project. These comprise one species that is Critically Endangered in Namibia, one Endangered, four Vulnerable and three Near Threatened (see below).

To the south, the Mile 4 Saltworks wetlands support 12 species that are Globally Threatened, namely: Lesser Flamingo, African Oystercatcher, Damara Tern (Simmons *et al.* 1998); and (added to this threatened list since 1998) Cape Cormorant, Bank Cormorant, Crowned Cormorant, Maccoa Duck, Chestnut-banded Plover, Curlew Sandpiper, Bar-tailed Godwit, Eurasian Curlew, Red Knot.

- 1% or more of population: Cape Cormorant, Greater Flamingo, Kelp Gull
- 0.5% or more of population: Chestnut-banded Plover

The 20 Red Data species are as follows (nine species with a higher probability of being present in the coastal study site area are indicated in bold; *species confirmed during recent site visits [2023] are indicated by an asterisk):

Aquatic species (19)

- **Cape Gannet** (Critically Endangered in Namibia, also Globally Endangered)
- ***Cape Cormorant** (Endangered, also Globally Endangered)
- **Lesser Flamingo** (Vulnerable, also Globally Near Threatened)
- ***Greater Flamingo** (Vulnerable)
- **Great White Pelican** (Vulnerable)
- ***Hartlaub's Gull** (Vulnerable)
- **Damara Tern** (Near Threatened, also Globally Vulnerable; see Figure 9 below for recent nesting records in the greater area)
- **Curlew Sandpiper** (Near Threatened, also Globally Near Threatened)
- **African Oystercatcher** (Near Threatened, also Globally Near Threatened)
- African Penguin (Endangered, also Globally Endangered)
- White-chinned Petrel (Vulnerable, also Globally Vulnerable)
- Caspian Tern (Vulnerable)
- Crowned Cormorant (Near Threatened, also Globally Near Threatened)
- Chestnut-banded Plover (Near Threatened, also Globally Near Threatened)

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- Eurasian Curlew (Near Threatened, also Globally Near Threatened)
- Bar-tailed Godwit (Near Threatened, also Globally Near Threatened)
- Red Knot (Near Threatened, also Globally Near Threatened)
- Sooty Shearwater (Near Threatened, also Globally Near Threatened)
- Black-necked Grebe (Near Threatened)

Terrestrial species (1)

- Ludwig's Bustard (Endangered, also Globally Endangered)

No raptors are included on the above list.

Damara Terns

Near Threatened in Namibia and Globally Vulnerable, the Damara Tern is a breeding Namibian near-endemic and coastal intra-African migrant that has been flagged as a species of concern for the present study (I&AP comments). Locally, there is variation in numbers and (some) breeding sites from year to year, although other core sites are used more consistently, e.g. Mile 4 Saltworks.

As the site visits for the present study (April-May 2023) took place outside the breeding season, no Damara Terns were observed, and no signs of nesting.

However, during an independent monitoring project, at the beginning of February 2023, at least 17 (possibly 20-30) Damara Tern nests were recorded <1 km south of the southernmost boundary of Extension 2 (the southern section) of the proposed township development (2.5 km north of Mile 4; Figure 1, 2 & 3, Figure 9), together with a day roost of 120 birds (M Boorman pers. comm. 2023). In addition, in 2021-2022 some 20 pairs of Damara Terns were recorded nesting in the area just north of the Erongo Desalination plant intake (8 km north of the study site), but were absent from this area in 2023 (M Boorman pers. comm. 2023; Figure 9).

At Mile 4 Saltworks (19 km to the south), the above observed recorded up to 100 Damara Terns (including at least 20 juveniles) on the beach and surrounding habitats on 13 February 2023, and 60-150 birds for the following 2-3 weeks (including 20% juveniles); and nine breeding events (M Boorman pers. comm. 2023) at what appears to be a regular, core breeding area.

During summer 2021-2022, covering the full breeding season and the total saltpan complex, some 180 Damara Terns were counted roosting on 28 February 2022, including 40 fledged juveniles (M Boorman pers. comm. 2 March 2022 in African Conservation Services 2022). By way of comparison, in March 2015, a maximum of 52 Damara Terns was recorded in the same area, and 15 nesting attempts with at least seven chicks (October 2014-April 2015; M Boorman pers. comm. in African Conservation Services 2014b). It is likely that the above large groups of these terns (including juveniles) amass from other areas from February onwards in preparation for a regular seasonal migratory flight northwards.

The Damara Terns thus appear to use some sites regularly, and other sites on a more irregular (and unpredictable) basis.

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Figure 9. Recorded Damara Tern nesting area in 2023, just south of the southernmost boundary of Extension 2 of the proposed township development; and in 2022 to the north of the Erongo Desalination Plant (M Boorman pers. comm. 2023; based on a Google Earth map).

4.2.4 Endemism

Endemism, or having a limited distribution due to specialised, restricted habitat requirements, renders a population more vulnerable to threats. The conservation of endemic species is a special responsibility of the country or region in which they occur. In Namibia, 15 species are near-endemic (with >90% of their populations in this country), and one species is fully endemic. Many more species are endemic or near-endemic to the greater southern African region.

The checklist of 110 species for the study area includes three species (3%) that are near-endemic to Namibia (Appendix 1). Of these, at least two (indicated below in bold; Figure 8) are potentially at risk to impacts from the project:

- **Damara Tern** (Near Threatened, and Globally Vulnerable; see Section 4.2.3 above for further details)
- ***Gray's Lark** (a small, nomadic terrestrial species that breeds on the Namib gravel plains inland of the coast itself)
- Rüppell's Korhaan (a medium-sized, sedentary terrestrial species; rare in the coastal study area)

Damara Terns were not observed during the site visits in April-May, as this was outside the breeding season (see above). However, recent nesting has been recorded in the surrounding areas.

One Gray's Lark was observed at the study site on 14 April 2023, in the Black Rocks boulder habitats (22.439514S 14.455702E). A group of five Gray's Larks was also observed nearby, just south of the Erongo Desalination Plant on 25 February 2023 (22.37942S 14.44306E), together with several suspected old (inactive) nest sites that appear to be used as roost sites (pers. obs.).

4.2.5 Residency, nomadism and migrant status (priority species)

Although many species on the bird checklist are resident, nomadic movements are common during at least some stages of life, due to changing and arid environmental conditions. Both short-distance and longer bird movements are possible. This is particularly true under the changing conditions associated with the coastal wetlands. Nomadic/migrant habits result in high mobility and consequently increase the risk of impacts such as collisions on overhead structures.

The conservation of migrant bird species is a shared responsibility of all the countries on such identified migrant routes. The priority bird checklist includes at least 29 species (34%) with some form of migrant status (Appendix 1). These include:

- 21 Palearctic/Arctic (non-breeding) migrants
- 6 intra-African (including breeding) migrants
- 2 partial/local migrants

Among the 20 Red Data species (see Section 5.2.1.2 above), at least eight species have some form of migrant status.

The 29 migrant species are as follows (16 species with a higher probability of being present in the coastal study site area are indicated in bold; *species confirmed during recent site visits are indicated by an asterisk):

- **Lesser Flamingo** (partial intra-African migrant)
- ***Greater Flamingo** (partial intra-African migrant)
- **Damara Tern** (breeding intra-African migrant)
- **Curlew Sandpiper** (Palearctic migrant)
- **Common Greenshank** (Palearctic migrant)
- **Parasitic Jaeger** (Palearctic migrant)
- **Common Ringed Plover** (Palearctic migrant)
- ***Grey Plover** (Palearctic migrant)
- **Sanderling** (Palearctic migrant)
- **Common Tern** (Palearctic migrant)
- ***Great Crested (Swift) Tern** (local migrant)
- **Sandwich Tern** (Palearctic migrant)
- **Ruddy Turnstone** (Palearctic migrant)
- ***Eurasian (Common) Whimbrel** (Palearctic migrant)
- ***Red-capped Lark** (intra-African migrant)
- **Barn Swallow** (Palearctic migrant)
- African Crake (intra-African migrant)
- Eurasian Curlew (Palearctic migrant)
- Bar-tailed Godwit (Palearctic migrant)
- Red Knot (Palearctic migrant)
- Chestnut-banded Plover (partial migrant)
- Common Redshank (Palearctic migrant)
- Ruff (Palearctic migrant)
- Common Sandpiper (Palearctic migrant)
- Little Stint (Palearctic migrant)
- Yellow-billed Stork (partial intra-African migrant)
- Arctic Tern (Palearctic migrant)
- Black Tern (Palearctic migrant)
- Little Tern (Palearctic migrant)

Only two of the above species are terrestrial (Red-capped Lark and Barn Swallow), the majority being aquatic.

The largest numbers of aquatic birds on the coast and its wetlands are found between October and April, when numerous summer migrant species are present. These species usually leave the area during the winter months. Occasional rare, vagrant species have also been recorded.

Species such as Greater Flamingo and Lesser Flamingo are known to move regularly up and down the coast between the coastal habitats, as confirmed by satellite tracking results.

4.2.6 Recorded breeding

Breeding of Damara Terns in the vicinity of the study area has been confirmed in 2022-2023, and in 2021-2022 (M Boorman pers. comm. 2023; see above). Other breeding records of Damara Terns in the greater area are outlined in Section 4.2.3 above.

