

**ENVIRONMENTAL IMPACT ASSESSMENT FOR
THE KUSIBED DELTA AND DUNE BELT AREA**

**MINISTRY OF ENVIRONMENT AND TOURISM,
DIRECTORATE OF ENVIRONMENTAL AFFAIRS**

**NAMIBIAN COAST CONSERVATION &
MANAGEMENT (NACOMA)**

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Final Draft Scoping Report



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List of Abbreviations

MGs – Matching Grants

NACOMA –

EIA – Environmental Impact Assessment

SEA - Strategic Environmental Assessment

EMP - Environmental Management Plan

KDDP/T – Kuiseb Delta Development Project/Trust

PCO – NACOMA Project Coordinating Office

TOR – Terms of Reference

MET – Ministry of Environment and Tourism

DEA – Directorate of Environmental Affairs

CBNRM – Community-Based Natural Resources Management

NATMIRC – National Marine Information and Research Centre

ICZM – Integrated Coastal Zone Management

ORV – Off-Road Vehicles

NPC – National Planning Commission

DST – Decision Support Tool

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Executive Summary

1.1 Introduction

The NACOMA project under **component 3** supports the management planning of coastal biodiversity hotspots, more specifically the "Implementation of Priority Actions under the Management Plans at site and landscape level" under sub-component 3.2. This supports small Matching Grants (MGs) for targeted investments in specific Project intervention sites in ecosystems of biodiversity importance. Furthermore, the NACOMA project commissioned the undertaking of the Strategic Environmental Assessment of the northern regions of Kunene and Erongo in 2006. The SEA strongly recommended that an Environmental Assessment be conducted for the Dune belt area between Swakopmund and Walvis Bay. It is against this background that NACOMA commissioned this study to conduct an environmental impact assessment (EIA) study and develop an environmental management plan (EMP) in reconfirming the carrying capacity of the Kuiseb Delta to community based tourism and Dune Belt Area to various conflicting resource use activities.

1.2 Project Location

The study area lies in the Central Namib Desert, between the Swoop River in the North and the sand dune area south of the Kuiseb River. The Kuiseb Delta lies in an area where the Kuiseb River flows down a steepened gradient onto the coastal flats. The Dune Belt Area between Swakopmund and Walvis Bay is important for tourism as it creates a number of job opportunities as part of the socio-economic development for the two coastal towns.

1.3 Environmental Assessment Requirements

The SEA for the Erongo Region strongly recommended an EIA be conducted in the Dune Belt area between Walvis Bay and Swakopmund. This area is spawned by tourism and recreational activities. The extent of impacts resulting from tourism activities is not assessed in-depth during SEA study. Hence, it makes sense to conduct an EIA for the entire area as recommended although the purpose of this project was initiated for the two MGs (KDDT and Walvis Bay Bird Paradise cc).

2. Environmental Regulatory Framework

Important legislative instruments that affect the feasibility, operation and management of eco-tourism activities include:

- Cabinet approved Environmental Assessment Policy for Sustainable Development and Environmental Conservation of 1995 published by the Ministry of Environment and Tourism (Directorate of Environmental Affairs (DEA), 1995;
- Environmental Management Act, 2007, (Act No. 7 of 2007) - (Not yet implemented);
- Water Resources Management Act, 2004, (Act No. 24 of 2004) - (Not yet implemented);
- The Nature Conservation Ordinance, Ordinance 4 of 1975, Amendment Act, Act 5 of 1996 and the draft Parks and Wildlife Management Bill of 2006;
- National Waste Management Policy, 2010
- National Heritage Act, 2004 (Act No. 27 of 2004)
- Coastal Policy for Namibia Green Paper
- Other legislations, policies and regulations to be identified during the full EIA.

3. Current and Future Land Uses of the Study Area

The study area between Swakopmund and Walvis Bay is concentrated with Tourism and recreational activities. Coastal tourism is one of the priority economic area for local, regional and national development. Community-based tourism provides avenue to local communities in the area (NACOMA, 2007). This area is also subject to intensive recreational pressure during peak holidays (NACOMA, 2004). There are also other activities in the area, such as quad-biking, cultural, sightseeing and eco-tours operating in the study area. The nature of these activities prompted this EIA study commissioned by NACOMA PCO.

4. Description of the Proposed Project

There are two proposed projects that received Matching Grant funding from NACOMA PCO. These projects are proposing community-based eco-tourism activities. The Kuiseb Delta Development Trust applied for a concession from MET and engage in Community Based Tourism activities. The Walvis Bay Bird Paradise proposes to establish a bird watching tourism activity. There are also other activities in the area, such as quad-biking, cultural, sightseeing and eco-tours operating in the study area. The nature of these activities prompted this EIA study commissioned by NACOMA PCO.

5. Baseline Environment

This section presents the description of the natural environment that may be affected by activities proposed in the study area. The Central Namib near the coast has a temperature range that is moderated by proximity to the sea. The average precipitation (fog and rain) ranges around 15mm at the coast. The wind at the coastal areas of Namibia is characterised by strong southerly winds but westerly and south westerly winds are also frequent. The area is characterised by four distinct geomorphological units. The largest by far is the dune field. Other units include inter-dune plains, gravel/ coastal plain, river beds and delta. Sufficient good quality groundwater is available for different land users in the coastal towns.

