- Environmental Clearance –

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Proposed Recreational facility with conference facilities – Dune 7, Dorob National Park, Erongo Region, Namibia

Client: Sandwich Dune Tours & Safari CC

APPLICATION REFERENCE #230703001651

June, 2023



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EXECUTIVE SUMMARY

This Environmental Impact Assessment (EIA) report evaluates the proposed development of a recreational facility with conference facilities at Dune 7, Walvis Bay, Erongo Region, Namibia. Sandwich Dune Tours and Safaris have been awarded the Dune 7 concession by the Ministry of Environment, Forestry, and Tourism (MEFT) Namibia. The project aims to enhance the visitor experience while addressing existing challenges faced by the recreational area.

The Dune 7 concession, located within Dorob National Park, has recently received criticism and public outcry due to issues such as littering, vandalized facilities, and deteriorating infrastructure. To address these concerns, the MEFT initiated renovations and increased the number of toilets available to visitors. However, a long-term solution was sought through a tender process, in which Sandwich Dune Tours and Safaris emerged as the successful bidder.

The proposed project includes various enhancements to the recreational area. Sandwich Dune Tours and Safaris plan to offer adventure activities such as paragliding, dune climbing, stargazing, and tours to Walvis Bay. Additionally, a restaurant will be developed, equipped to cater to all-day dining and host special events. A swimming pool and a bar operating until late hours will complement the restaurant. To accommodate overnight stays, 10 luxury chalets will be constructed.

The company anticipates employing approximately 45 people from the local catchment area, contributing to local employment opportunities and economic development. While the entrance to the restaurant will be free, visitors will be charged levies for participating in other Dune 7 activities, with details to be communicated later. The option to erect and operate a tethered hot air balloon has also been granted by the MEFT.

This EIA report assesses the potential environmental impacts associated with the proposed development. Factors such as habitat and biodiversity, water resources, waste management, energy consumption, landscape and visual characteristics, noise levels, air quality, and cultural and social aspects are considered. Mitigation measures will be proposed to minimize any adverse effects on the environment and ensure the project's sustainability.

Public participation processes will be undertaken to engage stakeholders and the local community, seeking their feedback and addressing concerns. This ensures transparency and inclusivity in the

decision-making process. The information and analysis provided in this EIA report will aid decision-makers in evaluating the project's feasibility and making informed decisions regarding its potential environmental implications.

Overall, the development of the recreational facility at Dune 7, managed by Sandwich Dune Tours and Safaris, presents an opportunity to improve the visitor experience while addressing environmental challenges. Through the implementation of appropriate mitigation measures and engagement with stakeholders, the project can contribute to sustainable development and the conservation of the natural and cultural heritage of the area.

Keywords: Executive summary, Environmental Impact Assessment, EIA, recreational facility, conference facilities, Dune 7, Walvis Bay, Erongo Region, Namibia, Sandwich Dune Tours and Safaris, Ministry of Environment, Forestry, and Tourism, Dorob National Park, visitor experience, sustainable development, mitigation measures, public participation.

1 INTRODUCTION

The Dune 7 Concession, located within Dorob National Park in Walvis Bay, Namibia, has recently been awarded to Sandwich Dune Tours & Safari CC by the Ministry of Environment, Forestry, and Tourism Namibia. This concession has long been a popular recreational area, but its deteriorating state, characterized by littering, vandalized facilities, and inadequate infrastructure, has raised concerns among the public. In response, the Ministry undertook a renovation project to address these issues and improve the overall condition of the site.

Figure 2: One of the five revamped braai facilities at Dune 7

Figure 1: Sign board welcoming visitors to Dune 7 site

Figure 3: Revamped Ablution Facilities, Dune 7

Figure 4: Aerial view of Dune, taken from above (by drone)

Sandwich Dune Tours & Safari CC, through a competitive tender process, emerged as the successful bidder among 18 applicants. The strength of their proposal, which emphasized environmental stewardship and enhancing the visitor experience, secured them the opportunity to manage the Dune 7 Concession. The company envisions transforming the area into a world-class recreational facility that offers a wide range of amenities and activities.

The primary objective of the project is to establish a recreational facility with conference amenities on the Dune 7 Concession. In addition to the conference facilities, the development will include small retail outlets and accommodations, providing visitors with a comprehensive and enjoyable experience. The project aims to attract both local and international tourists by offering an array of activities such as hot air balloon rides, fat biking, camel rides, sandboarding, star gazing, and hiking.

To enhance the overall visitor experience, Sandwich Dune Tours & Safari CC plans to construct a restaurant that will operate throughout the day, catering to the culinary preferences of visitors. The restaurant will also serve as a venue for special events such as weddings and corporate functions, adding a touch of exclusivity to the facility. Furthermore, the company intends to construct 10 luxury chalets to accommodate overnight guests, providing them with a comfortable and luxurious stay amidst the natural beauty of the Dune 7 Concession.

In alignment with sustainable practices, Sandwich Dune Tours & Safari CC aims to minimize the project's environmental impact. The company intends to implement responsible waste management strategies, employ sustainable energy practices, conserve water resources, protect biodiversity, and utilize eco-

friendly technologies and materials. Additionally, the project will prioritize the employment of local individuals to contribute to the economic growth of the surrounding communities.

This Environmental Impact Assessment (EIA) report will comprehensively evaluate the potential environmental impacts associated with the proposed developments and activities within the Dune 7 Concession. It will assess the effects on the landscape, flora and fauna, air and water quality, cultural heritage, and socio-economic factors. The report will also provide recommendations for sustainable management practices that will ensure the long-term preservation of the site's natural and cultural resources.

By undertaking this ambitious project, Sandwich Dune Tours & Safari CC and the Ministry of Environment, Forestry, and Tourism Namibia aim to revitalize the Dune 7 Concession, creating a sustainable and well-managed recreational facility that showcases the unique natural beauty of the area while offering a memorable and enriching experience for visitors.

1.1 Project Description

The Dune 7 Concession, located within Dorob National Park in Walvis Bay, Namibia, is set to undergo a transformative development led by Sandwich Dune Tours & Safari CC. This project aims to establish a comprehensive recreational facility that encompasses conference amenities, small retail outlets, accommodations, and a diverse range of activities.

Figure 5: Overview of the Concession Area

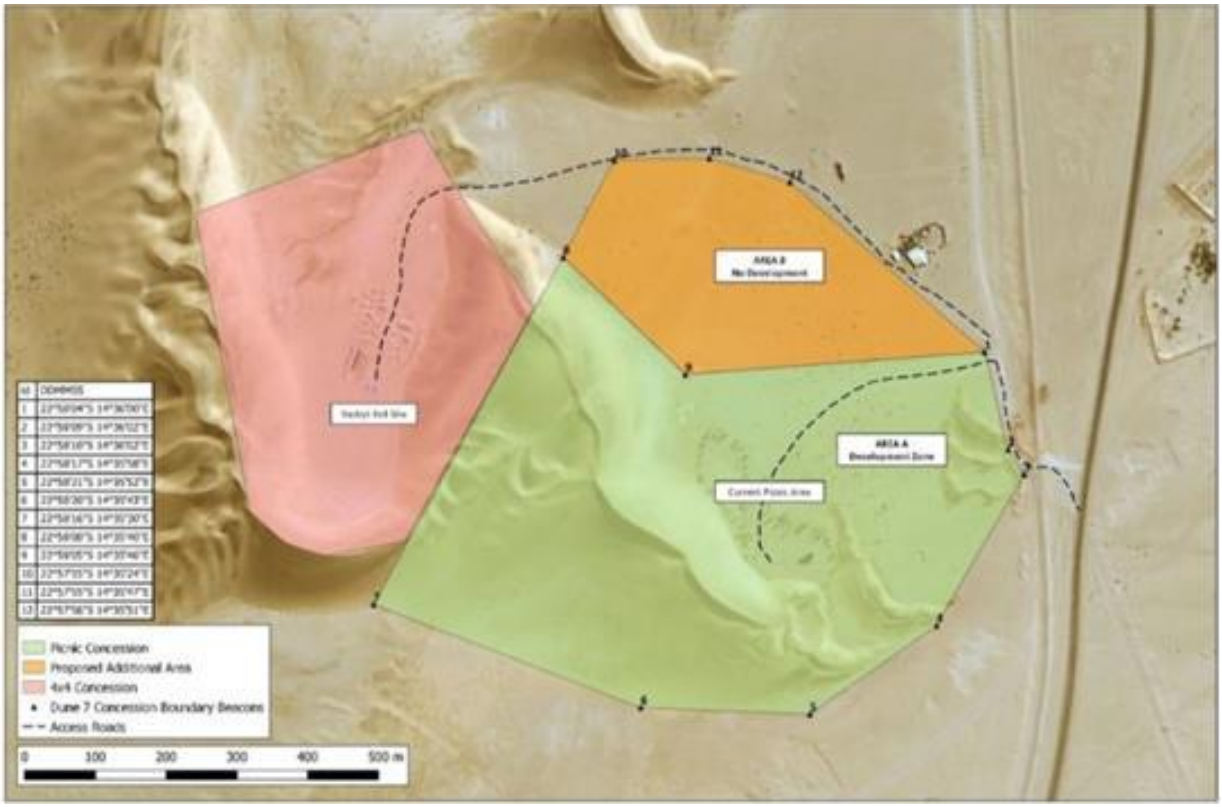

Figure 6: 3D Perspectives of Main Complex (Concept Proposal)

The primary objective of the project is to create a world-class recreational facility that caters to both local and international tourists. The development will feature conference facilities to accommodate various events and meetings, providing a unique setting amidst the stunning natural landscape of the Dune 7 Concession:

- **Conference Facilities:** The project includes the construction of state-of-the-art conference facilities within the Dune 7 Concession. These facilities will be designed to host various events, conferences, and meetings. The serene and picturesque surroundings will provide a unique backdrop, creating a memorable setting for attendees. The conference facilities will be equipped with modern technology and amenities to cater to the needs of business and leisure travellers.
- **Small Retail Outlets:** To enhance the visitor experience, the project will feature small retail outlets offering a selection of locally sourced products. These outlets will showcase the rich cultural heritage and craftsmanship of the region, providing visitors with the opportunity to purchase authentic and unique souvenirs. By promoting local businesses and artisans, the project aims to contribute to the economic growth and sustainability of the surrounding communities.
- **Accommodations:** Sandwich Dune Tours & Safari CC plans to construct 10 luxury chalets within the Dune 7 Concession. These chalets will offer comfortable and stylish accommodations for overnight guests. Designed to blend harmoniously with the natural environment, the chalets will provide a serene and peaceful retreat for visitors. Each chalet will be equipped with modern amenities and offer panoramic views of the surrounding landscape, allowing guests to connect with nature while enjoying a luxurious stay.