(Limited) breeding of the near-endemic Gray's Lark is possible in the greater study area, immediately south of the Erongo Desalination Plant, based on the observation of a group of suspected old nest-roost sites in February-March 2023 (see Section 4.2.4 above). No breeding has been observed as yet in the township development area, including at Black Rocks.

Breeding activity (including chicks) of White-fronted Plover, has been observed in the vicinity of Wlotzkasbaken in 2023 (pers. obs.). Although This aquatic species is presently ranked as Least Concern, the chicks are increasingly vulnerable to impacts of off-road driving (Figure 10).

As yet, no other species is known to breed in the immediate study area and vicinity.

Nineteen km to the south, breeding species at Mile 4 Saltworks include Damara Tern, Chestnut-banded Plover, Kelp Gull, Hartlaub's Gull and Caspian Tern (Simmons *et al.* 1998, Simmons *et al.* 2015). More rarely, the first recorded breeding attempts there by both flamingo species took place in 1997, and again of Lesser Flamingo in 2019 (Scott *et al.* 2019); attempted breeding by Bank Cormorants has also been recorded there, and suspected breeding of the near-endemic Gray's Lark inland of the saltworks, while breeding of Red-capped Lark is also possible inland (Simmons *et al.* 1998). Breeding of Gray's Lark was confirmed on the gravel plains inland of Swakopmund in 2022 (pers. obs.). Although African Oystercatcher has not been recorded breeding in the greater area, the saltworks is an important nursery ground for juveniles that breed to the south (including at Lüderitz and in South Africa).



Figure 10. White-fronted Plover chick with cryptic colouration near the Erongo Desalination Plant intake site (January 2023), typically taking shelter among the vehicle tracks.

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4.2.7 Potential sensitivities of bird groups in the study area

Aquatic bird species

Of the 78 bird species currently on the Namibian Red List (Simmons et al. 2015), 20 species are wetland birds, and 19 species are coastal/marine. Over 90% of the 29 migrant species are aquatic.

Coastal and marine species (including migrant species) are considered to be in decline mainly due to food shortages from over-fishing of sardines; hooking of birds by long-line fisheries; and collisions with and catching by trawler cables on nets. Wetland birds are likewise threatened by habitat degradation; riparian woodland degradation; declining water quantity and quality; and disturbance.

However, in the present study the focus is on bird species using the terrestrial habitats adjoining the coast, particularly Damara Tern.

Terrestrial bird species

The Namibian near-endemic Gray's Lark is restricted to sparsely vegetated gravel plain habitats in north- and central-western Namibia, and is also subject to cumulative habitat loss impacts.

4.3 Bird species at risk

As mentioned above, risk assessment and mitigation efforts are directed towards priority species, namely those that have a high biological significance, i.e. primarily Red Data species (including those with migrant status) and/or endemic or near-endemic species.

For the study site and surrounding areas, 44 potential priority species were initially identified, narrowed down to 17 species on the basis of observed abundance in the study area (Table 4). Examples of non-priority species with the potential to cause impacts on infrastructure are also indicated in Table 4.

The 17 priority species may be subdivided into the following groups (species with confirmed occurrence in 2023 are indicated with an asterisk):

Five Red Data species (four of which are also Globally Threatened)

Aquatic species

- **Damara Tern** (Near Threatened, Globally Vulnerable; breeding Namibian near-endemic [breeding in greater area 2021-22 (N) and 2022-23 (S)], intra-African migrant)
- Lesser Flamingo (Vulnerable; Globally Near Threatened; nomadic, [partial] intra-African migrant)
- *Greater Flamingo (Vulnerable; nomadic, [partial] intra-African migrant)
- Curlew Sandpiper (Near Threatened, Globally Near Threatened; Palearctic migrant)
- African Oystercatcher (Near Threatened, Globally Near Threatened; resident, juveniles disperse)

Two species near-endemic to Namibia (90% of population)

- **Damara Tern** (also included under Red Data species above)
- ***Gray's Lark** (nomadic; suspected breeding in the greater study area, see Figure 42 below)

Ten other (non-Red Data) migrant species

- Common Greenshank (Palearctic migrant)
- Common Ringed Plover (Palearctic migrant)
- *Grey Plover (Palearctic migrant)
- Sanderling (Palearctic migrant)
- Common Tern (Palearctic migrant)
- Sandwich Tern (Palearctic migrant)
- *Greater Crested (Swift) Tern (local migrant)
- Ruddy Turnstone (Palearctic migrant)
- *Eurasian Whimbrel (Palearctic migrant)
- *Red-capped Lark (resident, nomadic, intra-African migrant)

Non-priority species with the potential to cause impacts

Several other (non-priority) bird species have the potential to impact on infrastructure, through their perching, nesting and other activities; some also have the potential to be attracted as scavengers, e.g. on food wastes, anglers' refuse. However, such impacts are considered to be low, and are not discussed further. Examples of these species are indicated in Table 4. These include:

(a) On infrastructure

- *Hartlaub's Gull, *Kelp Gull
- Speckled (Rock) Pigeon
- Cape Sparrow, House Sparrow

(b) By having the potential to be attracted as scavengers

- Great White Pelican
- *Hartlaub's Gull, *Kelp Gull
- Pied Crow, Cape Crow

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Table 4. List of potential priority bird species for the proposed Wlotzkasbaken Township Development Extension

*Common and scientific names according to SABAP2 website (<http://sabap2.adu.org.za>); also see Roberts Bird Guide 2016 (Chittenden *et al.* 2016)

KEY:

PRIORITY STATUS (species most likely to be impacted indicated in bold; see Appendix 1 for scientific names)

– **Conservation status**

- **Red Data status** (Simmons *et al.* 2015, Brown *et al.* 2017; red): CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern/Secure; G = global status; rare = now rare in Namibia
- **Endemism** (Simmons *et al.* 2015, Brown *et al.* 2017; green): NE = near-endemic; Nam = Namibia (≥90% of population in Namibia); s Afr = southern Africa; B = breeding
- **Residency**: R = resident, N = nomadic, M = migrant (blue), V = vagrant, Ra = rare, par = partial; migrant species: pal = Palearctic, intra-Afr = intra-African

Hab = Habitat: M = purely/predominantly marine; A = aquatic (freshwater/marine/coastal waterbodies); T = terrestrial

BIRD ATLAS DATA (see Figure 4 above)

- **SABAP1**: Southern African Bird Atlas Project 1 data that was published as Harrison *et al.* (1997), available on EIS 2023 (QDS 2214AD)
- **SABAP2**: Southern African Bird Atlas Project 2 data, available on <http://sabap2.adu.org.za>; (see Figure 9) (presence or absence; pentad 2220-1425; 2225_1425)
- **Latest record**: SABAP2 (RR[%] = reporting rate as %; full protocol or ad hoc)
- **Additional records**: personal observation 2023

PROB

- Probability of (priority) species occurring in study area: H = high, M = moderate, L = low, I = improbable

IMPACT

- Provisional screening of potential impacts: D = disturbance; H = habitat impacts; O = other impacts: species with the potential to cause impacts on infrastructure through nesting, perching or other activities; species with the potential to be attracted as scavengers

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Common group	Common species	Cons status	Residency/ other sensitivities	Hab	SABAP1 (1987-1991)	SABAP2			Additional records	Prob	Impact
						2220_1425		2225_1425			
						FP (RR%)	Latest record				
A. Red Data/Namibian near-endemic species with the potential to be impacted by the project (23)											
Red Data species (20)											
Tern	Damara	NT, G VU, B NamNE	Br intra-Afr mig	M	v	33.3	2021	2022		M-H	D, H
Flamingo	Lesser	VU, G NT	Nom, intra-Afr mig	A (M)	v	5.7	2020	2022	Satellite tracking data	M	(D)
Flamingo	Greater	VU	Nom, intra-Afr mig	A (M)	v	13.8	2021	2020	Pers obs 2023 Satellite tracking data	L-M	(D)
Sandpiper	Curlew	NT, G NT	Pal mig	M, A	v	9.2	2021	2020		L-M	D
Oystercatcher	African	NT, G NT	Res, juvs disperse	M	v	11.5	2021	2020		L-M	(D)
Gannet	Cape	CR, G EN		M	v	24.7	2022	2022		M-H	
Cormorant	Cape	EN, G EN NE s Afr		M (A)	v	94.8	2022	2022	Pers obs 2023	H	
Penguin	African	EN, G EN		M	v	0.6	2018			L	
Bustard	Ludwig's	EN, G EN	Nom, local movements	T		0.6	2020			I	
Petrel	White-chinned	VU, G VU		M	v	0.6	2020			L	
Pelican	Great White	VU	Sed, nom	A, M	v	17.2	2021	2020		M	D?, S
Gull	Hartlaub's	VU	Sed, movements	A, M	v	79.3	2022	2022	Pers obs 2023	H	S
Tern	Caspian	VU	Res/sed/nom	M, A	v	7.5	2021	2014		L	
Cormorant	Crowned	NT, G NT End s Afr		M				2013		L	
Plover	Chestnut-banded	NT, G NT	Res, nom, par mig	A	v	1.7	2018	2014		L-I	