The literature review was undertaken to determine the actual as well as potential vertebrate fauna associated with the general area commonly referred to as the Southern Namib or Southern Desert. This area is bordered inland by the Central Namib or Central Desert. Climatically the coastal area is referred to as Cool Desert with a high occurrence of fog. The Namib Desert Biome makes up a large proportion (32%) of the land area of Namibia with parks in this biome making up 69% of the protected area network or 29.7% of the biome. Four of 14 desert vegetation types are adequately protected with up to 94% representation in the protected area network in Namibia. With the exception of municipal land, the area falls within the recently proclaimed Dorob National Park. No communal and freehold conservancies are located in the general area with the closest communal conservancy being the #Gaingu Conservancy in the Spitzkoppe area approximately 100 km to the northeast. Two important coastal wetlands – i.e. Walvis Bay Wetlands and Sandwich Harbour – both Ramsar sites, occur in the area. According to Curtis and Barnard (1998) the entire coast and the Walvis Bay lagoon as a coastal wetland, are viewed as sites with special ecological importance in Namibia. The known distinctive

values along the coastline are its biotic richness (arachnids, birds and lichens) with the Walvis Bay lagoon's importance being its biotic richness and migrant shorebirds as well as being the most important Ramsar site in Namibia. The Ramsar site covers 12 600 ha with regular counts of birds varying between 37 000 and well over 100 000 individuals, albeit mainly migratory species. The Walvis Bay wetland is considered the most important coastal wetland in southern Africa and one of the top 3 in Africa. The Sandwich Harbour Ramsar site covers 16 500 ha and falls within the Namib-Naukluft Park and enjoys full protection. This area is a centre of concentration of migratory shorebirds, waders and flamingos regularly supporting over 142 000 and 50 000 birds during summer and winter, respectively. The area is bordered by the Kuiseb River to the south (Walvis Bay area) and the Swakop River to the north (Swakopmund area) with catchment areas of 15 500 km² and 30 100 km², respectively. The central coastal region and the Walvis Bay area in particular, is regarded as "relatively low" in overall (all terrestrial species) diversity. Overall terrestrial endemism in the area on the other hand is "moderate to high". The overall diversity and abundance of large herbivorous mammals (big game) is viewed as "low to medium" with 1-2 species while overall diversity of large carnivorous mammals (large predators) is determined at 4 species with brown hyena being the most important with "medium" densities expected in the area. It is estimated that at least 54 reptile, 7 amphibian, 42 mammal and 182 bird species (breeding residents) are known to or expected to occur in the general/immediate Walvis Bay/Swakopmund area of which a high proportion are endemics.

6. Scoping Study Conclusions

Coastal tourism is a priority economic area for local, regional and national development. Community-based tourism activities can provide employment but they are also likely to cause social and environmental impact. Biological hotspots, breeding areas, environmental sensitive areas may suffer from uncontrolled tourism development and activities. These impacts however can be effectively mitigated through careful planning and design of sustainable tourism activities.

7. Scoping Study Recommendations

7.1 Full Environmental Assessment

Based on the findings of the scoping study it is recommended that a full EIA and the development of an EMP be undertaken for the proposed eco-tourism and recreational activities in the Kuiseb Delta and Dune Belt area. Draft TOR for the full EIA and EMP include the list of stakeholders, specialist studies to be undertaken, likely positive and negative impacts to be considered as well as draft proposed outline of the EIA and EMP reports.

7.2 Aims and Objectives of the Full Environmental Assessment (EA)

The aims and objectives of the full EIA and EMP with respect to the proposed eco-tourism activities in the Kuiseb and Dune Belt areas are:

- To assess all likely positive and negative impacts environmental and social impacts on the local and regional (Erongo Region) and national (Namibia) using appropriate assessments guidelines, methods and techniques covering the complete project cycle. The EIA and EMP shall be performed in accordance and conforming to national regulatory requirements, process and specifications in Namibia and in particular Ministry of Environment and Tourism and the Namibian Tourism Board as well as draft guidelines for conducting EIA & EMP (MET/DEA, 2008).
- The development of appropriate mitigation of appropriate measures that will enhance the positive impacts and reduce the likely negative impacts anticipated or identified.

7.3 Stakeholders

Stakeholders' participation in the EIA process is a critical component in achieving transparent decision-making. Stakeholders' involvement in the EIA process gives all interested and affected parties such as local communities and individuals a voice in issues that may bear directly on their health, welfare, and quality of life. An open flow of environmental information can foster objective consideration of the full range of issues involved in project planning and can allow communities and citizens to make reasoned choices about the benefits and risks of proposed actions (MET/DEA, 2008).