Figure 7: 3D Perspectives of Activities Centre (Concept Proposal)

Figure 8: 3D Perspectives of Restaurant and Retail (Concept Proposal)

- **Hot Air Balloon Rides:** One of the key attractions of the project is the introduction of hot air balloon rides. Visitors will have the opportunity to soar above the breathtaking sand dunes, experiencing a bird's-eye view of the mesmerizing landscape. These tethered hot air balloon rides will provide a unique and unforgettable experience, allowing guests to appreciate the vastness and beauty of the Dune 7 Concession from a different perspective.

Figure 9: 3D Perspectives of Chalets (Concept Proposal)

Figure 10: 3D Perspectives of Main Complex - Pool area, Picnic area, Central Plaza (weddings) (Concept Proposal)

— **Fat Biking, Camel Rides, and Sandboarding:** For adventure enthusiasts, the project will offer a range of exhilarating activities. Fat biking, where participants ride specialized bikes with oversized tires, will

allow visitors to navigate the sandy terrain with ease and excitement. Camel rides will provide a traditional mode of transportation, allowing guests to explore the dunes while immersing themselves in the local culture. Sandboarding, a thrilling sport similar to snowboarding, will give visitors the opportunity to glide down the dunes, enjoying the adrenaline rush and the stunning surroundings.

- **Stargazing and Hiking:** To cater to those seeking a more tranquil experience, the project will offer stargazing and hiking opportunities. The vast and unpolluted night skies of the Dune 7 Concession provide the perfect backdrop for stargazing enthusiasts. Visitors can witness the awe-inspiring beauty of the stars while learning about the constellations and the celestial wonders above. Hiking trails will be carefully designed to showcase the natural diversity of the area, allowing visitors to explore the unique flora and fauna while immersing themselves in the serene environment.
- **Desert and Walvis Bay Tours**: In addition to the exciting activities within the Dune 7 Concession, Sandwich Dune Tours & Safari CC will offer desert and Walvis Bay tours to enrich the visitor experience.
- **Desert Tours:** The project will provide guided desert tours, allowing visitors to explore the mesmerizing beauty of the surrounding desert landscapes. Knowledgeable guides will lead guests on immersive journeys, sharing insights about the unique desert ecosystem, geological formations, and indigenous flora and fauna. Visitors will have the opportunity to witness the incredible adaptations of desert life and learn about the delicate balance that exists in this harsh yet captivating environment.
- **Walvis Bay Tours:** As part of the project, Sandwich Dune Tours & Safari CC will organize tours to the nearby coastal town of Walvis Bay. Known for its abundant marine life and scenic beauty, Walvis Bay offers a range of attractions and activities. Visitors can embark on boat trips to observe dolphins, seals, and migratory bird species in their natural habitat. The famous Walvis Bay Lagoon, a Ramsar site, provides a haven for flamingos and other water birds, making it a must-visit destination for nature enthusiasts. Additionally, visitors can explore the town's rich history, visit local markets, and indulge in fresh seafood at waterfront restaurants.

The desert and Walvis Bay tours will provide a holistic experience for visitors, allowing them to explore both the inland desert and the coastal wonders of Namibia. These tours will contribute to the local economy by promoting tourism and generating employment opportunities for local guides and support staff.

The proposed activities within the Dune 7 Concession will provide a wide range of experiences for visitors, catering to different interests and preferences. From conference facilities and retail outlets to adventurous activities and serene retreats, the project aims to create a holistic and memorable recreational facility. The subsequent sections of this Environmental Impact Assessment (EIA) report will delve into a detailed analysis of the potential environmental impacts associated with these activities, as well as propose mitigation measures and management strategies to ensure the long-term sustainability and preservation of the natural and cultural resources of the site.

By offering a diverse range of activities, including conference facilities, retail outlets, accommodations, hot air balloon rides, fat biking, camel rides, sandboarding, stargazing, hiking, and desert and Walvis Bay

tours, the project aims to attract a wide range of visitors and provide them with a memorable and enriching experience in the unique natural and cultural setting of the Dune 7 Concession.

2 ENVIRONMENTAL BASELINE CONDITIONS

Dorob National Park is a diverse and captivating destination, where the forces of climate, geology, and nature converge in harmony. Its awe-inspiring landscapes and unique ecosystems serve as a testament to the profound interplay between these elements.

Figure 11: Aerial View picture OF Dune 7 recreational site

Dorob National Park is a significant ecological area located in close proximity to the Dune 7 Concession project. The park encompasses diverse ecosystems and supports a wide range of plant and animal species. The Environmental Impact Assessment (EIA) conducted for the Dune 7 Concession project considered the existing ecosystems and biodiversity within Dorob National Park. The following information provides an overview of the park's key ecosystems and biodiversity:

2.1 Geology:

- Dorob National Park's geology features two primary rock formations: the Nama Group and the Etendeka Group.
- The Nama Group consists of sedimentary rocks, including sandstones, siltstones, and shale, formed in ancient river systems, deltas, and shallow marine environments.
- Erosion has sculpted canyons, cliffs, and rugged mountains from these sedimentary layers.
- The granite Brandberg Mountain, Namibia's tallest peak, showcases unique erosional patterns.
- The Etendeka Group, dating back around 130 million years, is an extensive volcanic formation composed of basalt and other volcanic rocks.
- Erosion has revealed ancient lava flows, basalt columns, and lava tubes from the Etendeka lavas.
- The Messum Crater, a circular depression, is an eroded remnant of an ancient volcano with distinct layers of lava flows and volcanic ash.
- Along the coastal areas, the Sperrgebiet is known for its diamond deposits and distinctive coastal geomorphology.
- Coastal processes like wind, waves, and tides continuously shape dunes, cliffs, and beaches along the Atlantic shoreline.
- The park's geology provides insights into its geological evolution, climate connections, and the forces of nature that shaped it (Wassenaar et al, 2013).

2.2 Ecosystems and Biodiversity:

- Dorob National Park boasts diverse ecosystems, each housing unique life forms.
- It spans coastal areas, arid deserts, mountains, and dry riverbeds, contributing to its ecological diversity.
- The coastal zone features sandy dunes, rocky shores, and tidal zones, providing habitats for numerous species.
- Desert regions are home to hardy, drought-resistant plant species like succulents and desert shrubs.
- The mountainous areas exhibit different plant communities, with more vegetation at higher elevations.
- Wildlife includes various mammals like oryx, springbok, zebras, jackals, and foxes.
- Birdlife is abundant, with resident and migratory species utilizing diverse habitats.
- Coastal regions attract seabirds like flamingos, cormorants, and pelicans.
- Reptiles, including lizards and snakes, are adapted to the desert environment and widespread.
- Insects and invertebrates play vital roles in pollination, decomposition, and nutrient cycling.
- Dorob National Park is renowned for its unique and rare plant species, emphasizing its importance in plant conservation.
- Biodiversity results from complex interactions between climate, geology, and the park's ecosystems.
- Conservation efforts focus on protecting the park's ecosystems and biodiversity for future generations (Jacobson, 2013).

2.2 Vegetation and Flora:

- Vegetation in Dorob National Park thrives in arid and desert conditions, employing specialized water-conserving strategies.
- Diverse plant species adapt to the harsh environment.
- Iconic welwitschia plants can extract moisture from coastal fogs and are prominent in the park.
- Coastal regions feature hardy shrubs like coastal sagebrush, resistant to salt spray and harsh winds.
- Sandy areas host drought-tolerant grasses, including the sand ganna, aiding dune stabilization.
- The park showcases the endemic Dorob star-plant (Stapelia variabilis) known for its star-shaped flowers and unique odor for pollinators.
- Plants like the desert melon (Citrullus desertorum) and desert cucumber (Acanthosicyos naudinianus) store water in their tissues to survive in arid conditions.
- Halophytic plants like the Nara plant (Acanthosicyos horridus) thrive in saline soils.
- Ephemeral riverbeds are lined with camelthorn trees (Acacia erioloba), providing shade and food for wildlife.
- Resilient lichens and mosses in rocky areas adapt to extreme conditions.

- The park's flora plays vital roles in soil stabilization, erosion prevention, and providing habitats and sustenance for wildlife (Loots et al, 2019).

Figure 12: Drought Resistant vegetation found on the Dune 7 site

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2.3 Wildlife and Fauna:

- Dorob National Park hosts a diverse array of wildlife and fauna adapted to its various ecosystems, including deserts, coastlines, and mountains.
- Mammals include the iconic oryx (gemsbok), adapted to desert life with efficient water conservation mechanisms, as well as species like springbok, Hartmann's mountain zebra, bat-eared foxes, jackals, and smaller rodents.
- A variety of bird species inhabit the park, including seabirds like flamingos, cormorants, pelicans, and gulls. Raptors such as the black-breasted snake eagle and pale chanting goshawk are also seen. Ground-dwelling birds like korhaans and larks are common.
- Desert-adapted reptiles like the Namaqua chameleon and various snakes, including the venomous puff adder and sand adder, are present.
- The coastal areas are important nesting sites for marine turtles, including loggerhead and leatherback turtles.
- Insects and invertebrates, often overlooked, contribute to pollination, decomposition, and nutrient cycling. Dung beetles, beetles, butterflies, and moths are among them.
- The park's diverse fauna reflects unique ecological interactions within each habitat, including predator-prey relationships and adaptations to harsh environments.
- Conservation efforts aim to protect and preserve the park's wildlife and fauna, ensuring the long-term survival of these species and their habitats.

2.4 Water Resources:

Dorob National Park, being located in a predominantly arid region, has limited permanent water resources. The park is characterized by a desert landscape where water scarcity is a common occurrence. However, there are some intermittent water sources within the park that contribute to the availability of water for wildlife and vegetation during certain times of the year. These include:

- **Ephemeral Rivers:** Dorob National Park is intersected by ephemeral rivers or dry riverbeds, such as the Kuiseb River and the Ugab River. These watercourses may experience occasional flows during periods of rainfall or after rare precipitation events. They provide temporary water sources for wildlife and support vegetation growth along their banks.
- **Groundwater:** Beneath the surface of the park, there may be limited groundwater resources that contribute to the availability of water. These underground water sources can sustain vegetation and provide water for wildlife, particularly during dry periods when surface water is scarce. However, the extent and accessibility of groundwater in the park may vary.
- **Coastal Fog:** Along the coastal areas of Dorob National Park, fog plays a significant role in the water supply. Coastal fogs, driven by the cold Benguela Current, can blanket the region and provide a source of moisture for certain plant species. These plants have adapted to capture and utilize fog as a water source in the otherwise arid conditions.

It's important to note that water availability in Dorob National Park can be highly variable and dependent on seasonal rainfall patterns, climate conditions, and geological factors. The park's ecosystems have evolved to cope with the arid environment, with plants and wildlife exhibiting various adaptations for water conservation. Conservation efforts focus on sustainable water management and ensuring the preservation of water resources to support the park's delicate balance of life.

2.5 Air Quality:

Air quality in Dorob National Park is influenced by several factors, including natural processes, human activities, and regional air circulation patterns. Here are some key points about air quality in the park:

- **Natural Factors:** The park's location in an arid region can contribute to generally good air quality. The absence of heavy industrial activities and limited urbanization within the park's boundaries helps maintain a relatively clean air environment.