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Common group	Common species	Cons status	Residency/ other sensitivities	Hab	SABAP1 (1987-1991)	SABAP2			Additional records	Prob	Impact
						2220_1425		2225_1425			
						FP (RR%)	Latest record				
Curlew	Eurasian	NT, G NT	Pal mig	M (A)	√		Pre-1991	2013		L-I	
Godwit	Bar-tailed	NT, G NT	Pal mig	A, M	√		Pre-1991	2012		I	
Knot	Red	NT, G NT	Pal mig	M	√		Pre-1991			I	
Shearwater	Sooty	NT, G NT		M	√		Pre-1991			I	
Grebe	Black-necked	NT	Res, nom	A, M		0.6	2013	2014	Power line collisions	L	
Namibian near-endemic species (3)											
Tern	Damara	NT, G VU (see above); BNamNE	Br intra-Afr mig	M	√	33.3	2021	2022		M-H	D, H
Lark	Gray's	NamNE 90%	Nom	T	√	23.0	2021	2017	Pers obs 2023, suspected nesting area	H	D, H
Korhaan	Rüppell's	NamNE 90%	Sed	T	√		Pre-1991			I	
B. Other (non-Red Data) migrant species (21)											
Greenshank	Common		Pal mig	A	√	0.6	2013	2022		L-M	D
Plover	Common Ringed		Pal mig	A	√	1.7	2019	2014		L-M	D
Plover	Grey		Pal mig	M	√	62.1	2021	2022	Pers obs 2023	H	D
Sanderling			Pal mig	M, A	√	9.2	2022	2022		M	D
Tern	Common		Pal mig	M	√	31.0	2022	2022		M	D
Tern	Greater Crested (Swift)		Res, local mig	M, A	√	52.3	2021	2020		M-H	D

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Common group	Common species	Cons status	Residency/ other sensitivities	Hab	SABAP1 (1987-1991)	SABAP2			Additional records	Prob	Impact
						2220_1425		2225_1425			
						FP (RR%)	Latest record				
Tern	Sandwich		Pal mig	M	√	27.0	2022	2022		M	D
Turnstone	Ruddy		Pal mig	M	√	22.4	2021	2022		M	D
Whimbrel	Eurasian (Common)		Pal mig	M	√	27.0	2021	2022	Pers obs 2023	L-M	D
Lark	Red-capped		Res, nom, intra-Afr mig	T	√	36.8	2021	2021	Pers obs 2023	M	D
Swallow	Barn (European)		Pal mig	T	√	19.0	2021	2022	Pers obs 2023	M-H	
Jaeger	Parasitic		Pal mig	M	√	9.8	2021	2020		L-M	
Crake	African		Intra-Afr mig	A, T		0.6	2021			L	
Redshank	Common		Pal mig	A, M	√		Pre-1991	2012		I	
Ruff			Pal mig	A	√	0.6	2013	2014		I	
Sandpiper	Common		Pal mig	M, A	√	0.6	2019			L	
Stint	Little		Pal mig	M, A	√	6.9	2020	2020		L	
Stork	Yellow-billed		Res, partial intra-Afr mig	A		0.6	2016			I	
Tern	Arctic		Pal mig	M	√		Pre-1991	2014		I	
Tern	Black		Pal mig	M	√	0.6	2014	2014		L	
Tern	Little		Pal mig	M	√		Pre-1991			I	
D. Species with the potential to cause other impacts (examples)											
Species to impact on infrastructure through nesting, perching or other activities (I)											
Gull	Hartlaub's	VU (see above)	Sed, movements	A, M	√	79.3	2022	2022	Pers obs 2023	H	I
Gull	Kelp				√	98.3	2022	2022	Pers obs 2023	H	S
Pigeon	Speckled					5.7	2021				I

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Common group	Common species	Cons status	Residency/ other sensitivities	Hab	SABAP1 (1987- 1991)	SABAP2			Additional records	Prob	Impact
						2220_1425		2225 _ 1425			
						FP (RR%)	Latest record				
Sparrow	Cape				v	92.0	2021	2014		H	I
Sparrow	House				v	25.9	2021	2018			I
Species with the potential to be attracted as scavengers (S)											
Pelican	Great White	VU	Sed, nom	A, M	v	17.2	2021	2020		M	S
Gull	Hartlaub's	VU (see above)	Sed, movements	A, M	v	79.3	2022	2022	Pers obs 2023	H	S
Gull	Kelp				v	98.3	2022	2022	Pers obs 2023	H	S
Crow	Pied				v	8.0	2021	2022		H	S
Crow	Cape					12.1	2021			M	S

5 Impact description and assessment, and recommendations for Mitigation, management and monitoring

5.1 Introduction

Two potential impacts have been identified for the project, namely:

- Physical/human disturbance of birds, including road mortalities and/or poaching
- Direct and indirect modification/loss/destruction of bird habitat

Details of the priority bird species that could become affected by the above impacts are included in Table 4 (and Section 4.3) above.

The potential impacts of the proposed development are described and assessed below (Section 5.2). Recommendations are made for mitigation, management and monitoring. The recommended mitigation/management measures are based on the mitigation hierarchy (Bennun et al. 2021; see Section 2.3 above). A key, underlying requirement is a holistic approach to management, with ongoing awareness and communication amongst relevant stakeholders, and ongoing monitoring and periodic assessment of results, for an adaptive management approach.

Note that end-of-life/decommissioning management and mitigation follow the same principles as the construction phase, and are therefore not included in the project phases below.

5.2 Impact description, assessment and recommendations for mitigation, management and monitoring

5.2.1 Physical/human disturbance of birds, including noise impacts, road mortality and poaching, and light disturbance

Impact description

Physical/human disturbance from developments can potentially impact on birds during both the construction and operational phases, thereby affecting the presence and/or foraging and breeding success of key species. This disturbance includes noise impacts, road mortality and poaching, and effects of artificial lighting.

During the construction phase, vehicle activity (including heavy machinery) and human activity on the site is at a peak, with high levels of **disturbance and noise**. Once operational, the amount of disturbance in the case of a township development should continue, although probably at lower levels.

The results of disturbance may be indirect or direct, and could include:

- Avoidance and displacement of birds from areas suitable for them before development, either temporarily or permanently; possibly barrier effects to normal movements
- A reduction in bird breeding success due to displacement (including of territorial bird species)

Further forms of disturbance could include **road mortality and poaching** of birds (and of eggs). Once operational, these sources of mortality should decrease.

The results of road mortality/poaching are mainly direct, and could include:

- Unnatural mortalities or injuries of birds (adults and chicks), caused by road collisions or poaching

- Poaching of birds and/or eggs, resulting in reduced breeding success
- Indirectly, mortalities of adults could also lead to the mortalities of dependent chicks

Disturbance in the form of **artificial lighting** may impact on night-flying or migrant birds, especially in terms of causing disorientation and/or collisions on structures. Research indicates that lights can attract and confuse migrating birds (Gehring et al. 2009; Manville 2005, 2009, 2013). Some insectivorous birds may also be attracted to lights. New forms of lighting in areas that were previously unlit may affect movement patterns and corridors. Lighting will be in effect during operation (including security lighting).

Any new forms of disturbance may potentially become **cumulative** in view of existing disturbances in the greater area, e.g. due to the proximity of the existing Wlotzkasbaken township, and ongoing recreational activities along the coast.

Priority bird species in the study area that may potentially be impacted (temporarily or permanently) by disturbance as a result of the construction of the proposed township include:

- **Damara Tern** (Near Threatened, Globally Vulnerable; breeding Namibian near-endemic; intra-African migrant); breeding confirmed immediately to the south of the proposed footprint in 2022-2023, and further northwards in 2021/2022 (but not 2022/2023); with the potential to try to breed in the area in the future; the breeding season is lengthy, and (some) breeding sites and roosting sites are variable from year to year; disturbance could create stress for this territorial species, or cause displacement from the area; disturbance and lighting could enhance opportunities for predation of adults, chicks and eggs; impacts of disturbance are difficult to predict, but could become cumulative.
- ***Gray's Lark** (Namibian near-endemic; nomadic); suspected breeding in greater area; if breeding takes place within the study area there is the potential to become displaced by disturbance, most probably permanently.
- Other **shoreline/coastal birds/waders** (including migrants, e.g. Curlew Sandpiper, Ruddy Turnstone, Eurasian Whimbrel); disorientation for night-flying species (including migrants) may result from artificial lighting.

Impact analysis: Physical/human disturbance of birds, including noise impacts, road mortality and poaching, and light disturbance

Disturbance is known to impact on bird species in different ways, resulting in displacement that may be either temporary or permanent.

For construction and operation:

The **importance** of the impact is regional/national, and up to national/international, as it involves Red Data (Namibian and Global) species, and Namibian near-endemics that do not occur elsewhere, as well as (to some extent) migrant bird species, of international importance.

The **magnitude** of change is a negative change.

The **permanence** is temporary or permanent.

The **reversibility** is possible to some extent, but mainly irreversible.

The **cumulative** impact is moderate.

The **environmental classification** is a less negative impact during construction and daily operations (-2).