A number of interviews and workshops will be conducted with the members of the local communities and any other stakeholders particularly in Walvis Bay and Institutions from Swakopmund and Walvis Bay. Consultations with stakeholders will cover the following:

- Awareness about the proposed projects
- Expectations of local communities in terms of temporal and permanent contracts/job opportunities as well as local economic benefits
- Worries and concerns of farmers and existing tour operators in Kuiseb Delta and Dune Belt areas
- Views of the various stakeholders, particularly the local communities of Walvis Bay, with respect to the likely positive and negative impacts of the proposed project on the environment and suggestions on the appropriate mitigation measures.

The following is the provisional list of identified interested and affected stakeholders who will be contacted for input/comments to the EIA process:

- MET/DEA/NACOMA
- MET – Parks, CBNRM, Tourism
- Roads Authority
- Ministry of Fisheries and Marine Resources (NATMIRC)
- NACOMA
- Ministry of Regional Local Government Housing and Rural Development
- Erongo Regional Council
- Namibia Wildlife Resorts
- Namibia Tourism Boards
- KDDT and Boards of Trustees
- Topnaars community in the Kuiseb Delta
- Walvis Bay Bird Paradise Caretaker
- Traditional authority
- NamWater
- NamPower
- Coastal Tour Operators Association
- Coastal Environment Trust of Namibia
- Lauberville – in the Kuiseb Delta
- National Heritage Council of Namibia
- Fishing Companies and NamPort (those involved with Topnaars community)
- 18 Tour operators and agencies are identified (Having stake in the KDDT)
- Rossing Foundation/Rio Tinto
- NGOMA Consulting Services
- Local and Tour Operator Organisations and representatives

- Walvis Bay Municipality
- Ministry of Agriculture, Water and Forestry
- National Botanical Research Institute
- Other stakeholders to be identified during newspaper advertisement and to be registered and reflected in the Final EIA report

7.4 Specialist Studies to be Undertaken

The specialist studies identified during scoping will be undertaken by specialist consultants and the results of these studies will comprise the full EIA and EMP reports.

- (i) The Archaeology study (Dr John Kinahan)
- (ii) The Vertebrate Fauna and Flora study (Mr Peter Cunningham)
- (iii) Geomorphology Study (Dr Martin Hipondoka)

7.5 Likely Positive Impacts to be Considered

The following is the summary of the likely positive impacts that will be assessed at different levels of the proposed solar energy project developmental stages;

- Local and Regional social, economic, and cultural impacts;
- Opportunities for community participation;
- Other issues to be identified during the consultation process.

7.6 Likely Negative Impacts to be Considered

The following is the summary of the likely negative impacts that will be assessed at different levels of the proposed solar energy project developmental stages;

- Current and future land uses, zonation and existing infrastructures and services;
- Threats to biodiversity (habitat alteration and species injury or mortality and disturbance);
- Visual impacts,
- Water use and quality;
- Waste and Sewage management at project sites ;
- Wind situation;

- Tourism activities and quad-biking
- Other issues to be identified during the consultation and full Environmental Assessment process.

7.7 Environmental Management Plan (EMP) Considerations

The following is the summary of the likely EMP considerations that will be assessed based on the findings of the EIA:

- Waste and sewerage management
- Wind situation
- Tourism carrying capacity
- Facilities and structures at project sites
- Historic and Archaeology sites
- Implementation of the EMP
- Environmental Awareness and Training
- Off-road Vehicle zones, access and driving
- Tour activities (e.g. hiking and driving trials, archaeology, historical and cultural tourism)
- Dealing with Environmental Complaints Guidance

7.8 Proposed Outline of EIA and EMP Reports

The following is the summary of the tentative content lists of EIA, EMP and Final Scoping (Baseline) reports:

VOLUME 1 or Part 1: Environmental Impact Assessment (EIA)

- (i) EXECUTIVE SUMMARY
- (ii) PROJECT BACKGROUND
- (iii) POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK
- (iv) DETAILED PROJECT DESCRIPTION
- (v) SOCIO-ECONOMIC ENVIRONMENT
- (vi) METHODOLOGY
- (vii) NATURAL ENVIRONMENTS
- (viii) ASSESSMENT OF LIKELY ENVIRONMENTAL IMPACTS
- (ix) ANALYSIS OF ALTERNATIVES

- (x) EIA CONCLUSIONS AND RECOMMENDATIONS
- (xi) REFERENCES

VOLUME 2 OR PART 2: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

- (i) INTRODUCTION TO THE EMP
- (ii) ENVIRONMENTAL POLICIES
- (iii) OBJECTIVES OF THE EMP
- (iv) THE EMP FRAMEWORK
- (v) IMPLEMENTATION OF THE EMP
- (vi) ENVIRONMENTAL MONITORING PLAN
- (vii) ENVIRONMENTAL MANAGEMENT AND TRAINING
- (viii) APPENDICES
- (ix) REFERENCES