- **Desert Dust:** As a desert region, Dorob National Park may experience periodic dust storms or strong winds carrying fine particles of sand and dust. These natural occurrences can temporarily affect air quality by increasing particulate matter in the air.

- **Coastal Fog:** The coastal areas of the park can experience foggy conditions, driven by the cold Benguela Current. While fog itself is not a pollutant, it can impact visibility and moisture levels in the air.

- **Human Activities:** Human activities occurring outside the park, such as industrial operations, vehicle emissions, and agricultural practices, can potentially contribute to air pollution. However, the direct impact of these activities on the park's air quality may be limited due to the park's remote location and protected status.

It's important to note that air quality can vary depending on weather conditions, seasonal factors, and regional influences. The arid nature and relatively undisturbed environment of Dorob National Park contribute to generally favorable air quality. However, continuous monitoring and responsible management practices are necessary to ensure the preservation of clean air for the park's ecosystems and the well-being of its flora and fauna.

2.6 Indigenous Communities:

The project area has no indigenous communities.

2.7 Archaeological and Historical Sites:

Dorob National Park encompasses a rich historical and archaeological heritage, with various sites of cultural significance. Here are some key points about the archaeological and historical sites in the park:

- **Stone Age Artefacts:** The park's desert landscapes have preserved numerous Stone Age artefacts, providing insights into the lives of early human populations. Stone tools, such as arrowheads, scrapers, and hand axes, have been discovered, indicating the presence of ancient hunter-gatherer communities.
- **Rock Art**: Several rock art sites can be found within Dorob National Park, showcasing the creative expressions of past civilizations. These rock art panels depict intricate paintings and engravings, depicting scenes of wildlife, human figures, and cultural practices. They provide glimpses into the spiritual and cultural beliefs of the ancient inhabitants.
- **Shell Middens:** Along the coastal areas of the park, remnants of shell middens can be observed. These mounds of discarded shells represent ancient kitchen waste deposits left by past human populations who relied on coastal resources for sustenance.
- **Shipwrecks:** The Skeleton Coast, which extends into Dorob National Park, is known for its treacherous waters and numerous shipwrecks. These shipwrecks stand as reminders of maritime history and the challenges faced by sailors navigating these dangerous coastlines.
- **Historical Trading Routes:** The park's location in the Namib Desert has historically been traversed by various trading routes, including the ancient caravan routes and paths used by indigenous communities for trade and cultural exchange.
- **German Colonial History:** The colonial history of Namibia includes the German colonial era, during which German settlers established presence and infrastructure in the region. The remnants of colonial structures, such as forts, railway lines, and mining sites, can be found in certain areas of the park, highlighting the historical context of the region.

Preserving and protecting these archaeological and historical sites is of significant importance. Conservation efforts aim to safeguard these cultural treasures, promote awareness and understanding of their significance, and ensure that future generations can appreciate and learn from the rich history and heritage of Dorob National Park.

2.8 Climatic Conditions:

The climate and weather conditions in the vicinity of Dune 7 are characteristic of the desert environment. Here's an overview:

2.8.1 Desert Climate:

- **Temperature:** Dune 7 experiences a classic desert climate with extreme temperature variations between day and night.

- **Summer (November to April)**: Summers in this region are scorching hot, with daytime temperatures often exceeding 40°C (104°F) or more. It can be uncomfortably hot for outdoor activities during the day.
- **Winter (May to October):** Winters are milder in terms of daytime temperatures, ranging from 20°C to 30°C (68°F to 86°F). However, nights can be quite cold, with temperatures dropping significantly, occasionally below freezing.

2.8.2 Rainfall:

The Namib Desert, where Dune 7 is located, is one of the driest places on Earth. Rainfall is extremely limited, and the region can go for months or even years without significant precipitation.

Rainfall is almost nonexistent in the desert environment surrounding Dune 7, making it an arid and dry landscape.

2.8.3 Wind:

Wind is a common feature of the desert climate in this area. Strong winds, often carrying sand, can occur at any time of year, but they are more prevalent during the winter months.

2.8.4 Fog:

Fog is another characteristic of the coastal desert areas near Dune 7. The cold Benguela Current along the coast can create dense coastal fog, especially during the summer months. This fog can provide moisture to the plants and wildlife in the area.

2.9 Tourism

Dorob National Park offers unique opportunities for tourism, allowing visitors to experience the park's diverse landscapes, wildlife, and cultural heritage. Here are some key aspects of tourism in Dorob National Park:

- **Nature-Based Tourism:** The park's pristine desert, coastal, and mountainous environments attract nature enthusiasts and adventure seekers. Visitors can engage in activities such as guided hikes, nature walks, wildlife spotting, birdwatching, and photography to explore and appreciate the park's natural beauty.
- **Desert Safaris and 4x4 Excursions:** The vast expanse of the Namib Desert provides a captivating setting for desert safaris and 4x4 excursions. These guided tours offer visitors the opportunity to explore the dunes, encounter desert-adapted wildlife, and learn about the unique desert ecology.
- **Coastal Activities:** The park's coastal areas, including the Skeleton Coast, offer a range of activities. Visitors can take guided tours to discover the shipwrecks that dot the coastline, witness the dramatic meeting of desert and ocean, and experience the diverse marine and birdlife found along the shores.
- **Cultural and Historical Experiences:** Dorob National Park's archaeological and historical sites provide insights into the region's cultural heritage. Guided tours can take visitors to rock art sites, shell middens, and other historical locations, allowing them to learn about the indigenous peoples and early inhabitants of the area.
- **Educational and Research Tourism:** The park's unique ecosystems, geological formations, and cultural heritage attract researchers, scientists, and educational groups. Educational tours and research programs offer opportunities for learning, studying the environment, and contributing to conservation efforts.
- **Sustainable Tourism Practices:** Tourism in Dorob National Park emphasizes responsible and sustainable practices. Measures are in place to minimize the impact on the environment and wildlife, promote conservation awareness, and support local communities through responsible tourism initiatives.
- **Accommodation and Facilities:** There are various accommodation options available near the park, including lodges, campsites, and eco-friendly accommodations. These facilities provide comfortable and convenient bases for visitors to explore the park while minimizing their ecological footprint.

Visiting Dorob National Park provides an immersive experience in the unique natural and cultural heritage of the region. It offers a chance to connect with nature, witness breathtaking landscapes, and gain a deeper understanding of the delicate balance between human history and the environment.

2.10 Socio-economic implications

The socio-economic aspects of Dorob National Park encompass the relationship between the park and the surrounding communities, as well as the potential benefits and challenges associated with the park's presence. Here are some key points regarding the socio-economic aspects of Dorob National Park:

- **Local Employment and Income Generation:** The park provides employment opportunities for local communities through various avenues such as park management, eco-tourism activities, and conservation projects. This contributes to local economic development, creating income sources for residents living in the vicinity of the park.

- **Community-Based Tourism:** Dorob National Park supports community-based tourism initiatives, where local communities participate in and benefit from tourism activities. This involves offering guided tours, cultural experiences, and craft sales, allowing communities to showcase their traditions, skills, and products to visitors.

- **Cultural Preservation:** The park's cultural heritage sites and interactions with indigenous communities promotes cultural preservation and empower local communities. Encouraging cultural exchange, supporting traditional practices, and involving local communities in decision-making processes can help preserve their cultural identity and traditions.

- **Conservation Partnerships:** Collaboration between the park management and local communities fosters conservation partnerships. This includes engaging community members in conservation efforts, promoting sustainable resource management practices, and facilitating the sharing of traditional knowledge to enhance conservation outcomes.

- **Education and Awareness:** Dorob National Park serves as an educational platform, raising awareness about environmental conservation, sustainable practices, and the importance of preserving biodiversity. Educational programs targeting local communities, schools, and visitors can promote environmental stewardship and support the long-term sustainability of the park.

- **Challenges and Mitigation:** Balancing conservation goals with socio-economic needs can present challenges. These challenges may include competing land-use interests, limited access to resources for local communities, and potential conflicts between conservation regulations and traditional livelihoods. Implementing participatory approaches, addressing community needs, and ensuring equitable benefit-sharing can help mitigate these challenges.

- **Infrastructure and Services:** The development and improvement of infrastructure and services in and around the park, such as roads, accommodations, and healthcare facilities, benefits both visitors and local communities. Accessible and well-maintained infrastructure can enhance tourism experiences, attract investment, and improve the quality of life for residents (Gaylard, 2017).

2.11 Dorob National Park Infrastructure

2.11.1 Walvis Bay Airport:

Walvis Bay Airport serves as an important transportation hub for the region, connecting it to domestic and international destinations. The airport plays a crucial role in facilitating tourism, trade, and economic activities in the area. The development of the Dune 7 Concession project can potentially increase the

demand for air travel, leading to an increased need for efficient airport services and infrastructure. (Namakalu, 2014).

Figure 13: Walvis Bay International Airport (Source: Google Maps, accessed July 2023)

2.11.2 C14 Road

The C14 road, which runs next to the project area, serves as a vital transportation route, connecting various towns and communities. It is an important link for trade, tourism, and transportation of goods and services. The C14 road in Namibia, connecting Walvis Bay to various destinations, including Dorob National Park, has a significant impact on tourism and development in the region. Here's a description of the road and its effects:

- **Scenic Route:** The C14 road is renowned for its stunning and diverse scenery
- **Accessibility:** The road serves as a crucial transportation link, making it accessible for both domestic and international travelers. It provides access not only to Dorob National Park but also to other natural attractions, such as the Namib Desert and the Skeleton Coast.
- **Road Conditions:** The condition of the C14 road can vary, with well-maintained sections near urban areas like Walvis Bay and gravel or sand tracks in more remote regions.
- **Tourist Attractions:** Along the C14 route, travelers may encounter various tourist attractions and points of interest. These could include viewpoints, hiking trails, desert landscapes, and opportunities for wildlife viewing. These attractions contribute to the road's popularity among tourists.

Impact on Tourism:

- **Tourist Accessibility:** The C14 road significantly improves the accessibility of remote and natural areas like Dorob National Park. It allows tourists to reach these destinations more easily, promoting tourism in the region.
- **Economic Boost:** Tourism along the C14 road route brings economic benefits to local communities. Tourists spend money on accommodations, meals, guided tours, and local products, which can stimulate the local economy and provide employment opportunities.
- **Conservation Awareness:** Tourism often raises awareness about the importance of preserving natural environments like Dorob National Park. Visitors become more environmentally conscious and support conservation efforts.
- **Infrastructure Development:** The popularity of the C14 road for tourism has led to the development of infrastructure such as accommodations, rest areas, and visitor centers, enhancing the overall tourism experience.