For indirect impacts:

The **importance** of the impact is local/immediately outside the footprint.

The **magnitude** of change is a negative change.

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The **permanence** is temporary or permanent.

The **reversibility** is possible to some extent, but mainly irreversible.

The **cumulative** impact is moderate.

The **environmental classification** is a reduced indirect impact (-1).

Table 5. Impact assessment: Physical/human disturbance of birds, including noise impacts, road mortality and poaching, and light disturbance.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Disturbance, including noise, may cause barrier effects to normal movements. Birds may avoid/leave the study site and surrounding areas (displacement), either temporarily or permanently. Disturbance to breeding birds can be severe (especially to territorial species); individuals affected but not populations. Road collisions/poaching may cause unnatural injuries or mortalities of birds (adults and chicks).	3 4	-1	2 3	2 3	2	-10 -13	-2	Definite
Daily Operations	Once operational, disturbance will continue, although at lower levels. Artificial lighting may cause disorientation of night-flying/migrant bird species. Artificial lighting may increase chances of predation on ground-nesting birds.	4	1	2 3	3	2	-12 -13	-2	Highly probable
Indirect Impacts	In the case of territorial species (e.g. Damara Tern), displacement could create stress, and reduced breeding success. Mortalities of adults could also lead to the mortalities of	1 2	-1	2 3	2 3	2	-8 -11	-1	Possible

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	dependent chicks, resulting in reduced breeding success. Disturbance of shoreline species may lead indirectly to loss of preferred habitats, e.g. for feeding.								
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Environmental classification and class values:

-1 to -9: A reduced negative impact (-1)

-10 to -19: A less negative impact (-2)

Mitigation and management recommendations: Physical/human disturbance of birds, including noise impacts, road mortality and poaching, and light disturbance

Desired Outcome: To reduce avoidable physical/human disturbance of birds during construction and operation.

Actions

Much of the noise and other disturbance associated with construction (and operation) is unavoidable. Impacts can, however, be kept to a minimum through responsible management practices.

Construction

Avoidance:

- Scheduling: adapt the timing of construction activities to avoid disturbing birds during sensitive periods (e.g. during breeding seasons). Before construction starts, the area should be surveyed at least twice during the Damara Tern breeding season (e.g. in January and February) for any signs of activity by this species; and for any other signs of nesting activity by Gray's Lark or other species. Disturbance of nesting birds should be avoided.

Minimisation:

- Abatement controls to reduce noise disturbance created during construction, e.g. all vehicles should be fitted with silencers.
- Operational controls to manage and regulate contractor activity:
 - Strict enforcement of a speed limit.
 - The construction activity should be restricted to the actual construction site and no unnecessary movement of vehicles or people should be allowed outside the construction zone.
 - Exclusion fencing should be erected around identified sensitive areas (e.g. pre-identified active Damara Tern nesting site to the south of the footprint; and in the Black Rocks area).
 - Strict enforcement of anti-poaching measures, with zero tolerance, and this should be emphasised during induction to contractors; offenders should be prosecuted.
- Ongoing promotion of awareness about the value of biodiversity and the negative impacts of disturbance, especially to breeding birds, and of poaching and road mortality.

Operation

- As far as possible, minimise the use of outdoor lighting. Security lighting should be kept to the minimum, and directed downward and away from any reflective surfaces; the pristine dark skies should be maintained, as far as possible (see <https://www.darksky.org>).

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- Lighting on any high structures (e.g. weather/communication masts) should preferably be flashing rather than static (G Martin pers. comm.); and red, intermittent lighting is recommended in general (Bennun et al. 2021), if permitted by the Namibian Civil Aviation Authority (NCAA).
- Enforce strict control of vehicular (including off-road bike) activity in the Black Rocks area; if possible, access should be permitted only on foot.
- Ongoing promotion of awareness about the value of biodiversity and the negative impacts of disturbance, especially to breeding birds, as part of a holistic approach to conservation.

Responsible Body

- Proponent
- Contractors

Data Sources and Monitoring

- Keep records of awareness training provided.
- Stress the need for reporting road mortality and poaching incidents, and clarify reporting procedures. Records should be kept of such incidents.
- Keep records of all other bird mortalities, including of migrant bird species.

5.2.2 Direct and indirect modification/loss/destruction of bird habitat

Impact description

Any removal or disturbance of natural habitat during the construction of the new township will result in a change to the habitat available to the birds in the area, potentially impacting on their ability to breed, forage and roost in the vicinity. The vegetation in the general area is sparse, but the small bushes and hummocks are important as habitat for smaller species such as Gray's Lark. Sensitive breeding habitats of Damara Tern on the coast may be modified or destroyed by the development. Such near-endemic species have restricted habitat requirements, and suitable breeding habitats are limited. The species nests in more open areas, which are also important e.g. for the detection of predators, and the loss of such habitats is a negative impact. Accidental spillage of fuels or other hazardous materials during construction and operations can result in contaminated sand. The above impacts may directly affect birds and their food sources.

The results of habitat destruction/modification may be indirect or direct, and could include:

- Avoidance and displacement of birds from areas suitable for them before development, either temporarily or permanently
- A reduction in bird breeding success due to displacement (including of territorial bird species)
- Permanent modification/destruction of sensitive habitats

Priority bird species in the study area that may potentially be impacted by habitat destruction as a result of the development include:

- ***Gray's Lark** (Namibian near-endemic; nomadic); suspected breeding in greater area; potentially displaced by habitat disturbance/loss, most probably permanently.
- **Damara Tern** (Near Threatened, Globally Vulnerable; breeding Namibian near-endemic; intra-African migrant); recorded breeding immediately to the south of the proposed footprint in 2022-2023, and further northwards in 2021/2022 (but not 2022/2023); with the potential to try to breed in the area in the future; the breeding season is lengthy, and (some) breeding sites and roosting sites are variable from year to year; habitat loss could create stress for this territorial

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species, or cause displacement from the area; impacts of habitat loss are difficult to predict, but could become cumulative.

- Other **shoreline/coastal birds/waders** (including migrants, e.g. Curlew Sandpiper, Ruddy Turnstone, Eurasian Whimbrel) may be impacted by habitat loss (e.g. in terms of preferred feeding areas) as an indirect cause of disturbance (see above).

Impact analysis: Direct and indirect modification/loss/destruction of bird habitat.

The modification/loss/destruction of habitat is known to impact on bird species in different ways, resulting in displacement that may be either temporary or permanent.

For construction:

The **importance** of the impact is local/immediately outside the footprint (but could have regional/national, and up to national/international consequences, as it involves Red Data [Namibian and Global] species, and Namibian near-endemics that do not occur elsewhere).

The **magnitude** of change is a negative change.

The **permanence** is permanent.

The **reversibility** is irreversible.

The **cumulative** impact is moderate.

The **environmental classification** is a less negative impact during construction (-2).

For indirect impacts:

The **importance** of the impact is local/immediately outside the footprint.

The **magnitude** of change is a negative change.

The **permanence** is permanent (however, shoreline/migrant bird species may be displaced from suitable habitats by disturbance, either temporarily or permanently)

The **reversibility** is possible to some extent, but mainly irreversible.

The **cumulative** impact is moderate.

The **environmental classification** is a less negative impact during construction (-2).

Table 6. Impact assessment: Direct and indirect modification/loss/destruction of bird habitat.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Habitat destruction during construction may cause avoidance/barrier effects to movement, resulting in displacement, either temporarily or permanently; individuals affected but not populations.	1 2	-1	3	3	2	-10 -11	-2	Highly probable

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	Permanent modification/ destruction of sensitive habitats, including breeding areas.								
Daily Operations	-	0	0	0	0	0	0	0	Unlikely
Indirect Impacts	A reduction in bird breeding success due to displacement (including of territorial bird species). Shoreline/migrant bird species may be displaced from suitable habitats by disturbance (either temporarily or permanently)	1 2	-1	3	3	2	-10 -11	-2	Possible

Environmental classification and class values:

-10 to -19: A less negative impact (-2)

0: No alteration (0)

Mitigation and management recommendations: Direct and indirect modification/loss/destruction of bird habitat

Desired Outcome: To reduce direct and indirect modification/loss/destruction of bird habitat during construction of the township.

Actions

Project design phase

Avoidance and minimisation:

- Micro-siting: where possible, the unnecessary destruction or degradation of habitat, including sensitive aspects such as the Black Rocks area (and any subsequently identified active Damara Tern breeding areas), should be avoided.

Construction phase

Restoration and rehabilitation:

- Repair of degradation or damage to biodiversity features and ecosystem services from project-related impacts that cannot be completely avoided and/or minimised, e.g. by restoration of temporary-use and lay down areas after construction activities are complete.

Minimisation:

- Abatement controls to reduce emissions and pollutants (erosion, dust, waste, litter) created during construction; wastewater management and water conservation measures.
- Operational controls to manage and regulate contractor activity, such as exclusion fencing around (or demarcation of) sensitive areas, designated machinery and lay-down areas, minimisation of vegetation loss and disturbance to soil.
- Ongoing promotion of awareness about the value of biodiversity and the negative impacts of habitat destruction.

Responsible Body

- Proponent
- Contractors

Data Sources and Monitoring

- Keep records of awareness training provided.