VOLUME 3 OR PART 3: FINAL SCOPING REPORT

- (i) EXECUTIVE SUMMARY
- (ii) PROJECT BACKGROUND
- (iii) ENVIRONMENTAL REGULATORY FRAMEWORK
- (iv) DESCRIPTION OF PROPOSED PROJECTS
- (v) BASELINE ENVIRONMENT
- (vi) HERITAGE RESOURCES
- (vii) SOCIO-ECONOMIC ENVIRONMENT
- (viii) GEOLOGICAL SETTINGS
- (ix) ENVIRONMENTAL MANAGEMENT
- (x) CONCLUSIONS AND RECOMMENDATIONS
- (xi) REFERENCES
- (xii) APPENDICES

1. PROJECT BACKGROUND

1.1 Introduction

The Namibian Coast Conservation and Management (NACOMA) project is a multi-sectoral national initiative that is aimed at enhancing coastal and marine biodiversity conservation through the mainstreaming of biodiversity conservation and sustainable use into coastal policy, legislative framework, and institutional and technical capacity. The NACOMA project is supporting four components addressing legislation, capacity building, sustainable investments and performance monitoring for Integrated Coastal Zone Management (ICZM).

The NACOMA project under **component 3** supports the management planning of coastal biodiversity hotspots, more specifically the "Implementation of Priority Actions under the Management Plans at site and landscape level" under sub-component 3.2. This supports small Matching Grants (MGs) for targeted investments in specific Project intervention sites in ecosystems of biodiversity importance. As such, the Kuiseb Delta Community and investors from Walvis Bay and Swakopmund were awarded small Matching Grants to invest in projects that support sustainable development. These MG's proposed activities that require an Environmental Impact Assessment (EIA) study. Furthermore, the NACOMA project commissioned the undertaking of the Strategic Environmental Assessment of the northern regions of Kunene and Erongo in 2006. The SEA strongly recommended that an Environmental Assessment be conducted for the Dune belt area between Swakopmund and Walvis Bay. It is against this background that NACOMA commissioned this study to conduct an environmental impact assessment (EIA) study and develop an environmental management plan (EMP) in reconfirming the carrying capacity of the Kuiseb Delta to community based tourism and Dune Belt Area to various conflicting resource use activities.

1.2 Project Location

The study area lies in the Central Namib Desert, between the Swakop River in the North and the sand dune area south of the Kuiseb River. The area has a considerably high variation of the natural environment and climatic patterns (InnoWind Draft Scoping Baseline Report, 2010) influenced by the position of the high-pressure cells over the

South Atlantic Ocean which creates arid and semiarid conditions on the west coast of Africa, (Svendsen et al., 2007).

1.2.1 The Kuiseb Delta

The Delta lies in an area where the Kuiseb River flows down a steepened gradient onto the coastal flats (Figure 1.1). The delta is made up of a series of channels and palaeo-channels forming an intricate network of fine-grained fluvial deposits associated with numerous small aeolian dunes South-east of Walvis Bay (Ninham Shand Consulting Services, 2008).

In the previous SEA study under the Namibia Coast Conservation Management Project (NACOMA), the Kuiseb Delta has been classified as an area of very high conservation priority falling under the Walvis Bay Nature Reserve Management Plan, in line with the new Wetland Policy. The study suggested that the Ministry of Environment and Tourism (MET) should formally designate the Nature Reserve as a protected area. MET, the Walvis Bay Municipality and the Coastal Environmental Trust of Namibia should ensure further enforcement of the national Wetland Policy in the area by adopting the Nature Reserve Management Plan. Furthermore, they should also establish a long-term environmental monitoring programme which should include the biodiversity elements for terrestrial, coastal and offshore habitats found in the wetland. They also suggested that the information derived from the monitoring programme should feed into the requirement for improved Environmental Impact Assessments. To make full use of the potential for development of eco-tourism and traditional tourism in the wetland, a tourism development plan for the Nature Reserve should be drafted by the Walvis Bay Municipality in collaboration with the Walvis Bay Tourism Association and the Marine Tour Association of Namibia. Developments of all tourist activities and accommodation facilities should occur on the basis of permissions subject to Environmental Impact Assessment, (MET/DEA, 2008).

1.2.2. Dune belt area

The Dune Belt Area between Swakopmund and Walvis Bay (Figure 1.1) is important for tourism as it creates a number of job opportunities as part of the socio-economic development for the two coastal towns. The area is characterised by a unique landscape of different types of dunes and gravel plains as well as a unique biodiversity, which is of

conservation importance. Due to the water scarcity and low annual rainfall, the rate of vegetation growth is very slow and requires a long period of time to recover from disturbances, (www.walvisbay-eco-tourism.com).

The dunes and gravel plains between Walvis Bay and the Kuiseb River, as well as south of the Kuiseb River include a variety of desert landscapes. Most outstanding are the various types of sand dunes which take on mainly crescent-shaped forms. The gravel plains are less spectacular but represent a natural part of the desert landscape around Walvis Bay as the windswept part of the desert. The gravel plains are rich in stones and minerals of a very high diversity and form an extremely sensitive desert pavement, (www.walvisbay-eco-tourism.com).