Impact on Development:

- **Infrastructure:** The C14 road contributes to the development of infrastructure in the region. Improved roads can lead to better connectivity, benefiting local communities by making transportation of goods and services more efficient.
- **Community Development:** The income generated through tourism along the C14 road can support community development projects, including education, healthcare, and infrastructure upgrades, improving the overall quality of life for residents.
- **Employment:** Tourism-related businesses along the C14 road provide employment opportunities for local residents. Jobs in the hospitality sector, as tour guides or in transportation services, help alleviate unemployment.
- **Regional Growth:** The development of tourism along this route can lead to regional growth, with more businesses and services catering to the needs of tourists and residents alike.

the C14 road in Namibia, connecting Walvis Bay to destinations like Dorob National Park, has a significant impact on tourism by improving accessibility to natural attractions and contributing to the local economy. It also plays a role in regional development through infrastructure improvements, job creation, and community development initiatives.

Figure 14: C14 Road, Dorob National Park, Namibia

2.11.3 Walvis bay town - airport road Walvis /"B2" road

The road connecting Walvis Bay and the Walvis Bay International Airport is commonly known as the "B2" road. The B2 road is a major highway in Namibia and serves as the primary route between Walvis Bay and the airport. It provides convenient access for travellers commuting between the town and the airport.

Figure 15: The B2 highway in Namibia, connecting Walvis Bay to the airport

The Walvis Bay-Airport Road (B2 road) holds significant importance for various reasons:

- **Transportation**: The road serves as a crucial transportation link between Walvis Bay, a major coastal town in Namibia, and the Walvis Bay International Airport. It facilitates the movement of people, goods, and services between the town and the airport, ensuring smooth connectivity for travelers and cargo transportation.
- **Tourism and Trade:** Walvis Bay is a popular tourist destination and an important hub for international trade in Namibia. The B2 road plays a vital role in supporting tourism activities by providing a convenient route for tourists traveling to and from the airport. It also serves as a transportation artery for trade, allowing the smooth movement of goods to and from the port of Walvis Bay.
- **Economic Development:** The road's accessibility and connectivity contribute to the economic development of the Walvis Bay region. It supports various industries, including tourism, fishing, mining, manufacturing, and logistics, by facilitating the movement of goods and providing convenient access for business activities. The efficient transportation infrastructure enhances the region's competitiveness and attracts investments.
- **Regional Connectivity:** The B2 road serves as a link to other parts of Namibia and neighboring countries. It connects Walvis Bay to the national road network, enabling travelers to access other cities and towns within Namibia. Moreover, the road serves as a gateway to regional destinations,

such as Windhoek (the capital city), Swakopmund, and other towns in Namibia, fostering regional integration and trade.

- **Accessibility for Residents:** The B2 road provides an essential transportation route for the residents of Walvis Bay, ensuring convenient access to essential services, including healthcare, education, shopping centers, and employment opportunities. It improves the quality of life for local residents by reducing travel times and enhancing connectivity.
- **Emergency Services:** In times of emergencies, such as medical emergencies or disaster situations, the B2 road acts as a vital lifeline for providing rapid access to medical services, emergency response teams, and disaster relief efforts. Its well-maintained infrastructure facilitates the efficient movement of emergency vehicles, ensuring timely assistance to those in need.

The Walvis Bay-Airport Road (B2 road) plays a significant role in supporting the region's economic growth, facilitating tourism, enhancing regional connectivity, and improving the quality of life for residents. Its importance extends beyond transportation, contributing to various aspects of social and economic development in the Walvis Bay area and beyond.

3 LEGAL FRAMEWORK

In Namibia, the Environmental Management Act of 2007 and the Environmental Impact Assessment Regulations of 2012 are two key legal instruments that regulate the environmental impacts of development activities. These laws require developers to undertake an Environmental Impact Assessment (EIA) prior to carrying out any significant development activities in order to identify potential environmental impacts and to propose measures to mitigate or manage them.

Table 1: Summary of legislative framework relevant to the proposed development

LEGISLATION/ GUIDELINE	RELEVANT PROVISIONS	IMPLICATIONS FOR THIS PROJECT
Namibian Constitution First Amendment Act 34 of 1998	- "The State shall actively promote… 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" (Article 95(l)).	- Ecological sustainability should inform and guide this EA and the proposed development.
Environmental Management Act EMA (No 7 of 2007)	- Requires that projects with significant environmental impact are subject to an environmental assessment process (Section 27). - Details principles that are to guide all EAs.	- The EMA and its regulations should inform and guide this EA process.
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	- Details requirements for public consultation within a given environmental assessment process (GN 30 S21). - Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	
Forestry Act 12 of 2001 Nature Conservation Ordinance 4 of 1975	- Prohibits the removal of any vegetation within 100 m from a watercourse (Forestry Act S22(1)). - Prohibits the removal of and transport of various protected plant species.	- Even though the Directorate of Forestry has no jurisdiction within townlands, these provisions will be used as a guideline for the conservation of vegetation.
Labour Act 11 of 2007	- Details requirements regarding minimum wage and working conditions (S39-47).	- The Proponent should ensure that all contractors involved during the construction, operation and

		maintenance of the proposed project comply with the provisions of these legal instruments.
Health and Safety Regulations GN 156/1997 (GG 1617)	— Details various requirements regarding health and safety of labourers.	
Public Health Act 36 of 1919	— Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	
National Heritage Act 27 of 2004	— Section 48(1) states that "A person may apply to the [National Heritage] Council [NHC] for a permit to carry out works or activities in relation to a protected place or protected object".	Any heritage resources (e.g., human remains etc.) discovered during construction requires a permit from the NHC for relocation.
Burial Place Ordinance 27 of 1966	— Prohibits the desecration or disturbance of graves and regulates how bodies may be unearthed or dug up.	Regulates the exhumation of graves.
Water Resources Management *Act* 11 of 2013.	— To provide for the management, protection, development, use and conservation of water resources; to provide for the regulation and monitoring of water services and to provide for incidental matters.	The protection of ground and surface water resources should be a priority. The main threats will most likely be concrete and hydrocarbon spills during construction and hydrocarbon spills during operation and maintenance.
Namibia Water Corporation Act 12 of 1997	— To establish the Namibia Water Corporation Limited; to regulate its powers, duties and functions; to provide for a more efficient use and control of water	

	resources; and to provide for incidental matters.	
Urban and Regional Planning Act (No. 5 of 2018).	- Subdivision of land situated in any area to which an approved Town Planning Scheme applies must be consistent with that scheme (S31).	- The proposed use of the project site must be consistent with the Walvis Bay Town Planning Scheme
Road Ordinance 1972 (Ordinance 17 0f 1972)	- Width of proclaimed roads and road reserve boundaries (S3.1) - Control of traffic on urban trunk and main roads (S27.1) - Rails, tracks, bridges, wires, cables, subways or culverts across or under proclaimed roads (S36.1) - Infringements and obstructions on and interference with proclaimed roads. (S37.1) - Distance from proclaimed roads at which fences are erected (S38)	- The limitations applicable on RA proclaimed roads should inform the proposed layout and zonings where applicable.
Walvis Bay Zoning Scheme.	— This statutory document provides land use regulations and development.	Land uses and developments should be in accordance with the Walvis Bay Zoning Scheme
Integrated Urban Spatial Development Framework (IUSDF) of Walvis Bay	— Provides future land use planning within the Walvis Bay district.	The IUSDF was utilized to see if the proposed activity is in accordance with the future planning of Walvis Bay.
Walvis Bay Climate Strategic Action Plan	— Provides action plans on how Town Planning can help mitigate climate change	To promote two-storey developments, reduce urban sprawl and land competition. Encourage EIA studies with regards to rezoning.
Walvis Bay Biodiversity Report of 2008. (WBBR:2008)	— Provides a comprehensive summary and map of sensitive Biodiversity Areas and Zoning in the Walvis Bay district.	To ensure that the proposed activity is not located close to any Biodiversity Area or Zoning.
Sustainable Urban Energy Planning: A handbook for cities and towns in developing countries (SUEP:2004)	— Provides a comprehensive list and case studies to implement energy saving measures.	Implementing energy-efficiency and carbon mitigation measures. Conserve natural resources with city planning.
Walvis Bay Public Open Space Policy	Sets criteria of parameters for development of parks (POS) in Walvis Bay	

4 METHODOLOGY

The methodology used for conducting the Environmental Impact Assessment (EIA) report involved a comprehensive and systematic approach to assess the potential environmental impacts of the proposed project. The following steps were followed:

4.1 Data Collection:

Relevant data and information were collected from various sources, including government agencies, environmental studies, scientific literature, and field surveys. This involved gathering information on the project site, surrounding areas, natural resources, ecosystems, and socio-economic factors (Pavlickova, 2015).

4.2 Site Visit:

A thorough site visit was conducted to gather first-hand information about the project area, including its physical characteristics, biodiversity, land use patterns, water resources, and cultural heritage sites. This provided valuable insights into the existing environmental conditions and potential impacts.

4.3 Impact Identification:

Potential environmental impacts associated with the project were identified through a combination of literature review, expert knowledge, and field observations. This involved considering the direct and indirect impacts on ecosystems, water resources, air quality, cultural heritage, socio-economic factors, and other relevant parameters.

4.4 Impact Assessment:

The identified impacts were assessed in terms of their magnitude, extent, duration, and significance. This step involved evaluating the potential consequences of the project on various environmental components, such as flora and fauna, water quality, air pollution, cultural sites, and socio-economic aspects.

4.5 Mitigation Measures:

Appropriate mitigation measures were proposed to minimize or offset the identified environmental impacts. These measures aimed to reduce or eliminate negative effects and enhance positive outcomes. Best practices, technological advancements, and legal requirements were considered in developing the mitigation strategies.

4.6 Stakeholder Engagement:

Throughout the assessment process, stakeholders, including local communities, government agencies, non-governmental organizations, and relevant experts, were consulted and engaged. Their inputs, concerns, and suggestions were considered to ensure the inclusiveness and effectiveness of the assessment.

4.7 Reporting:

The findings of the EIA were compiled into a comprehensive report, which includes the project description, baseline conditions, identified impacts, assessment results, mitigation measures, and

monitoring and management plans. The report follows international standards and guidelines for EIA reporting and includes references to all the data sources and studies used.

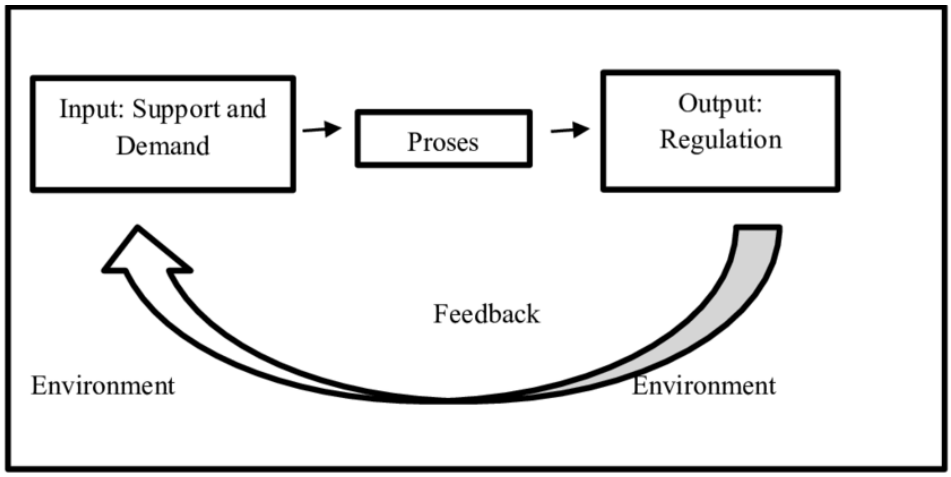
Theories and concepts used

In conducting the Environmental Impact Assessment (EIA) report, several theories and concepts were applied to guide the assessment process and enhance its effectiveness. These include:

4.8 Systems Theory:

The assessment approach adopted a systems perspective, recognizing that ecosystems are complex, interconnected systems. This theory helped in understanding the interactions and interdependencies between different environmental components, such as flora, fauna, water resources, and air quality. It allowed for a holistic evaluation of potential impacts and the identification of cascading effects within the ecosystem (Lim,1985; Saatsi, 2017).