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- Keep records of any (subsequently) identified bird nesting sites.

5.3 Summary of impact assessment

The above 17 priority species are potentially at risk to the following impacts:

- **Physical/human disturbance of birds, including noise impacts, road mortality and poaching, and light disturbance**
 - Construction: -2: A less negative impact
 - Daily operations: -2: a less negative impact
 - Indirect impacts: -1: a reduced negative impact
- **Direct and indirect modification/loss/ destruction of bird habitat**
 - Construction: -2: A less negative impact
 - Daily operations: 0: no alteration
 - Indirect impacts: -2: A less negative impact

6 Conclusion

According to the baseline and scoping of bird habitats and species, the study area is potentially sensitive for certain bird species, especially when viewed in the broader context of adjacent protected habitats, including two nationally protected areas and a chain of coastal wetlands (with a Ramsar site and several Important Bird Areas).

A total of 110 bird species has been recorded for the study area and surrounds, representing 16% of the 676 species currently recorded in Namibia. This **species richness** is regarded as relatively high for such a limited area, and emphasises the importance of aquatic habitats in the greater, arid area. These include coastal wetlands such as Mile 4 Saltworks, some 19 km to the south of the proposed plant site, where waterbirds are concentrated.

The above checklist includes a total of 20 species (18%) with Red Data status. Of these, 15 species (75%) are also Globally Threatened. The checklist also includes three species (3%) that are near-endemic to Namibia, and at least 29 species (34%) with some form of migrant status. Breeding for Damara Tern is confirmed in the greater study area (to the south of the proposed township development site) for 2022-2023, and in the area north of the desalination plant intake site in 2021-2022. Breeding is also suspected for Gray's Lark in the greater study area (2023).

Risk assessment and mitigation efforts are directed towards priority species, namely those that have a high biological significance, i.e. primarily Red Data species (including those with migrant status) and/or endemic or near-endemic species.

Seventeen priority bird species have been short-listed from a total of 44 potential priority species, as a focal group identified on the basis of local abundance as being at higher risk to potential impacts resulting from the proposed project. The emphasis for assessment should be on groups of birds likely to be at risk, rather than on individual species; and the precautionary principle should prevail.

The 17 short-listed priority species comprise the following:

Five Red Data species (four of which are also Globally Threatened)

Aquatic species

- **Damara Tern** (Near Threatened, Globally Vulnerable; breeding Namibian near-endemic [breeding in greater area 2021-22 (N) and 2022-23 (S)], intra-African migrant)
- Lesser Flamingo (Vulnerable; Globally Near Threatened; nomadic, [partial] intra-African migrant)
- *Greater Flamingo (Vulnerable; nomadic, [partial] intra-African migrant)
- Curlew Sandpiper (Near Threatened, Globally Near Threatened; Palearctic migrant)
- African Oystercatcher (Near Threatened, Globally Near Threatened; resident, juveniles disperse)

Two species near-endemic to Namibia (90% of population)

- **Damara Tern** (also included under Red Data species above)
- ***Gray's Lark** (nomadic; suspected breeding in greater area)

Ten other (non-Red Data) migrant species

- Common Greenshank (Palearctic migrant)
- Common Ringed Plover (Palearctic migrant)
- *Grey Plover (Palearctic migrant)
- Sanderling (Palearctic migrant)
- Common Tern (Palearctic migrant)
- Sandwich Tern (Palearctic migrant)
- *Greater Crested (Swift) Tern (local migrant)
- Ruddy Turnstone (Palearctic migrant)
- *Eurasian Whimbrel (Palearctic migrant)

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- *Red-capped Lark (resident, nomadic, intra-African migrant)

Species with the potential to cause impacts

Examples are provided of species with the potential to cause impacts, including on infrastructure and with the potential to be attracted as scavengers.

The above 17 priority bird species are potentially at risk to the following two main impacts, rated as follows:

- **Physical/human disturbance of birds, including noise impacts, road mortality and poaching, and light disturbance**
 - Construction: -2: A less negative impact
 - Daily operations: -2: a less negative impact
 - Indirect impacts: -1: a reduced negative impact
- **Direct and indirect modification/loss/ destruction of bird habitat**
 - Construction: -2: A less negative impact
 - Daily operations: 0: no alteration
 - Indirect impacts: -2: A less negative impact

Recommendations are made for mitigation and monitoring for the Environmental Monitoring Plan. An adaptive approach to mitigation is recommended, dependent on the feeding of the results of ongoing monitoring into management strategies. The effective application of the above mitigation should help reduce the impacts of the proposed development. However, ongoing monitoring is considered essential, both during construction and post-construction, with periodic evaluation of monitoring results.

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Appendix 1

Checklist of bird species recorded in the proposed Wlotzkasbaken Township Development Extension area, Erongo Region

*Common and scientific names according to SABAP2 website (<http://sabap2.adu.org.za>); also see Roberts Bird Guide 2016 (Chittenden et al. 2016)

TOTAL 110 SPECIES

KEY:

PRIORITY STATUS (provisional first-screened priority species indicated in red)

– Conservation status

- **Red Data status** (Simmons et al. 2015, Brown et al. 2017; red): CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern/Secure; G = global status; rare = now rare in Namibia
- **End = Endemism** (Simmons et al. 2015, Brown et al. 2017; green): NE = near-endemic; Nam = Namibia (≥90% of population in Namibia); s Afr = southern Africa; B = breeding

– **Residency:** R = resident, N = nomadic, M = migrant (blue), V = vagrant, Ra = rare, par = partial; migrant species: pal = Palearctic, intra-Afr = intra-African

Hab. = Habitat: M = purely/predominantly marine; A = aquatic (freshwater/marine/coastal waterbodies); T = terrestrial

BIRD ATLAS DATA

- **SABAP1:** Southern African Bird Atlas Project 1 data that was published as Harrison et al. (1997), available on EIS 2023 (QDS 2214AD)
- **SABAP2:** Southern African Bird Atlas Project 2 data, available on <http://sabap2.adu.org.za>; (presence or absence; pentad 2220-1425; 2225_1425; 2215_1425)
- **Latest record:** SABAP2 (RR%) = reporting rate as %; full protocol or ad hoc)
- **Additional records:** including personal observation 2023

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Common group	Common species	Genus	Species	Cons status	Residency	SABAP1 (1987-1991)	SABAP2			Additional records
							2220_1425	2220_1425	2225_1425	
							FP (RR%)	Latest record		
Avocet	Pied	<i>Recurvirostra</i>	<i>avosetta</i>			√	2.9	2021	2022	
Bee-eater	Swallow-tailed	<i>Merops</i>	<i>hirundineus</i>		Nom, local mig		0.0	2013		
Bokmakierie	Bokmakierie	<i>Telophorus</i>	<i>zylonus</i>			√		Pre-1991		
Bulbul	African Red-eyed	<i>Pycnonotus</i>	<i>nigricans</i>				4.0	2019		
Bunting	Lark-like	<i>Emberiza</i>	<i>impetuani</i>		Nom	√		Pre-1991		
Bustard	Ludwig's	<i>Neotis</i>	<i>ludwigii</i>	EN, G EN,	Nom, local movements, partial mig		0.6	2020		
Buzzard	Augur	<i>Buteo</i>	<i>augur</i>						2013	
Buzzard	Jackal	<i>Buteo</i>	<i>rufofuscus</i>	End sAfr	Local movements		0.6	2013		
Canary	Black-throated	<i>Crithagra</i>	<i>atroularis</i>				0.6	2019		
Chat	Familiar	<i>Oenanthe</i>	<i>familiaris</i>				0.6	2015		
Chat	Tractrac	<i>Emarginata</i>	<i>tractrac</i>			√	44.3	2021	2022	
Coot	Red-knobbed	<i>Fulica</i>	<i>cristata</i>			√	0.6	2013	2013	
Cormorant	Cape	<i>Phalacrocorax</i>	<i>capensis</i>	EN, G EN, NE s Afr		√	94.8	2022	2022	Pers obs 2023
Cormorant	Crowned	<i>Microcarbo</i>	<i>coronatus</i>	NT, G NT E s Afr					2013	
Cormorant	Reed	<i>Phalacrocorax</i>	<i>africanus</i>			√		Pre-1991		