As per Cabinet decision, the dune belt area currently managed by MET, should be included in the Walvis Bay Nature Reserve, and free zones for off-road driving should be maintained east of Walvis Bay and east of Long Beach. The demarcation of the free zone east of Long Beach should take into account the area south of the settlement, used for breeding purposes by Damara Tern birds. The management and environmental monitoring of the area should be part of the activities proposed for the Nature Reserve and the expansion of eco-tourism activities should be promoted through inclusion of the dune belt in the proposed Walvis Bay tourism development plan. Cabinet decision also suggested that prospecting or mining licences should not be granted in the dune belt once the existing licences expire and that the zoning of eco-tourism and free zones for off-road driving should become object of a detailed Environmental Impact Assessment, (www.walvisbay-eco-tourism.com) and (MET/DEA, 2008).

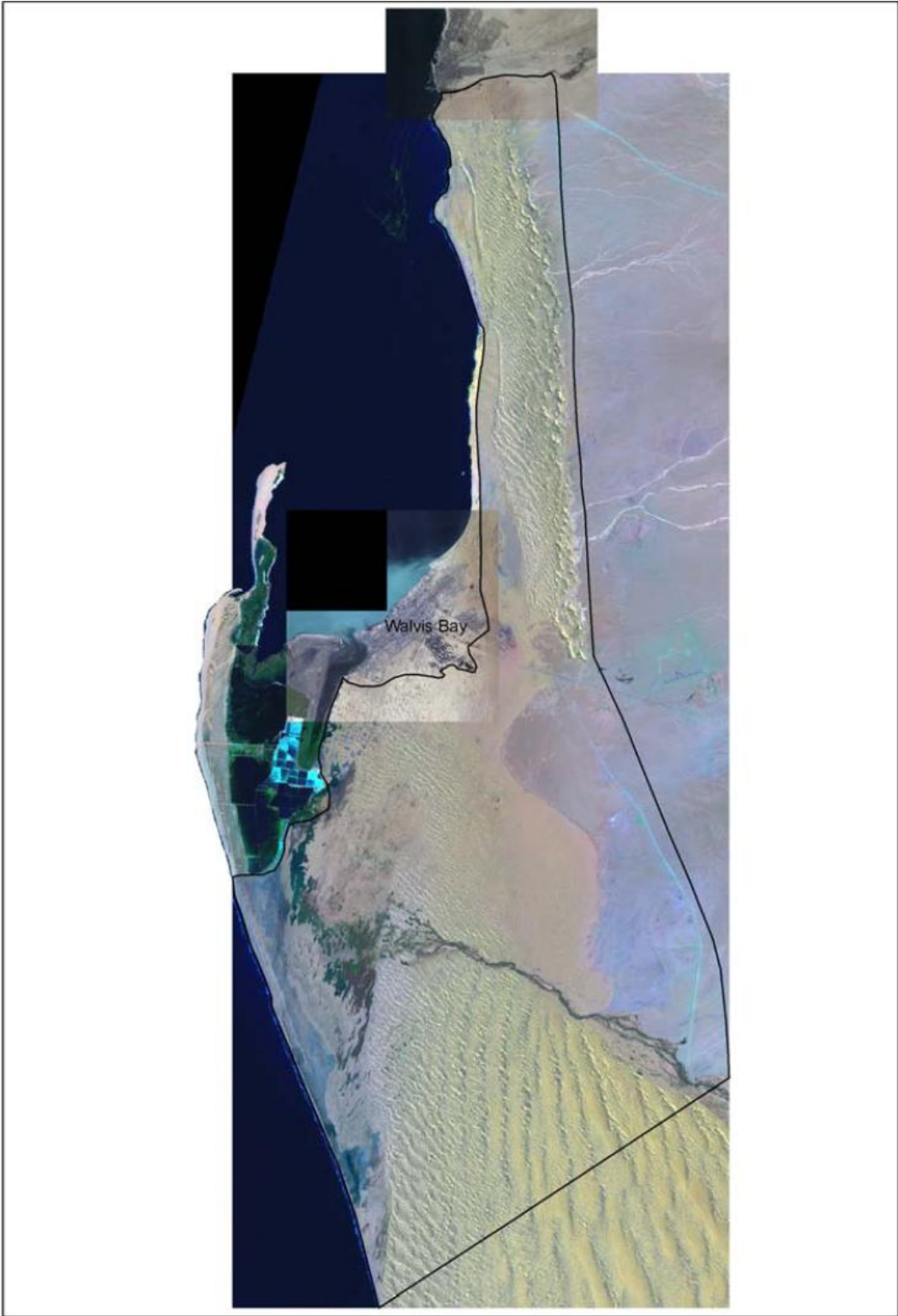


Figure 2.1 1.1: Project Location

1.3 Environmental Assessment Requirements

As explained earlier, the SEA strongly recommended an EIA be conducted in the Dune Belt area between Walvis Bay and Swakopmund. This area is spawned by tourism and recreational activities. The extent of impacts resulting from tourism activities is not assessed in-depth during SEA study. Hence, it makes sense to conduct an EIA for the entire area as recommended although the purpose of this project was initiated for the two MGs (KDDT and Walvis Bay Bird Paradise cc).