Figure 16: Political systems theory David Easton



4.9 Carrying Capacity:

The concept of carrying capacity was considered to assess the project's potential impact on the environment. It refers to the maximum number of individuals or the level of activity that an ecosystem can support without experiencing significant degradation. By evaluating the project's scale, intensity, and resource demands, the assessment determined whether the proposed activities would exceed the carrying capacity of the area (Carrion-Mero, 2021).

4.10 Environmental Thresholds:

The assessment considered environmental thresholds, which are the limits beyond which significant harm or irreversible changes to ecosystems may occur. By evaluating the project's potential impacts against

these thresholds, the assessment determined whether the proposed activities would exceed acceptable limits and trigger detrimental environmental consequences.

4.11 Stakeholder Theory:

The stakeholder theory was applied to ensure the involvement of relevant stakeholders throughout the assessment process. This theory recognizes that stakeholders, including local communities, government agencies, and non-governmental organizations, have a legitimate interest in the project and its impacts. Engaging stakeholders facilitated information sharing, understanding of concerns, and incorporation of diverse perspectives in decision-making (Murray, 2018).

4.12 Best Available Technology and Best Environmental Practices:

The assessment considered the principles of using the best available technology and implementing best environmental practices. These concepts aim to minimize the project's environmental footprint by selecting and employing technologies and practices that are efficient, effective, and environmentally friendly (Ortolano, et al, 1995). The assessment evaluated the feasibility and applicability of such measures for mitigating potential impacts.

4.13 Cumulative Impact Assessment:

The assessment recognized the potential cumulative impacts of the proposed project in conjunction with existing and planned activities in the surrounding area. This approach considered the combined effects of multiple projects on the environment and assessed their cumulative significance. It helped to identify potential synergies, conflicts, and trade-offs among different activities and develop appropriate mitigation strategies.

By integrating these theories and concepts into the EIA process, the assessment aimed to provide a robust and comprehensive analysis of the project's potential environmental impacts. The application of these theories and concepts enhanced the scientific rigour, objectivity, and transparency of the assessment, ultimately supporting informed decision-making and sustainable project development (Ortolano, et al, 1995).

5 ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment (EIA) is a systematic process that evaluates the potential environmental impacts of a proposed project, plan, or policy. It is conducted to identify and assess the potential adverse effects on the environment and human well-being before a project is implemented. The primary purpose

of an EIA is to inform decision-makers and stakeholders about the potential environmental consequences of a project and to propose measures to mitigate or minimize those impacts (Sandham, 2013).

The EIA process involves the collection and analysis of data on various environmental components, such as air quality, water resources, biodiversity, land use, and socio-economic factors. It considers both the direct and indirect impacts that the project may have on the environment, including short-term and long-term effects. The assessment takes into account the project's entire life cycle, from construction and operation to decommissioning and potential post-project impacts (Zhao, 2023).

Through the EIA process, potential environmental risks and impacts are identified, and suitable mitigation measures are developed to avoid, minimize, or compensate for adverse effects. The assessment also provides an opportunity for public participation, allowing affected communities and stakeholders to voice their concerns and contribute to the decision-making process.

The ultimate goal of an EIA is to ensure that the proposed project is implemented in an environmentally sustainable manner. It aims to strike a balance between development and environmental conservation by promoting the protection of ecosystems, biodiversity, natural resources, and human health. The information and recommendations provided by the EIA are crucial for making informed decisions, shaping project design, and incorporating sustainable practices into development plans (Loomis, 2018).

5.1 Habitat and Biodiversity

Habitat and biodiversity assessment is a crucial component of the environmental impact assessment process. It involves the evaluation of the existing habitat types, ecological communities, and the presence of various species within the project area. The assessment aims to understand the potential impacts of the proposed project on the habitat and biodiversity, including any potential loss or degradation of natural habitats, changes in species composition, and disturbance to sensitive ecosystems.

To conduct a habitat and biodiversity assessment, several key steps are typically followed:

5.1.1 Baseline Data Collection:

The assessment begins with gathering baseline data on the existing habitat types, vegetation communities, and species diversity within the project area. This may involve field surveys, data collection from relevant sources, and consultation with experts in biodiversity and ecology.

5.1.2 Identification of Sensitive Habitats:

Sensitive habitats, such as wetlands, forests, or protected areas, are identified and assessed for their ecological importance and conservation status. These habitats may support threatened or endangered species or provide critical ecosystem services.

5.1.3 Species Inventory:

The assessment includes the identification and inventory of plant and animal species present in the project area. This involves documenting species richness, abundance, and distribution patterns, including both common and rare species.

5.1.4 Impact Analysis:

The potential impacts of the project on habitat and biodiversity are analyzed based on the project's scope, activities, and potential disturbances. This analysis considers factors such as habitat loss, fragmentation, pollution, and disturbance caused by construction, operation, or other project-related activities.

5.1.5 Mitigation and Conservation Measures:

The assessment provides recommendations for mitigating adverse impacts on habitat and biodiversity. These may include habitat restoration or creation, species protection measures, implementation of environmental management plans, and adherence to relevant environmental regulations and guidelines.

5.1.6 Monitoring and Follow-up:

The assessment also emphasizes the need for monitoring the project's impact on habitat and biodiversity during and after project implementation. Monitoring allows for adaptive management practices, ensuring that any unexpected impacts are identified and appropriate measures are taken in a timely manner.

By conducting a comprehensive habitat and biodiversity assessment, the potential impacts of the project on the environment can be better understood and appropriate measures can be implemented to minimize negative effects, conserve biodiversity, and promote sustainable development.

5.2 Water Resources

The water resources assessment in the desert environment focused on understanding the unique characteristics and challenges associated with water availability and management in this arid region. Given the limited water resources in desert areas, the assessment aimed to evaluate the potential impacts of the project on the existing water sources and develop strategies for sustainable water use.

Key Steps in the Water Resources Assessment:

5.2.1 Data Collection:

Gathered information on available water sources, including surface water bodies, groundwater aquifers, and any existing water infrastructure. Collected data on water availability, seasonal variations, and historical water use patterns in the desert region.

5.2.2 Water Balance Analysis:

Conducted a water balance analysis to assess the inflows, outflows, and storage of water in the desert ecosystem. This involved evaluating factors such as rainfall, evaporation rates, groundwater recharge, and surface runoff.

5.2.3 Groundwater Assessment:

Assessed the characteristics and potential of groundwater resources in the desert, including the depth of the water table, aquifer properties, and groundwater quality. Conducted hydrological studies and monitored groundwater levels to understand the sustainability of groundwater extraction.

5.2.4 Water Demand and Consumption Analysis:

Evaluated the projected water demand for the proposed project, considering factors such as construction, operation, and associated activities. Analyzed the water consumption patterns and identified potential water-saving measures or technologies to reduce water usage.

5.2.5 Impact on Water Availability:

Assessed the potential impact of the project on the availability of water resources in the desert. Considered the projected increase in water demand and evaluated if it could lead to water scarcity or depletion of local water sources. Analyzed the potential impacts on nearby communities, ecosystems, and other water users.

5.2.6 Water Conservation and Management Strategies:

Developed strategies and measures to promote water conservation and efficient water management practices. This included recommending the use of water-efficient technologies, rainwater harvesting systems, and wastewater recycling methods. Proposed water management plans to ensure sustainable water use and minimize the project's impact on the fragile desert ecosystem.

5.2.7 Mitigation and Monitoring:

Identified potential mitigation measures to address any adverse impacts on water resources. This could include implementing water-efficient practices, establishing water monitoring systems, and conducting regular assessments to track changes in water availability and quality. Developed contingency plans to address potential water shortages or unexpected impacts on water resources.

5.2.8 Stakeholder Engagement:

Engaged with relevant stakeholders, including local communities, water management authorities, and environmental organizations. Incorporated their feedback, concerns, and traditional knowledge related to

water resources into the assessment process. Fostered collaboration to ensure the sustainable management of water resources in the desert.

The water resources assessment highlighted the importance of sustainable water management in a desert environment. It emphasized the need for water conservation practices, efficient use of water resources, and the implementation of innovative technologies to minimize water consumption. The assessment's findings informed the development of water management plans and recommended measures for the project to ensure responsible water use and the long-term sustainability of water resources in the desert.

5.3 Waste Management

Waste management plays a critical role in minimizing the environmental impacts of any project. In the context of the Dune 7 Concession, a comprehensive waste management assessment was conducted to identify and mitigate potential adverse effects on the environment and human health. The assessment focused on various aspects of waste management, including waste generation, collection, storage, transportation, treatment, and disposal. The key findings and recommendations are outlined below:

5.3.1 Waste Generation:

The assessment examined the types and quantities of waste generated by the proposed activities in the Dune 7 Concession. This included solid waste, hazardous waste, and wastewater. The waste generation rate was estimated based on the projected visitor numbers, accommodation facilities, restaurant operations, and adventure activities.

5.3.2 Waste Minimization and Recycling:

Strategies for waste minimization and recycling were explored to reduce overall waste generation and promote sustainable practices. These strategies included implementing waste reduction measures, encouraging visitors to use reusable products, promoting recycling programs, and partnering with local recycling facilities.

5.3.3 Waste Collection and Storage:

Adequate waste collection and storage facilities were identified and designed to ensure efficient waste management. The assessment considered the appropriate placement of waste bins, their capacity, and the frequency of waste collection. Special attention was given to prevent littering and ensure proper waste segregation.

5.3.4 Waste Transportation:

The transportation of waste from the Dune 7 Concession to appropriate treatment or disposal facilities was assessed. The assessment considered the use of suitable vehicles, adherence to transportation regulations, and the selection of routes that minimize the environmental impact.

5.3.5 Waste Treatment and Disposal:

The assessment evaluated the available waste treatment and disposal options. Consideration was given to environmentally sound methods such as recycling, composting, and waste-to-energy technologies. Where applicable, hazardous waste was identified and handled in accordance with relevant regulations and best practices.