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Common group	Common species	Genus	Species	Cons status	Residency	SABAP1 (1987-1991)	SABAP2			Additional records
							2220_1425	2220_1425	2225_1425	
							FP (RR%)	Latest record		
Cormorant	White-breasted	<i>Phalacrocorax</i>	<i>lucidus</i>			√	91.4	2022	2022	Pers obs 2023
Crake	African	<i>Crecopsis</i>	<i>egregia</i>		Intra-Afr mig		0.6	2021		
Crow	Cape	<i>Corvus</i>	<i>capensis</i>				12.1	2021		
Crow	Pied	<i>Corvus</i>	<i>albus</i>			√	8.0	2021	2022	
Cuckoo	Diederik	<i>Chrysococcyx</i>	<i>caprius</i>		Br intra-Afr mig		0.6	2015		
Curlew	Eurasian	<i>Numenius</i>	<i>arquata</i>	NT, G NT	Pal mig	√		Pre-1991	2013	
Darter	African	<i>Anhinga</i>	<i>rufa</i>				0.6	2016		
Dove	Laughing	<i>Spilopelia</i>	<i>senegalensis</i>			√	0.6	2013	2014	
Dove (Pigeon)	Rock (Feral)	<i>Columba</i>	<i>livia</i>			√	0.6	2018	2014	
Dove	Ring-necked (Turtle)	<i>Streptopelia</i>	<i>capicola</i>			√		Pre-1991		
Drongo	Fork-tailed	<i>Dicrurus</i>	<i>adsimilis</i>				4.6	2019		
Eagle-Owl	Spotted	<i>Bubo</i>	<i>africanus</i>				0.0	2014		
Egret	Little	<i>Egretta</i>	<i>garzetta</i>			√	1.1	2013		
Egret	Western Cattle	<i>Bubulcus</i>	<i>ibis</i>				1.1	2021	2014	
Falcon	Lanner	<i>Falco</i>	<i>biarmicus</i>				0.6	2013	2013	
Finch	Red-headed	<i>Amadina</i>	<i>erythrocephala</i>				0.6	2016		
Fiscal	Southern	<i>Lanius</i>	<i>collaris</i>				2.3	2016		
Flamingo	Greater	<i>Phoenicopterus</i>	<i>roseus</i>	VU	Nom, intra-Afr mig	√	13.8	2021	2020	Pers obs 2023 Satellite tracking data,

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Common group	Common species	Genus	Species	Cons status	Residency	SABAP1 (1987-1991)	SABAP2			Additional records
							2220_1425	2220_1425	2225_1425	
							FP (RR%)	Latest record		
										power line collisions
Flamingo	Lesser	<i>Phoeniconaias</i>	<i>minor</i>	VU, G NT	Nom, intra-Afr mig	√	5.7	2020	2022	Satellite tracking data, power line collisions
Gannet	Cape	<i>Morus</i>	<i>capensis</i>	CR, G EN		√	24.7	2022	2022	
Godwit	Bar-tailed	<i>Limosa</i>	<i>lapponica</i>	NT, G NT	Pal mig	√		Pre-1991	2012	
Goose	Egyptian	<i>Alopochen</i>	<i>aegyptiaca</i>				0.6	2018	2014	
Goshawk	Pale Chanting	<i>Melierax</i>	<i>canorus</i>	NE s Afr			0.6	2018		
Grebe	Black-necked	<i>Podiceps</i>	<i>nigricollis</i>	NT, G NT	Res, nom		0.6	2013	2014	Power line collisions
Greenshank	Common	<i>Tringa</i>	<i>nebularia</i>		Pal mig	√	0.6	2013	2022	
Guineafowl	Helmeted	<i>Numida</i>	<i>meleagris</i>				0.6	2021		
Gull	Black-headed (Common)	<i>Chroicocephalus</i>	<i>ridibundus</i>		Pal vagrant		1.7	2014	2023	
Gull	Grey-headed	<i>Chroicocephalus</i>	<i>cirrocephalus</i>			√	18.4	2021	2023	
Gull	Hartlaub's	<i>Chroicocephalus</i>	<i>hartlaubii</i>	VU	Sed, movements	√	79.3	2022	2022	Pers obs 2023
Gull	Kelp	<i>Larus</i>	<i>dominicanus</i>			√	98.3	2022	2022	Pers obs 2023
Heron	Black-headed	<i>Ardea</i>	<i>melanocephala</i>				2.9	2019		

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Common group	Common species	Genus	Species	Cons status	Residency	SABAP1 (1987-1991)	SABAP2			Additional records
							2220_1425	2220_1425	2225_1425	
							FP (RR%)	Latest record		
Heron	Grey	<i>Ardea</i>	<i>cinerea</i>			√	2.9	2021	2016	
Jaeger	Parasitic	<i>Stercorarius</i>	<i>parasiticus</i>		Pal mig	√	9.8	2021	2020	
Kestrel	Rock	<i>Falco</i>	<i>rupicolus</i>				38.5	2022	2014	
Kite	Black-shouldered (Black-winged)	<i>Elanus</i>	<i>caeruleus</i>		Res, nom	√		Pre-1991		
Knot	Red	<i>Calidris</i>	<i>canutus</i>	NT, G NT	Pal mig	√		Pre-1991		
Korhaan	Rüppell's	<i>Eupodotis</i>	<i>rueppellii</i>	NamNE 90%	Sed	√		Pre-1991		
Lapwing	Blacksmith	<i>Vanellus</i>	<i>armatus</i>			√	1.7	2020	2014	
Lark	Gray's	<i>Ammomanopsis</i>	<i>grayi</i>	NamNE 90%	Nom	√	23.0	2021	2017	Pers obs 2023
Lark	Red-capped	<i>Calandrella</i>	<i>cinerea</i>		Res, nom, intra-Afr mig	√	36.8	2021	2021	Pers obs 2023
Lark	Sabota	<i>Calendulauda</i>	<i>sabota</i>			√		Pre-1991		
Martin	Rock	<i>Ptyonoprogne</i>	<i>fuligula</i>						2019	
Moorhen	Common	<i>Gallinula</i>	<i>chloropus</i>		Res, nom	√		Pre-1991	2013	
Mousebird	Red-faced	<i>Urocolius</i>	<i>indicus</i>				0.6	2021		
Mousebird	White-backed					√		Pre-1991		
Owl	Southern White-faced (Scops)	<i>Ptilopsis</i>	<i>granti</i>		Res, nom		0.0	2013		
Oystercatcher	African	<i>Haematopus</i>	<i>moquini</i>	NT, G NT	Res, juvs disperse	√	11.5	2021	2020	

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Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, Namibia
 Avifauna baseline/scoping and assessment (31 July 2023)

Common group	Common species	Genus	Species	Cons status	Residency	SABAP1 (1987-1991)	SABAP2			Additional records
							2220_1425	2220_1425	2225_1425	
							FP (RR%)	Latest record		
Pelican	Great White	<i>Pelecanus</i>	<i>onocrotalus</i>	VU	Sed, nom	√	17.2	2021	2020	
Penguin	African	<i>Spheniscus</i>	<i>demersus</i>	EN, G EN		√	0.6	2018		
Petrel	White-chinned	<i>Procellaria</i>	<i>aequinoctialis</i>	VU, G VU		√	0.6	2020		
Pigeon	Speckled	<i>Columba</i>	<i>guinea</i>				5.7	2021		
Pipit	Long-billed	<i>Anthus</i>	<i>similis</i>			√		Pre-1991		
Plover	Chestnut-banded	<i>Charadrius</i>	<i>pallidus</i>	NT, G NT	Res, nom, par mig	√	1.7	2018	2014	
Plover	Common Ringed	<i>Charadrius</i>	<i>hiaticula</i>		Pal mig	√	1.7	2019	2014	
Plover	Grey	<i>Pluvialis</i>	<i>squatarola</i>		Pal mig	√	62.1	2021	2022	Pers obs 2023
Plover	Kittlitz's	<i>Charadrius</i>	<i>pecuarius</i>						2013	
Plover	Three-banded	<i>Charadrius</i>	<i>tricoloris</i>		Res	√	1.1	2013		
Plover	White-fronted	<i>Charadrius</i>	<i>marginatus</i>		Res, local mig	√	93.7	2021	2022	Pers obs 2023 (2 pairs with 1 chick)
Quelea	Red-billed	<i>Quelea</i>	<i>quelea</i>		Nom		1.1	2021		
Redshank	Common	<i>Tringa</i>	<i>totanus</i>		Pal mig	√		Pre-1991	2012	
Ruff	Ruff	<i>Calidris</i>	<i>pugnax</i>		Pal mig	√	0.6	2013	2014	
Sanderling	Sanderling	<i>Calidris</i>	<i>alba</i>		Pal mig	√	9.2	2022	2022	
Sandpiper	Common	<i>Actitis</i>	<i>hypoleucos</i>		Pal mig	√	0.6	2019		
Sandpiper	Curlew	<i>Calidris</i>	<i>ferruginea</i>	NT, G NT	Pal mig	√	9.2	2021	2020	

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Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, Namibia
 Avifauna baseline/scoping and assessment (31 July 2023)