This project conform to the Environmental Assessment Policy for Sustainable, Development and Environmental Conservation (1995), Environmental Management Act, 2007 (Act No.7 of 2007) and the Draft Procedures and guidelines for EIA & EMP of 2008. In accordance with the Policy on Tourism and Wildlife Concessions on State Land, proposed tourism activities in the Kuiseb Delta and Dune Belt area are required to undertake an EIA study. In accordance with the Environmental Management Act, 2007 (Act No.7 of 2007), the Environmental Study shall include (i) Scoping (Baseline report) (ii) Environmental Impact Assessment and (iii) development of an Environmental management Plan. The framework for conducting the EA is explained in the following reports (SAIEA, 2003, Republic of Namibia, 2008 & Republic of Namibia, 1995) and the illustration is shown in Figure 1.2 below:

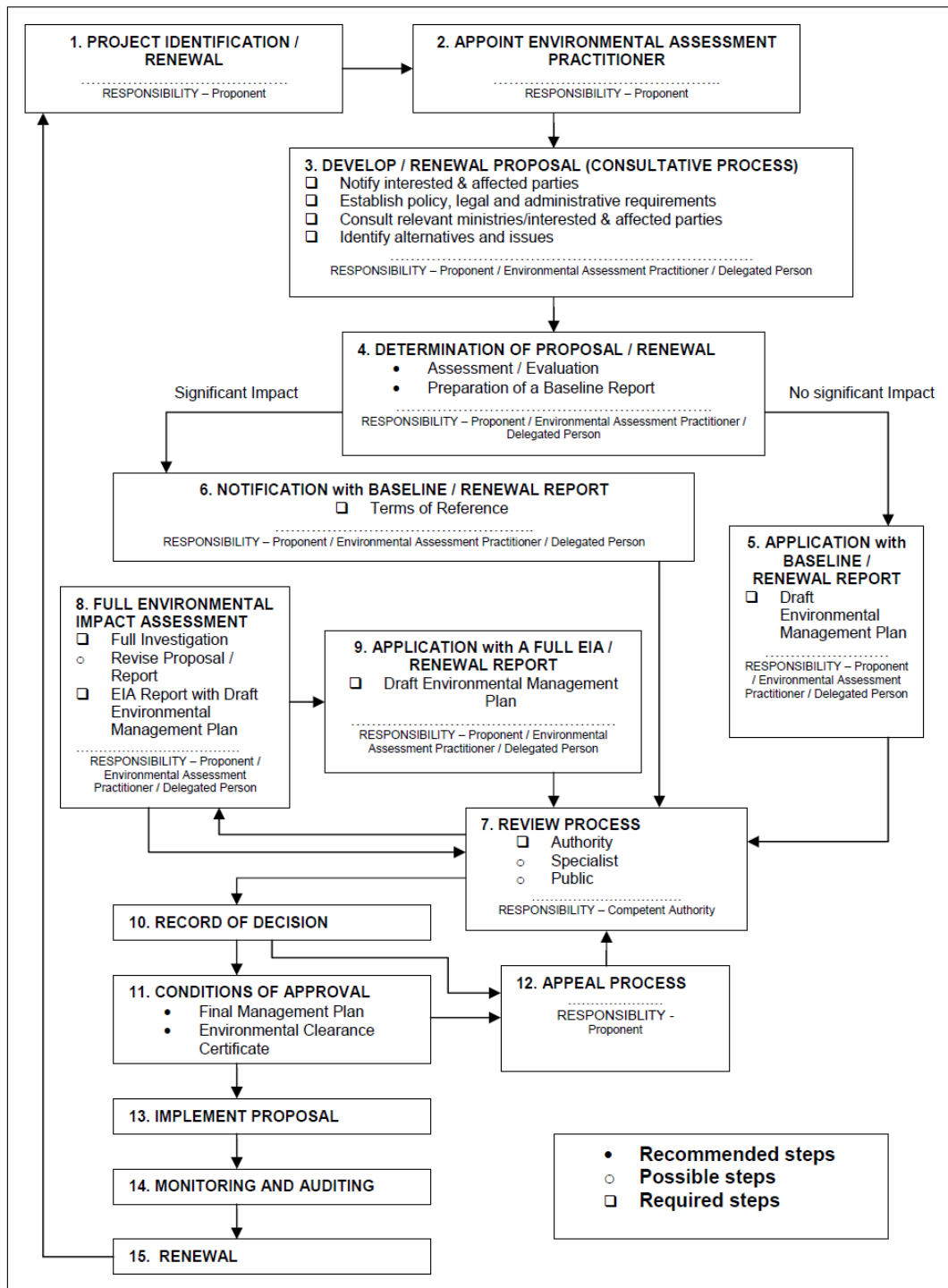


Figure 2.1 1.2: Environmental Assessment process in Namibia (Directorate of Environmental Affairs, 2008).