5.3.6 Monitoring and Compliance:

A monitoring and compliance program was recommended to ensure that waste management practices adhere to local regulations and industry standards. The program includes regular inspections, waste audits, and monitoring of waste-related parameters such as landfill leachate and air emissions.

5.3.7 Stakeholder Engagement and Awareness:

Engaging with stakeholders, including visitors, local communities, and waste management authorities, was emphasized to raise awareness about proper waste management practices. Educational campaigns, signage, and information materials were proposed to promote responsible waste disposal and encourage visitor participation.

The waste management assessment aimed to establish an effective waste management system that minimizes environmental impacts, protects human health, and promotes sustainable practices. The findings and recommendations serve as a basis for the development of a waste management plan tailored to the specific needs of the Dune 7 Concession.

5.4 Energy and Resource Consumption

The assessment of energy and resource consumption focused on evaluating the projected energy needs and resource usage associated with the operations of the Dune 7 Concession. The goal was to identify opportunities for energy efficiency, renewable energy integration, and sustainable resource management. The key findings and recommendations are presented below:

5.4.1 Energy Demand Analysis:

A comprehensive analysis was conducted to determine the energy demands of the proposed activities within the Dune 7 Concession. This included the energy requirements for lighting, heating, cooling, equipment, and other operational needs. Historical data, industry standards, and projected visitor numbers were taken into account to estimate the energy demand.

5.4.2 Renewable Energy Potential:

The assessment explored the potential for integrating renewable energy sources into the operations of the Dune 7 Concession. The availability of solar, wind, or other renewable resources in the area was assessed, along with the feasibility of implementing renewable energy technologies such as solar panels

or wind turbines. The aim was to reduce reliance on fossil fuel-based energy sources and minimize greenhouse gas emissions.

5.4.3 Energy Efficiency Measures:

Various energy efficiency measures were recommended to optimize energy consumption within the concession. This included the use of energy-efficient lighting systems, appliances, and equipment, as well as the implementation of energy management practices such as scheduling and monitoring. Insulation and passive cooling strategies were also considered to reduce the need for artificial cooling.

5.4.4 Resource Management:

The assessment examined the consumption of natural resources within the Dune 7 Concession, such as water, fuel, and materials. Opportunities for resource conservation, recycling, and sustainable procurement practices were identified. Water-saving fixtures, waste reduction programs, and environmentally friendly materials were suggested to minimize resource consumption and promote sustainability.

5.4.5 Monitoring and Reporting:

A monitoring and reporting framework was recommended to track energy and resource consumption over time. This would allow for the assessment of progress, identification of inefficiencies, and the implementation of corrective measures. Regular energy audits and resource usage assessments were proposed as part of this framework.

5.4.6 Stakeholder Engagement:

Engaging stakeholders, including staff, visitors, and local communities, was emphasized to raise awareness and promote sustainable energy and resource consumption practices. Educational initiatives, training programs, and information campaigns were suggested to encourage responsible behavior and foster a culture of sustainability.

The energy and resource consumption assessment aimed to minimize the environmental impact associated with energy use and resource extraction, while also promoting efficient and sustainable practices. The recommendations provided a roadmap for the implementation of energy efficiency measures, renewable energy integration, and responsible resource management within the Dune 7 Concession.

5.5 Landscape and Visual Impact

The Landscape and Visual Impact Assessment focused on evaluating the potential changes to the visual character and scenic quality of the Dune 7 Concession area as a result of the proposed development. The assessment aimed to identify any significant landscape and visual impacts and provide mitigation

measures to minimize adverse effects (Cilliers, 2023). The key steps and findings of the assessment are outlined below:

5.5.1 Baseline Assessment:

A detailed baseline assessment of the existing landscape and visual characteristics of the Dune 7 Concession area was conducted. This included an analysis of the landforms, vegetation, water bodies, and other natural features, as well as the visual quality and scenic value of the area. Visual resources and viewpoints were identified and mapped.

5.5.2 Impact Identification:

The potential impacts of the proposed development on the landscape and visual environment were identified. This included assessing the visual prominence of new structures, changes in land use patterns, alterations to the natural topography, and the introduction of built elements. The visual effects of increased human activity, such as increased traffic or visitor presence, were also considered.

5.5.3 Visual Sensitivity Analysis:

Areas of high visual sensitivity were identified, such as viewpoints, protected landscapes, and culturally significant sites. These areas were given special consideration in assessing the potential impacts and determining appropriate mitigation measures.

5.5.4 Mitigation Measures:

Mitigation measures were proposed to minimize adverse landscape and visual impacts. These measures aimed to preserve and enhance the visual quality and scenic value of the area. Examples of mitigation measures may include strategic placement of structures to minimize visibility, landscape design to integrate built elements with the natural surroundings, and the use of appropriate materials and colors to blend harmoniously with the landscape.

5.5.5 Visual Impact Assessment:

The visual impacts of the proposed development were assessed using visual simulation techniques, such as 3D modeling or photomontages. These tools allowed for a visual representation of the proposed changes and facilitated the evaluation of their visual effects from different viewpoints and perspectives.

5.5.6 Monitoring and Management:

A monitoring and management plan was recommended to ensure ongoing assessment and management of landscape and visual impacts. This plan would include periodic monitoring of the visual conditions, review of the effectiveness of mitigation measures, and the implementation of any necessary adjustments or additional measures.

The Landscape and Visual Impact Assessment provided a comprehensive evaluation of the potential impacts on the visual character and scenic quality of the Dune 7 Concession area. By identifying key areas of concern and proposing mitigation measures, the assessment aimed to ensure that the proposed development is in harmony with the surrounding landscape and minimizes any adverse visual effects.

5.6 Noise and Air Quality

The Noise and Air Quality Assessment focused on evaluating the potential impacts of the proposed development on noise levels and air quality in and around the Dune 7 Concession area. The assessment aimed to identify any potential noise and air pollution sources, quantify their impacts, and propose mitigation measures to minimize adverse effects (Stansfeld, 2015). The key steps and findings of the assessment are outlined below:

5.6.1 Baseline Assessment:

A detailed baseline assessment of the existing noise levels and air quality in the Dune 7 Concession area was conducted. This included measuring ambient noise levels and concentrations of air pollutants at various locations within and around the area. Baseline data was collected to establish the existing noise and air quality conditions.

5.6.2 Noise Assessment:

The potential noise sources associated with the proposed development were identified, such as construction activities, operation of recreational facilities, and increased visitor traffic. Noise measurements and modeling techniques were employed to assess the potential noise impacts on sensitive receptors, including nearby communities and wildlife habitats. Applicable noise standards and guidelines were used to evaluate the significance of the noise impacts.

5.6.3 Air Quality Assessment:

The potential air pollution sources associated with the proposed development were identified, such as dust generation from construction activities, emissions from vehicles, and potential impacts on air quality due to increased human activity. Air quality monitoring and modeling techniques were used to assess the potential impacts on ambient air quality parameters, including particulate matter (PM), nitrogen oxides (NOx), and volatile organic compounds (VOCs).

5.6.4 Impact Evaluation:

The noise and air quality impacts were evaluated based on the baseline data and the predicted changes associated with the proposed development. The assessment considered factors such as the magnitude, duration, and frequency of noise events, as well as the dispersion and deposition of air pollutants. The potential impacts on human health, wildlife, and sensitive ecosystems were also considered.

5.6.5 Mitigation Measures:

Mitigation measures were proposed to minimize adverse noise and air quality impacts. These measures aimed to reduce noise emissions at the source, implement noise barriers or buffers, and apply best practices for dust control and air pollution prevention. Other measures may include adopting quieter technologies, implementing traffic management strategies, and promoting sustainable transportation options.

5.6.6 Monitoring and Management:

A monitoring and management plan was recommended to ensure ongoing assessment and management of noise levels and air quality. This plan would include regular monitoring of noise levels and air pollutant concentrations, evaluation of the effectiveness of mitigation measures, and the implementation of any necessary adjustments or additional measures.

The Noise and Air Quality Assessment provided a comprehensive evaluation of the potential impacts on noise levels and air quality associated with the proposed development. By identifying key noise and air pollution sources and proposing mitigation measures, the assessment aimed to ensure that the development is conducted in an environmentally responsible manner and minimizes any adverse noise and air quality effects.

5.7 Cultural and Social Impacts

The Cultural and Social Impacts Assessment focused on evaluating the potential effects of the proposed development on the cultural heritage, social fabric, and well-being of the local communities and stakeholders. The assessment aimed to identify and assess both positive and negative impacts, as well as propose mitigation measures and enhancement strategies to ensure the preservation and promotion of cultural and social values (Mair, et al., 2023). The key aspects and findings of the assessment are outlined below:

5.7.1 Cultural Heritage Assessment:

A comprehensive assessment was conducted to identify and evaluate the cultural heritage resources in and around the Dune 7 Concession area. This involved identifying archaeological sites, cultural landscapes, traditional land uses, sacred sites, and other significant cultural features. The assessment considered the potential impacts of the proposed development on these cultural heritage resources, including potential physical disturbances, loss of cultural values, and changes to cultural practices.

5.7.2 Social Impact Assessment:

The assessment also considered the social impacts of the proposed development on the local communities and stakeholders. This involved identifying potential changes in land use patterns, access to resources, employment opportunities, community cohesion, and social well-being. The assessment aimed

to understand the potential positive and negative social implications of the development, including effects on livelihoods, traditional practices, community dynamics, and social infrastructure.

5.7.3 Stakeholder Engagement:

Meaningful engagement with local communities, indigenous groups, and relevant stakeholders was a crucial component of the assessment. Consultations, interviews, and participatory workshops were conducted to gather input, concerns, and aspirations of the affected communities and stakeholders. Their perspectives and insights were incorporated into the assessment process to ensure a holistic understanding of cultural and social impacts.

5.7.4 Impact Evaluation:

The identified cultural and social impacts were evaluated based on the baseline data, stakeholder consultations, and relevant cultural and social impact assessment frameworks. The assessment considered the significance, magnitude, duration, and distribution of the impacts. Both short-term and long-term effects were taken into account, including potential cumulative impacts in the context of other ongoing or planned developments in the area.

5.7.5 Mitigation and Enhancement Measures:

Based on the assessment findings, appropriate mitigation measures and enhancement strategies were proposed. These measures aimed to minimize adverse cultural and social impacts and promote positive outcomes. Mitigation measures may include preserving and protecting cultural heritage sites, promoting cultural tourism and local enterprises, fostering community engagement and participation, and supporting capacity-building initiatives. Enhancement strategies may focus on strengthening cultural identity, promoting cultural exchange, and providing social benefits to the local communities.

5.7.6 Monitoring and Management:

A monitoring and management plan was recommended to ensure the ongoing assessment and management of cultural and social impacts. This plan would involve monitoring the implementation and effectiveness of mitigation measures, conducting periodic reviews of the cultural and social conditions, and adapting strategies as needed. It would also involve establishing mechanisms for continuous engagement with the affected communities and stakeholders to address any emerging issues or concerns.