Common group	Common species	Genus	Species	Cons status	Residency	SABAP1 (1987-1991)	SABAP2			Additional records
							2220_1425	2220_1425	2225_1425	
							FP (RR%)	Latest record		
Shearwater	Sooty	<i>Puffinus</i>	<i>griseus</i>	NT, G NT		√		Pre-1991		
Shoveler	Cape	<i>Spatula</i>	<i>smithii</i>						2014	
Sparrow	Cape	<i>Passer</i>	<i>melanurus</i>			√	92.0	2021	2014	
Sparrow	House	<i>Passer</i>	<i>domesticus</i>			√	25.9	2021	2018	
Sparrow	Southern Grey-headed	<i>Passer</i>	<i>diffusus</i>				3.4	2016		
Starling	Wattled	<i>Creatophora</i>	<i>cinerea</i>		Nom		0.6	2013		
Stilt	Black-winged	<i>Himantopus</i>	<i>himantopus</i>		Res, nom	√	2.3	2019	2014	
Stint	Little	<i>Calidris</i>	<i>minuta</i>		Pal mig	√	6.9	2020	2020	
Stork	Yellow-billed	<i>Mycteria</i>	<i>ibis</i>		Res, partial intra-Afr mig		0.6	2016		
Storm-Petrel	Wilson's	<i>Oceanites</i>	<i>oceanicus</i>			√		Pre-1991		
Sunbird	Dusky	<i>Cinnyris</i>	<i>fuscus</i>			√	19.0	2021	2012	
Swallow	Barn (European)	<i>Hirundo</i>	<i>rustica</i>		Pal mig	√	19.0	2021	2022	
Swift	Bradfield's	<i>Apus</i>	<i>bradfieldi</i>				1.1	2016	2016	
Swift	Little	<i>Apus</i>	<i>affinis</i>		Res, part mig		1.1	2017	2022	
Teal	Cape	<i>Anas</i>	<i>capensis</i>		Res, nom	√	1.1	2021	2014	
Teal	Red-billed	<i>Anas</i>	<i>erythrorhyncha</i>		Res, nom	√		Pre-1991		
Tern	Arctic	<i>Sterna</i>	<i>vittata</i>		Pal mig	√		Pre-1991	2014	
Tern	Black	<i>Chlidonias</i>	<i>niger</i>		Pal mig	√	0.6	2014	2014	
Tern	Caspian	<i>Hydroprogne</i>	<i>caspia</i>	VU	Res/sed/nom	√	7.5	2021	2014	
Tern	Common	<i>Sterna</i>	<i>hirundo</i>		Pal mig	√	31.0	2022	2022	

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Environmental Impact Assessment for the proposed Wlotzkasbaken Township Development Extension, Erongo Region, Namibia
 Avifauna baseline/scoping and assessment (31 July 2023)

Common group	Common species	Genus	Species	Cons status	Residency	SABAP1 (1987-1991)	SABAP2			Additional records
							2220_1425	2220_1425	2225_1425	
							FP (RR%)	Latest record		
Tern	Damara	<i>Sternula</i>	<i>balaenarum</i>	NT, G VU, B NamNE	Br intra-Afr mig	√	33.3	2021	2022	
Tern	Greater Crested (Swift)	<i>Thalasseus</i>	<i>bergii</i>		Res, local mig	√	52.3	2021	2020	
Tern	Little	<i>Sternula</i>	<i>albifrons</i>		Pal mig	√		Pre-1991		
Tern	Sandwich	<i>Thalasseus</i>	<i>sandvicensis</i>		Pal mig	√	27.0	2022	2022	
Turnstone	Ruddy	<i>Arenaria</i>	<i>interpres</i>		Pal mig	√	22.4	2021	2022	
Wagtail	Cape	<i>Motacilla</i>	<i>capensis</i>			√	95.4	2022	2022	Pers obs 2023
Warbler	African Reed	<i>Acrocephalus</i>	<i>baeticatus</i>				1.1	2016		
Warbler	Willow	<i>Phylloscopus</i>	<i>trochilus</i>				0.6	2012		
Waxbill	Common	<i>Estrilda</i>	<i>astrild</i>			√		Pre-1991	2013	
Weaver	Southern Masked	<i>Ploceus</i>	<i>velatus</i>			√	4.0	2019	2013	
Whimbrel	Eurasian (Common)	<i>Numenius</i>	<i>phaeopus</i>		Pal mig	√	27.0	2021	2022	Pers obs 2023

Appendix F Archaeological Specialist Study

10 May 2023

Geo Pollution Technologies (Pty) Ltd
PO Box 11073
Windhoek; Namibia

For attention: Quzette Bosman

**ARCHAEOLOGICAL ASSESSMENT OF PROPOSED WLOTSKASBAKEN TOWNSHIP DEVELOPMENT,
ERONGO REGION, NAMIBIA**

DECLARATION

I hereby declare that I do:

- (a) have knowledge of and experience in conducting archaeological 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 development activities at the specific location 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 the site of the proposed Wlotzkasbaken township development. Eight archaeological sites and palaeoenvironmental features were recorded. The finds are of low significance and are situated in a severely degraded setting. In view of the fact that development will involve excavation it is recommended that the Archaeological Chance Finds Procedure is adopted by the project EMP.

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1. Introduction
2. Legal requirements
3. Archaeological setting
4. Observations
5. Conclusions & recommendations

Appendix 1: Archaeological Chance Finds Procedure

1. INTRODUCTION

1.1 Background

Geo Pollution Technologies Namibia is carrying out an environmental assessment of the proposed Wlotzkasbaken township development in the Erongo Region of Namibia. The site of the development lies between Wlotzkasbaken and the northern limits of Swakopmund, bounded by the Atlantic coast in the west and the C34 coastal road to the east. The site is undeveloped but considerably degraded by offroad vehicle traffic and unregulated refuse disposal.

Archaeological remains in Namibia are protected under the National Heritage Act (27 of 2004) and National Heritage Regulations (Government Notice 106 of 2005), and Geo Pollution Technologies appointed the undersigned, J. Kinahan, archaeologist, to carry out an assessment of the proposed development site. A field survey was carried out on 7th May 2023. The following report sets out the results of the survey and an assessment of the of the finds 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 development. 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 resources, including historical sites arising from the proposed development activities.
2. The identification and demarcation of possibly sensitive archaeological sites that may require special mitigation measures to eliminate, avoid or compensate for likely destructive impacts.
3. Formulation and motivation of specific mitigation measures, if required, 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 archaeological 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 sites 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. Heritage sites 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”. Also relevant are the National Heritage Regulations, Government Notice (GN) 3490 of 2005.

It is important to be aware that no official gazetted 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. In cases where such guidelines are applicable, those of the IFC, specifically Guidance Note 8: Cultural heritage, 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) also apply to the management of impacts on archaeological sites and remains whether these are considered in detail by the environmental assessment or not.

3. ARCHAEOLOGICAL SETTING

The western parts of Namibia are recognized as a globally important archaeological landscape, having abundant evidence of human settlement spanning the last one million years.¹ Of particular interest and significance are archaeological sites dating to within the last 12 000 years, a period of marked climatic instability that brought

¹ Kinahan, J. 2020. *Namib, the archaeology of an African desert*. Windhoek, UNAM Press.

many changes in human settlement and subsistence behaviour.² 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. 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, including small area investigations such as that reported here, draws from and builds upon previous work, leading to an improved understanding of the regional archaeology.

The coast of Namibia is relatively well studied archaeologically and while evidence of Pleistocene era occupation is restricted to a few specific localities, evidence of Holocene occupation is distributed over the whole coastline, with notable concentrations along parts of the coast where water is available from shallow springs and seepages. Coastal archaeological sites in such localities have evidence of systematic exploitation of marine resources, primarily shellfish but also including seabirds, fur seal and various fish species. As relatively rich resource bases, these sites also have well developed links to the interior and appear to have functioned as part of a quasi-seasonal pattern of movement. Available evidence is that reliance on marine resources increased during the last 2000 years with the adoption of domestic livestock which led to an increase in the human population of the coastal zone, accompanied by heightened competition for resources. Coastal settlements became particularly important during the last three centuries as trading entrepôts and places of contact with passing ships.³

4. OBSERVATIONS

A foot survey was carried out over the proposed development site at Wlotzskabaken to locate and document its archaeological features. The terrain is typical of the Namibian coastline north of Swakopmund which is characterized by a sinuous littoral with minor rock outcrops and a steeply shelving profile. The northern part of the proposed development site at Wlotzskabaken is marked by a southwesterly aligned dolerite outcrop with large corestone boulders at surface. To the south, the terrain is a gently undulating gravel surface with some traces of the same dolerite outcropping but deeply weathered. The surface is mainly of coarse sand with some minor beach cobbles. Small vegetated hummock dunes line the coastal margin of the proposed development site.

Figure 1 indicates the regional archaeological setting of the proposed development site at Wlotzskabaken, with an inset map showing the distribution of archaeological sites and relevant palaeoenvironmental features. All these points 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 the standard parallel scales set out in Table 1. The sites are listed within the report with their location and S/V ranking.

² Deacon, J. & Lancaster, N. 1988. *Late Quaternary palaeoenvironments of southern Africa*. Oxford: Oxford University Press.

³ Kinahan, J. and Kinahan, J.H.A. 2017. Post-Pleistocene archaeology and geomorphological processes on the Namib Desert coast of Southwestern Africa. *Journal of Island and Coastal Archaeology* 12: 65-77.