1.4 Purpose of this Scoping (Baseline) Study

This scoping report is prepared for the EIA of the Kuseb Delta, Walvis Bay sewerage ponds and Dune Belt Area in the coastal area of the Dorob National Park, Erongo Region. The objective of scoping study is to identify from a broad range of potential problems, a

number of key issues of concern that should be addressed by an EIA. Scoping also assist in identification of information sources and data gaps that may require to be filled by specialists studies. Therefore, this phase of assessment determines the key elements of the Environmental Management Plan (EMP) for the Kuiseb Delta, Walvis Bay sewerage ponds and Dune Belt area.

The output of this scoping exercise contained in this report includes:

- Description of existing, proposed and potential activities
- A preliminary list of reasonable alternatives to be considered in the EIA
- Identification of laws and guidelines that have been considered in the preparation of the scoping report
- Description of physical, biological, cultural, social and economic environment that may be affected by proposed tourism activities in the study area
- Description of environmental issues and potential impacts, including cumulative impacts that have been identified
- An inventory of stakeholders likely to be consulted

2. ENVIRONMENTAL REGULATORY FRAMEWORK

2.1 Introduction

The study area was previously known as a National West Coast Recreational area. As such most activities are geared towards recreational, leisure and non-consumptive tourism. In addition, the Kuiseb Delta, Walvis Bay sewerage ponds and Dune Belt area are situated within the newly proclaimed Dorob National Park. Therefore, tourism and nature conservation activities fall within jurisdiction of the Ministry of Environment and Tourism with environmental regulations guided by the Directorate of Environmental Affairs, within the same ministry.

Although, the Environmental Management Act, 2007 (Act No.7 of 2007) and procedures and guidelines for the EIA and EMP are not yet implemented, they provided the framework followed by the process of developing the baseline report and an EIA study. However, the study followed the legal framework provided by the Environmental Impact Assessment Policy, 1995. The legislation of the Republic of Namibia that are relevant for this study and has been consulted for the scoping study are listed in section 2.2 as presented below.

2.2 Environmental Regulations

2.2.1 Constitution of the Republic of Namibia (1990)

The constitution commits the Government of Namibia to sustainable utilisation of Namibia's natural resources for the benefit of all Namibians. Article 95 of the constitution states that *"the State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of natural resources on a sustainable basis for the benefit of all Namibians both present and future"*

2.2.2 Environmental Management Act, 2007 (Act No.7 of 2007)

The Environmental Management Act of Namibia is not yet implemented, nevertheless it provide legal framework necessary for the guidance of the scoping and EIA studies. Accordingly, the act will give legislative effect to the EIA Policy; allow establishment of the

Sustainable Development Advisory Council and appointment of the Environmental Commissioner. Such institutions are expected to improve the management of impact assessment in Namibia. With regard to this study, the act gives directives to developers to gain clearance from the Environmental Commissioner before proceeding with plans. The functions of the Environmental Commissioner are currently carried out by the Environmental Assessment Unit of DEA/MET.

2.2.3 Environmental Assessment Policy

The essence of the EIA policy is the principle of achieving and maintaining sustainable development. In it, all policies, programmes and projects undertaken within Namibia shall be guided by sustainable development principles. The Environmental Assessment Policy requires require full EIA to be submitted to the Ministry of Environment and Tourism for commercial tourism and recreation facilities. As such, proponents are required to follow the integrated environmental management procedure set out in the policy.

2.3 Other Specific Legislation

2.3.1 Nature Conservation legislation

Nature Conservation Ordinance amendment Act, Act 5 of 1996 progressed from the old South African Nature Conservation Ordinance, Ordinance 4 of 1975. The Amendment act provides for community based natural resource management. The Draft Parks and Wildlife Management Bill is anticipated to replace the Nature Conservation Ordinance amendment Act, Act 5 of 1996. The state protected areas are governed by the amended act.

2.3.2 Tourism

The National Policy on Tourism for Namibia, 2008 aims to provide a framework for the mobilisation of tourism resources to realise long term national goals defined in Vision 2030 and specific targets of the NDP3, namely, sustained economic growth, employment creation, reduced inequalities in income, gender as well as between the various regions, reduced poverty and the promotion of economic empowerment.

2.3.3 National Heritage Act

The National Heritage Act provides for the preservation and registration of places and objects of national significance. Moreover, it establishes a National Heritage Council and a National Heritage Register.

2.3.4 Water Resource Management and Regulations

The Water Act, Act No. 54 of 1956 inherited from South Africa is still in force because the National Water Resource Act, Act No. 24 of 2004 is not yet promulgated. The Act makes provision for a number of functions pertaining to control and use of water resources, water supply and protection of water resources. Once the National Water Act of 2004 is promulgated it will provide specific procedures for water abstraction permitting that are much more adapted to Namibia's climate and geohydrology than the Water Act of 1956.

2.3.5 Waste Management

The essence of the National Waste Management Policy, 2010 is to prevent and reduce health risks associated with exposure to healthcare substances, household, radiation and other waste from healthcare workers, waste handlers and public by promoting sound environmental waste management practices. In addition, to design appropriate means of safe and sustainable waste management. In order to achieve lasting positive impact on health and environment, any new program should be subjected to sustainability assessment before implementation.