The Cultural and Social Impacts Assessment aimed to provide a comprehensive understanding of the potential effects of the proposed development on the cultural heritage and social dynamics of the area. By considering the perspectives of local communities and stakeholders and proposing appropriate mitigation and enhancement measures, the assessment aimed to promote the sustainable development of the Dune 7 Concession while respecting and safeguarding the cultural and social values of the region.

5.8 Solar Energy Feasibility Study / Assessment:

Explored the viability of implementing solar energy solutions:

- **Solar Resource Assessment:** Analyzed historical solar irradiance data to determine the solar energy potential in the desert region.
- **Energy Demand:** Calculated the project's energy consumption requirements to assess the feasibility of solar energy meeting these needs.
- **Technology Suitability:** Evaluated the suitability of solar photovoltaic panels or solar thermal systems for the project's energy demands.

5.8.1 Environmental and Economic Benefits:

Assessed the potential advantages of solar energy adoption:

- **Environmental Impact:** Analyzed the reduction in greenhouse gas emissions and other environmental benefits associated with solar energy.
- **Economic Viability:** Estimated the long-term cost savings from using solar power compared to traditional non-renewable energy sources.

5.8.2 Solar Energy Implementation:

Consider strategies for integrating solar energy solutions:

- **Solar Panel Installation:** Evaluated the feasibility of installing solar photovoltaic panels on suitable project structures.
- **Solar Thermal Systems:** Assessed the potential of utilizing solar thermal systems for water heating or other energy needs.

5.8.3 Energy Independence:

Examined the benefits of reducing reliance on non-renewable energy sources:

- **Reduced Carbon Footprint:** Highlight the positive environmental impact of utilizing solar energy to power project activities.
- **Long-Term Savings:** Emphasize potential cost savings in terms of energy expenditures over the project's lifecycle.

5.8.4 Monitoring and Maintenance:

Establish plans for monitoring and maintaining solar energy systems:

- **Performance Monitoring:** Implement systems to monitor the efficiency and output of solar energy installations.

- **Regular Maintenance:** Develop a maintenance schedule to ensure optimal functioning of solar panels or thermal systems.

This Solar Energy Feasibility Study aims to determine the practicality of implementing solar energy solutions for the Dune 7 Concession. By assessing both environmental benefits and economic considerations, the study seeks to provide valuable insights into the potential of harnessing solar power in a desert environment.

5.9 Sand Erosion and Stabilization Assessment for Dune 7 Concession:

5.9.1 Sand Dynamics Study: Examined the dynamics of sand movement and erosion:

- **Wind Patterns:** Analyzed prevailing wind patterns to understand the direction and intensity of sand movement.
- **Erosion Hotspots:** Identified areas most susceptible to sand erosion based on topography and wind dynamics.

5.9.2 **Erosion Vulnerability Assessment**:

Evaluated areas prone to sand erosion:

- **Geomorphology Analysis:** Study the terrain characteristics to determine erosion-prone zones.
- **Vegetation Cover:** Assess the role of vegetation in stabilizing sand and preventing erosion.

5.9.3 Stabilization Strategies:

Develop strategies to counteract sand erosion:

- **Natural Barriers:** Investigate the use of natural barriers like dune grasses or vegetation to stabilize sand movement.
- **Structural Interventions:** Explore the possibility of using physical structures to mitigate sand erosion, such as sand fences or dune stabilization walls.

4.9.4 Erosion Control Measures:

Implement erosion control measures:

- **Sand Fencing:** Consider installing sand fencing perpendicular to prevailing wind direction to trap and stabilize sand.
- **Vegetation Planting:** Propose planting native vegetation to stabilize sand dunes and prevent erosion.
- **Dune Stabilization Walls:** Evaluate the use of stabilizing walls or barriers to prevent sand drift.

4.9.5 Infrastructure Protection:

Protect project infrastructure from sand erosion:

- **Site Design:** Develop infrastructure layouts that consider natural wind barriers and minimize exposure to sand movement.
- **Construction Techniques:** Implement erosion control measures during construction, such as covering exposed surfaces to prevent sand accumulation.

4.9.6 Environmental Preservation:

Preserve the natural landscape and ecosystem:

- **Sensitive Areas:** Identify ecologically sensitive areas and prioritize erosion control measures to protect these regions.
- **Erosion-induced Habitat Change:** Assess the impact of sand movement on local habitats and propose strategies to mitigate adverse effects.

This Sand Erosion and Stabilization Assessment aims to understand and manage the challenges posed by sand movement and erosion in the desert environment. By identifying vulnerable areas and implementing effective erosion control measures, the assessment seeks to safeguard infrastructure and maintain the natural landscape's integrity.

5.10 Health and Safety Assessment for Dune 7 Concession:

4.10.1 Desert-Specific Risk Assessment:

Conduct a comprehensive health and safety risk assessment for desert conditions:

- **Climate Hazards:** Evaluated risks related to extreme heat, dehydration, and sun exposure.
- **Sand Storms:** Identified potential dangers posed by sand storms, including reduced visibility and flying debris.
- **Wildlife Hazards:** Assessed risks associated with desert-dwelling creatures, such as snakes and scorpions.

5.10.1 Safety Protocols Development:

Develop safety protocols tailored to desert-specific hazards:

- **Extreme Heat Safety:** Establish guidelines for staff and visitors to prevent heat-related illnesses, including hydration practices and rest recommendations.
- **Sand Storm Preparedness:** Create procedures for sheltering in place during sand storms and guidelines for safely resuming activities afterward.

5.10.2 Emergency Response Plans:

Develop emergency response plans to address desert-related risks:

- **Heat-Related Emergencies:** Outline steps for identifying and responding to heat-related illnesses, including first aid measures and evacuation protocols.
- **Sand Storm Incidents:** Define actions to take during a sand storm, such as seeking shelter and communicating safety instructions.

5.10.3 Safety Education and Training:

Ensure staff and visitors are adequately informed about desert safety:

- **Safety Briefings:** Conduct mandatory safety briefings for all staff and visitors, emphasizing desert-specific risks and precautions.
- **Training Programs:** Provide training sessions for staff on first aid, emergency response, and the use of safety equipment.

5.10.4 Safety Equipment and Facilities:

Equip the site with necessary safety measures:

- **Emergency Kits:** Distribute first aid kits, sunblock, and other essentials across the site for quick access during emergencies.
- **Shelters and Signage:** Install emergency shelters and clear signage to guide visitors to safe areas during sand storms.

This Health and Safety Assessment aims to identify and manage the unique risks associated with the desert environment, ensuring the well-being of both staff and visitors. By developing comprehensive safety protocols and education initiatives, the assessment seeks to minimize the impact of desert-specific hazards and create a secure environment for all.

5.11 Climate Change Resilience Assessment for Dune 7 Concession:

4.13.1 Vulnerability Assessment:

Identify potential climate change impacts on the project:

- **Temperature Rise:** Assessed the extent of temperature increase and its effects on infrastructure, vegetation, and visitor comfort.
- **Precipitation Changes:** Evaluated alterations in precipitation patterns and potential implications for water availability and erosion.

4.13.2 Impact Analysis:

Examined the direct and indirect consequences of climate change:

- **Infrastructure Resilience:** Assessed the ability of infrastructure to withstand extreme heat and potential heat-related damage.
- **Ecological Effects:** Analyzed likely impacts on plant and animal species, especially those sensitive to temperature changes.

This Climate Change Resilience Assessment aims to identify potential climate change impacts on the project and develop adaptive strategies to enhance its long-term viability. By considering both immediate and long-term climate challenges, the project can continue to operate successfully while contributing to the broader efforts of climate change mitigation and adaptation.

6 MITIGATION MEASURES

Mitigation measures play a crucial role in minimizing the potential negative impacts of the Dune 7 concession project and ensuring sustainable development. The following mitigation measures are proposed to address various environmental and social aspects:

6.1 Habitat and Biodiversity:

- Conduct comprehensive surveys to identify and protect sensitive habitats and endangered species.
- Implement measures to minimize disturbance to wildlife, such as establishing buffer zones and designated trails.
- Implement habitat restoration programs to enhance biodiversity in degraded areas.

6.2 Water Resources:

- Implement water conservation measures to minimize water consumption, considering the arid nature of the region.
- Develop efficient water management systems, including rainwater harvesting and wastewater treatment.
- Monitor water quality regularly to ensure compliance with environmental standards.

6.3 Waste Management:

- Develop a comprehensive waste management plan that includes waste reduction, recycling, and proper disposal of waste.
- Install adequate waste collection points and promote responsible waste practices among visitors and staff.
- Collaborate with local waste management authorities to ensure proper waste management practices.

6.4 Energy and Resource Consumption:

- Incorporate energy-efficient designs and technologies in the construction and operation of facilities.
- Promote the use of renewable energy sources, such as solar power, to reduce reliance on fossil fuels.
- Implement resource conservation measures, such as efficient lighting systems and water-saving fixtures.

6.5 Landscape and Visual Impact:

- Design structures and facilities in a manner that blends harmoniously with the natural landscape.
- Minimize the visual impact by using low-profile structures and natural materials.
- Implement landscaping strategies to enhance the aesthetic appeal of the area and mitigate visual disturbances.

6.6 Noise and Air Quality:

- Employ soundproofing techniques in construction and operational activities to minimize noise impacts.
- Regularly monitor air quality and implement measures to mitigate dust and air pollution.
- Promote the use of eco-friendly transportation options and encourage visitors to minimize vehicle emissions.

6.7 Cultural and Social Impacts:

- Engage with local communities to identify and address potential cultural and social concerns.
- Develop programs to promote cultural heritage preservation and awareness among visitors.
- Provide training and employment opportunities for local residents to maximize socio-economic benefits.

6.8 Health and Safety

- Ensure the health and safety of staff and visitors in the challenging desert environment.
- Conduct a comprehensive health and safety risk assessment specific to desert conditions.
- Safety Protocols: Develop and implement safety protocols for extreme heat, sandstorms, and other desert-related hazards.
- Visitor Information: Provide clear and accessible information to staff and visitors about desert-specific safety measures.

6.9 Sand Erosion and Stabilization

- Prevent sand erosion to protect infrastructure and preserve the natural landscape.
- Erosion Study: Study the dynamics of sand movement and erosion in the desert to identify vulnerable areas.
- Erosion Control: Implement erosion control measures, such as sand fences, vegetation planting, and dune stabilization.
- Infrastructure Protection: Design infrastructure to withstand sand impact and reduce erosion vulnerability.

6.10 Solar Energy

- Evaluate the feasibility of utilizing solar energy to reduce reliance on non-renewable energy sources.

- Solar Feasibility Study: Conduct a feasibility study to assess the suitability of harnessing solar energy in the desert environment.
- Solar Panel Installation: If feasible, install solar panels or solar thermal systems to meet a portion of the project's energy needs.

6.11 Cultural Heritage (if any)

- Protect and preserve cultural heritage sites and artifacts within the project area.
- Cultural Heritage Survey: Conduct a cultural heritage survey to identify and protect historical sites and artifacts.
- Site Preservation: Establish protective measures for identified cultural heritage sites, including restricted access if necessary.
- Educational Initiatives: Develop educational programs and signage to raise awareness about the cultural heritage in the area.