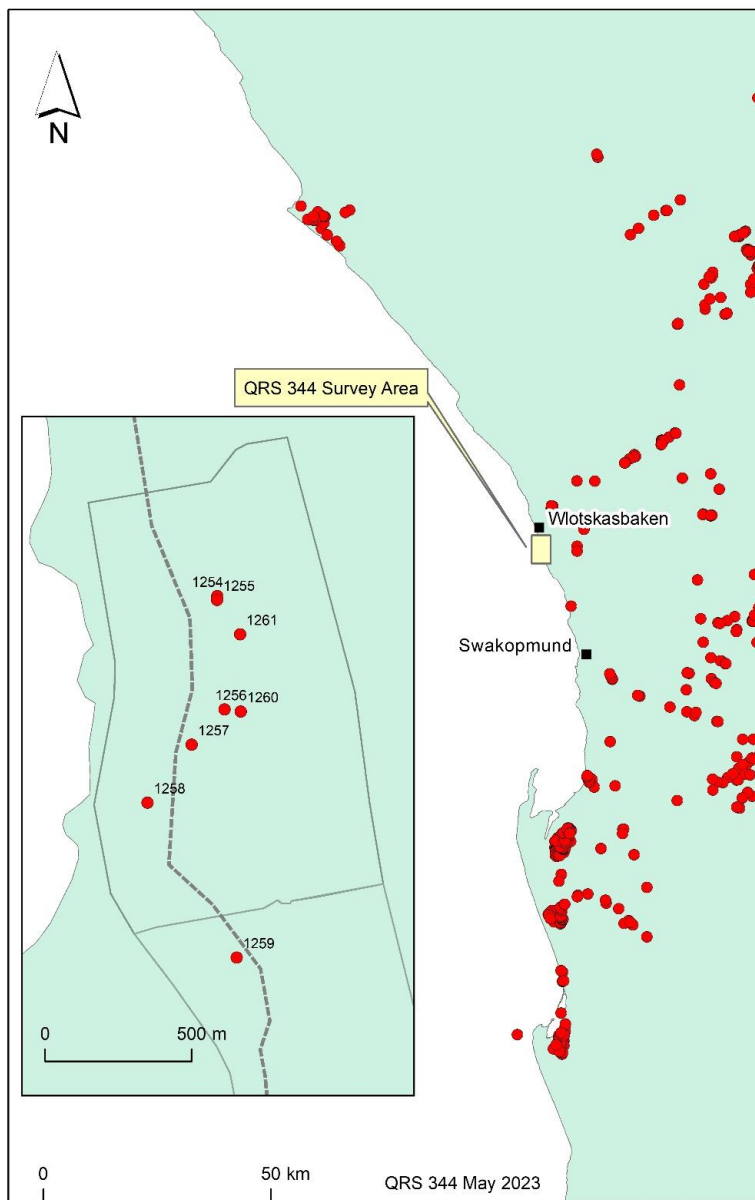


Figure 1: The regional archaeological setting (distribution of sites shown as red dots) with the position of the wlotzkasbaken survey area indicated. The inset map shows the extent of the proposed development area with the location of the eight sites found during the field survey. The dashed line in the inset map indicates a proposed limit on the proximity of development to the coastline.

QRS 344/1254

Site coordinates: Lat. -22,4339 Long. 14,4580291

Setting: Among dolerite boulders
 Description: Dispersed stone stone artefact waste scatter, hydrothermal vein quartz and cryptocrystalline chert
 Records: Field notes, locality data.
 Significance rating: 2
 Vulnerability rating: 2

QRS 344/1255

Site coordinates: Lat. -22,434 Long. 14,4580241

Setting: Among dolerite boulders
 Description: Small scatter 1x1.5m *Donax serra*, with windbreak of small boulders 1.5m long
 Records: Field notes and locality data.
 Significance rating: 2
 Vulnerability rating: 2

QRS 344/1256

Site coordinates: Lat. -22,4374 Long. 14,4582531

Setting: Among dolerite boulders
 Description: Small scatter 1x1.5m *Donax serra*.
 Records: Field notes, locality data.
 Significance rating: 2
 Vulnerability rating: 2

QRS 344/1257

Site coordinates: Lat. -22,4384 Long. 14,4572441

Setting: Among dolerite boulders.
 Description: Small scatter 1x1.5m *Donax serra*.
 Records: Field notes, locality data.
 Significance rating: 2
 Vulnerability rating: 2

QRS 344/1258

Site coordinates: Lat. -22,4402 Long. 14,4558851

Setting: Among dolerite boulders
 Description: Small scatter 1x1.5m *Donax serra*, with comminuted fragments of *Dosinia hepatica* and fragments *Saccostrea* spp. exposed by rodent burrowing.
 Records: Field notes, locality data.
 Significance rating: 2
 Vulnerability rating: 3

contribute some insights into the local landscape and archaeology. The archaeological sites are of low significance and do not merit further investigation, due to the fact that the sites which are in themselves small and poorly preserved, are located in a severely degraded area.

The palaeoenvironmental evidence is consistent with earlier findings from other parts of the Namib coast. The Wlotzskabaken area was subject to dynamic coastal changes including the mid-Holocene marine transgression which raised the sea level by approximately 2m amsl. In the Wlotzskabaken area this would have created and maintained a shallow tidal lagoon immediately to the south of the dolerite dyke. The presence of *Dosinia hepatica* is consistent with this scenario. It is possible that the lagoon feature would have partially encircled the dolerite dyke to create a high tide island feature. The guano deposit is consistent with this scenario. The molluscan fauna associated with beach cobbles may have been deposited after the extinction of the lagoon when sea levels returned to normal at about 4000 years bp.

Due to the fact that the survey reported here was limited to surface observations only, and the fact that the proposed Wlotzskabaken township development will involve some excavation, there is a possibility that buried or subsurface archaeological evidence may be found in the course of site works. For this reason it is recommended that the project EMP should adopt the Chance Finds Procedure attached here as Appendix 1.

APPENDIX 1: ARCHAEOLOGICAL CHANCE FINDS PROCEDURE

Areas of proposed development 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 sites or items of heritage significance will be found in the course of development work.

Personnel and contractor heritage induction is intended to sensitize people so that they may recognize heritage “chance finds” in the course of their work. The procedure set out here covers the reporting and management of such finds.

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.

The “chance finds” procedure is intended to ensure compliance with the relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): “ a person who discovers any archaeological objectmust 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. Please note that the Chance Finds Procedure is NOT a substitute for archaeological assessment.

Both Namibian and international standards (e.g. IFC Guidance Note and IFC Performance Standard on Heritage, 2012) require professional archaeological assessment. The Chance Finds Procedure is intended to assist the developer in following the right course of action when archaeological remains are encountered such as during earthmoving operations.

RESPONSIBILITIES

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 (operator) 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 AH GIS for field confirmation by archaeologist

Action by archaeologist:

- a) Inspect site and confirm addition to AH 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 G Consultant's Curriculum Vitae

ENVIRONMENTAL ASSESSMENT PRACTITIONER**Quzette Bosman**

Quzette Bosman has 15 years' experience in the Impact Assessment Industry, working as an Environmental Assessment Practitioner and Social Assessment practitioner mainly as per the National Environmental Legislation sets for South Africa and Namibia. Larger projects have been completed in terms of World Bank and IFC requirements. She studied Environmental Management at the Rand Afrikaans University (RAU) and University of Johannesburg (UJ), including various Energy Technology Courses. This has fuelled a passion towards the Energy and Mining Industry with various projects being undertaken for these industries. Courses in Sociology has further enabled her to specialize in Social Impact Assessments and Public Participation. Social Assessments are conducted according to international best practise and guidelines. Work has been conducted in South Africa, Swaziland and Namibia.

CURRICULUM VITAE QUZETTE BOSMAN

Name of Firm : Geo Pollution Technologies (Pty) Ltd
 Name of Staff : QUZETTE BOSMAN
 Profession : Social Impact Assessor /
 Environmental Assessment Practitioner
 Years' Experience : 15
 Nationality : South African
 Position : Senior Environmental Consultant
 Specialisation : ESIA & ESMP; SIA
 Languages : Afrikaans – speaking, reading, writing – excellent
 English – speaking, reading, writing – excellent
 German –speaking - fair

First Aid Class A : EMTSS, 2017
 Basic Fire Fighting : EMTSS, 2017

EDUCATION AND PROFESSIONAL STATUS:

BA Geography & Sociology : Rand Afrikaans University, 2003
 BA (Hons.) Environmental Management : University of Johannesburg, 2004

PROFESSIONAL SOCIETY AFFILIATION:

Namibian Environment and Wildlife Society
 International Association of Impact Assessors South Africa (IAIA SA)
 Member 2007 - 2012
 Mpumalanga branch Treasurer 2008/2009

OTHER AFFILIATIONS

Mkhondo Catchment Management Forum (DWAF): Chairperson 2008-2010
 Mkhondo Water Management Task Team (DWAF): Member 2009

AREAS OF EXPERTISE:

Knowledge and expertise in:

- ◆ environmental impact assessments
- ◆ project management
- ◆ social impact assessment and social management planning
- ◆ community liaison and social monitoring
- ◆ public participation / consultation, social risk management
- ◆ water use licensing
- ◆ environmental auditing and compliance
- ◆ environmental monitoring
- ◆ strategic environmental planning

EMPLOYMENT:

2015 - Present : Geo Pollution Technologies – Senior Environmental Practitioner
 2014-2015 : Enviro Dynamics – Senior Environmental Manager
 2010 - 2012 : GCS – Environmental Manager (Mpumalanga Office Manager)
 2007 - 2009 : KSE-uKhozi - Technical Manager: Environmental
 2006 -2007 : SEF – Environmental Manager
 2004 - 2005 : Ecosat – Environmental Manager

PUBLICATIONS:

Contract reports : +190
 Publications : 1