6.12 Noise and Air Quality

- Minimize noise and air quality impacts on the environment and surrounding areas.
- Noise Control: Implement noise-reduction measures during construction and operation phases, such as scheduling noisy activities during off-peak hours.
- Air Quality Monitoring: Monitor air quality to ensure compliance with regulations and implement measures to mitigate dust emissions.

6.13 Climate Change Resilience

- Assess and enhance the project's resilience to climate change, including temperature and precipitation variations.
- Climate Change Assessment: Continuously assess the project's vulnerability to climate change and adapt strategies as needed.
- Adaptation Strategies: Develop and implement adaptation strategies to ensure the project remains viable in the face of long-term climate challenges.

These mitigation measures aim to ensure the project's operations are conducted in an environmentally and socially responsible manner. They will be implemented in accordance with applicable laws, regulations, and industry best practices to mitigate potential adverse impacts and foster sustainable development.

7 SITE ALTERNATIVES

The consideration of site alternatives is crucial in the decision-making process for any development project, as it helps assess and compare different options based on various factors. some potential site alternatives that could have been considered during the project planning phase:

7.1 Alternative locations within Dorob National Park:

The project could have explored alternative sites within the national park that have less sensitive ecosystems or lower biodiversity values. This would help minimize the potential impact on the existing habitats and wildlife.

7.2 Off-site locations:

The project could have considered establishing the recreational facility and tourism activities outside of Dorob National Park. This would allow for the development of a similar facility in an area with fewer environmental constraints and potentially lower impacts on sensitive ecosystems.

7.3 Brownfield sites:

The project could have explored the possibility of utilizing existing developed areas or brownfield sites instead of developing on pristine land. Brownfield sites are previously developed areas that are no longer in use and may provide opportunities for redevelopment while minimizing the impact on natural habitats.

7.4 Collaboration with existing tourism operators:

Instead of developing a new facility, the project could have considered partnering with existing tourism operators in the region. This would allow for the utilization of their established infrastructure and resources, reducing the need for extensive new construction and potential environmental impacts.

These site alternatives would have required careful consideration and evaluation to assess their feasibility, environmental impact, and compatibility with the project objectives. Conducting a thorough analysis of the alternatives could have provided valuable insights into the most suitable site for the recreational facility while minimizing negative environmental consequences.

Certainly, the selection of the Dune 7 Concession area as the site for the recreational facility was deemed more suitable for several reasons:

7.5 Resource availability:

The Dune 7 Concession area offers unique natural resources and scenic beauty that align with the objectives of the project. Its sand dunes, desert landscapes, and proximity to Walvis Bay provide an attractive setting for tourism and recreational activities.

7.6 Existing infrastructure:

The Dune 7 Concession area already has some infrastructure in place, such as access roads and basic facilities. This provides a foundation for the development of the recreational facility, reducing the need for extensive construction and minimizing potential environmental disturbance

7.7 Concession management:

The Ministry of Environment, Forestry, and Tourism awarded the Dune 7 Concession to Sandwich Dune Tours and Safaris through a competitive tender process. This indicates that the company demonstrated the capability to manage the area responsibly, ensuring the preservation of the environment and compliance with regulations.

7.8 Local economic benefits:

The development of the recreational facility in the Dune 7 Concession area is expected to generate employment opportunities for approximately 45 people from the local catchment. This will contribute to the socioeconomic development of the surrounding communities and enhance local livelihoods.

While alternative sites may have been considered, the Dune 7 Concession area was ultimately chosen due to its compatibility with the project objectives, existing infrastructure, and the responsible management provided by Sandwich Dune Tours and Safaris. The decision aimed to strike a balance between promoting tourism and recreation while minimizing negative environmental impacts in a concession area that is well-suited for such activities.

8 PUBLIC PARTICIPATION

Public participation is a crucial aspect of the Environmental Impact Assessment (EIA) process for the Dune 7 concession project. It provides an opportunity for stakeholders and the public to engage in the decision-making process, express their concerns, and contribute to the project's outcomes. The following steps were undertaken to ensure meaningful public participation:

8.1 Notification:

The relevant stakeholders and potentially affected communities were notified about the project and the EIA process. This involved public announcements, advertisements, and the dissemination of information through various channels, including local newspapers – New Era, site meetings, and online platforms – Facebook and website.

8.2 Public Consultation:

Public consultation sessions were held to provide stakeholders with the opportunity to voice their opinions, ask questions, and provide feedback on the project. These sessions were conducted in accessible locations and at convenient times to encourage maximum participation.

8.3 Information Provision:

Comprehensive project information, including the project description, potential environmental impacts, and mitigation measures, was made available to the public. This information was presented in clear and understandable language to facilitate informed decision-making and constructive input from stakeholders.

8.4 Feedback Collection:

Various mechanisms were employed to collect feedback and input from the public, such as comment forms, surveys, and dedicated email addresses. These feedback channels allowed stakeholders to express their concerns, suggest alternatives, and provide additional information relevant to the project.

8.5 Stakeholder Engagement:

Key stakeholders, including local communities, non-governmental organizations, and relevant government agencies, were engaged throughout the EIA process. This involved one-on-one meetings, stakeholder workshops, and collaboration to ensure their perspectives and interests were considered.

8.6 Consideration of Feedback:

All feedback and comments received during the public participation process were carefully reviewed and considered during the development of the EIA report. Where feasible and appropriate, the concerns and suggestions raised by stakeholders were incorporated into the mitigation measures and project design.

8.7 Public Disclosure:

The EIA report, including a summary of the public participation process and the feedback received, was made publicly available. This ensured transparency and allowed interested parties to access and review the findings, conclusions, and proposed mitigation measures.

The public participation process aimed to foster an inclusive and transparent approach to decision-making, ensuring that the concerns and interests of the public and stakeholders were taken into account. It provided an opportunity for meaningful engagement and contributed to the development of a well-rounded EIA report for the Dune 7 concession project.

9 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Introduction

This chapter outlines the Environmental Management Plan (EMP) for the Dune 7 Concession project. The EMP is designed to guide the effective management of environmental and social aspects throughout the project's lifecycle. This plan is a dynamic document that will be continuously reviewed and updated to ensure its effectiveness in mitigating potential impacts, enhancing sustainability, and promoting responsible project operations.

9.2 Objectives of the Environmental Management Plan

The primary objectives of the EMP are as follows:

- **Minimize Environmental Impact:** Implement measures to minimize adverse environmental effects, protect sensitive habitats, and conserve biodiversity.
- **Ensure Health and Safety:** Prioritize the health and safety of staff and visitors by establishing protocols for desert-specific hazards.
- **Promote Sustainability:** Foster sustainable practices by assessing and harnessing renewable energy sources, specifically solar power.
- **Preserve Cultural Heritage:** Protect and preserve cultural heritage sites and artifacts within the project area.
- **Manage Noise and Air Quality:** Control noise levels and maintain air quality standards in line with regulations.
- **Enhance Climate Resilience:** Evaluate and enhance the project's resilience to climate change, ensuring long-term viability.

9.3 Implementation Responsibilities

The successful execution of the EMP requires clearly defined roles and responsibilities. The responsible parties for each mitigation measure are outlined in the respective sections of this plan. However, overall project management and oversight of the EMP will fall under the jurisdiction of the Environmental Management Team (EMT), which includes representatives from various relevant disciplines.

9.4 Monitoring and Reporting

Continuous monitoring and regular reporting are essential components of the EMP. The monitoring activities will encompass various aspects, including habitat and biodiversity, health and safety, solar energy production, cultural heritage preservation, noise and air quality, and climate resilience. Data collected through monitoring will be analyzed to ensure compliance with regulatory requirements and the effectiveness of mitigation measures.

Monitoring reports will be generated at defined intervals and shared with relevant stakeholders, including regulatory agencies, local communities, and project management. Any deviations from the mitigation measures or environmental standards will be reported promptly, along with corrective actions taken or planned.

9.5 Adaptive Management

The EMP is a dynamic tool designed to adapt to changing circumstances and new information. An adaptive management approach will be employed to continuously improve the effectiveness of mitigation measures and address emerging challenges. The following steps will be undertaken:

- **Regular Reviews:** Periodic reviews of the EMP will be conducted to assess its effectiveness in mitigating environmental and social impacts.
- **Data-Driven Decision Making:** Monitoring data and feedback from stakeholders will inform decision-making processes.
- **Revisions and Updates:** The EMP will be revised and updated as necessary based on review outcomes and new information.
- **Stakeholder Engagement:** Ongoing engagement with stakeholders will ensure transparency and inclusivity in decision-making and adaptation.

The EMP is a vital component of the Dune 7 Concession project, reflecting a commitment to responsible and sustainable development. By adhering to the measures outlined in this plan, the project aims to minimize its environmental footprint, enhance safety, and contribute positively to the local community and the broader ecosystem. Through continuous monitoring, adaptive management, and stakeholder engagement, the project will strive to meet and exceed its environmental and social responsibilities.

10 ENVIRONMENTAL IMPACT ASSESSMENT REPORT CONCLUSION

In conclusion, this Environmental Impact Assessment (EIA) report has comprehensively evaluated the proposed development of a recreational facility with conference facilities at Dune 7, Walvis Bay, Erongo Region, Namibia. This project, managed by Sandwich Dune Tours and Safaris, represents an opportunity to enhance the visitor experience while addressing pressing environmental challenges faced by the Dune 7 Concession area.

The EIA process has been conducted in accordance with local and international standards, considering various environmental and social factors. Through this assessment, we have identified potential environmental impacts and proposed a range of mitigation measures aimed at minimizing adverse effects on the environment and human health. These measures encompass habitat and biodiversity preservation, health and safety protocols, solar energy integration, cultural heritage preservation, noise and air quality control, and climate change resilience.

The engagement with stakeholders, including local communities, regulatory agencies, and waste management authorities, has been a fundamental part of the EIA process. The feedback received has been invaluable in shaping the project's design and mitigation strategies, ensuring that it aligns with the values and concerns of the broader community.

Furthermore, this EIA report has highlighted the commitment to the responsible and sustainable development of the Dune 7 Concession area. It emphasizes the importance of ongoing environmental monitoring, adaptive management, and stakeholder engagement to ensure that the project remains environmentally and socially responsible throughout its lifecycle.

It is our belief that the implementation of the proposed mitigation measures, together with a commitment to continuous improvement and transparency, will allow the Dune 7 Concession project to thrive while protecting the unique natural and cultural heritage of the area. This endeavor represents an opportunity for responsible tourism development, economic growth, and the conservation of the desert ecosystem, contributing positively to the region and the nation.

In conclusion, the development of the recreational facility at Dune 7, under the management of Sandwich Dune Tours and Safaris, holds great promise in realizing a sustainable and environmentally conscious future for this iconic desert landscape.

This report stands as a testament to our dedication to responsible development and the safeguarding of the pristine desert environment.

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