2.3.6 Coastal Policy for Namibia (Green Paper, Feb 2009)

The Coastal Policy Green Paper is a background document which sets the overall framework for development in the coastal area. As such it sets out, firstly, the coastal policy process. As with other legislation that are not yet in force, the study will consider green paper coastal policy.

3. Current and future land uses of the study

Erongo Region is one of the most economically active regions in the country. Its' economy rely heavily on Fisheries, Mining and Tourism. The study area between Swakopmund and Walvis Bay is concentrated with Tourism and recreational activities. Coastal tourism is one of the priority economic area for local, regional and national development. Community-based tourism provides avenue to local communities in the area (NACOMA, 2007). This area is also subject to intensive recreational pressure during peak holidays (NACOMA, 2004).

The current EIA study excludes townlands of Swakopmund and Walvis Bay as well as industrial areas between the towns. Nevertheless, NACOMA (2009) published in its management plan for the central coast park of the Namib-Skeleton coast national park. These areas are shown in Figure 2.1 below:

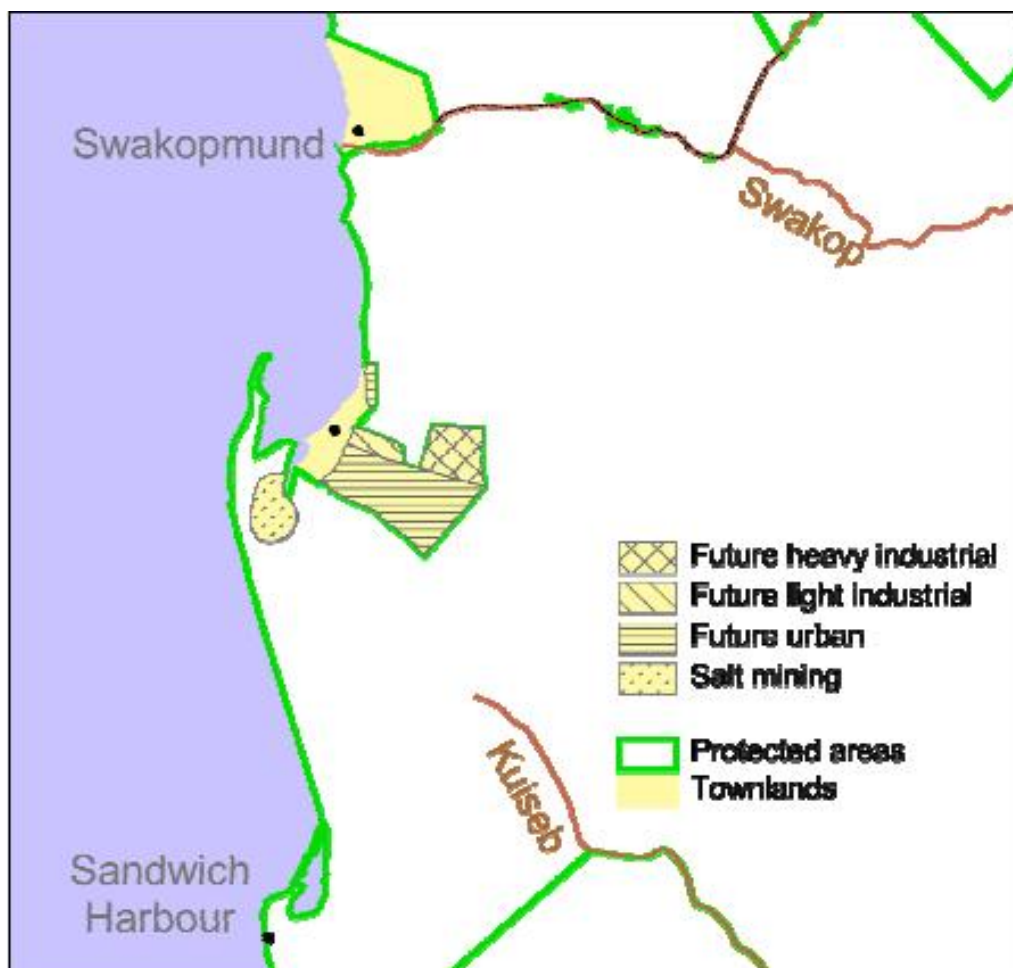


Figure 3.1 Future areas of infrastructure growth in the southern central coast area (NACOMA, 2009:47)

3.1 Current and future tourism activities in the Kuiseb Delta and Dune Belt area

According to the BGR (2008) tourism products in the area include adventure tourism, business tourism, non-consumptive tourism and ecotourism. As such, the Dune belt area is the only coastal dune area that is easily accessible to the public (NACOMA, 2004). In itself, the area is important for multiple tourism use practices in the tour operator sector. The area also contains a diversity of biophysical features and attractive landscape. Land-based and nature-based tourism activities in the study area are included in itinerary for trips from the coast into Kunene region, notably Twyfelfontein (NACOMA, 2007). Figure 2.2 below illustrates current land-use zones in the study area.

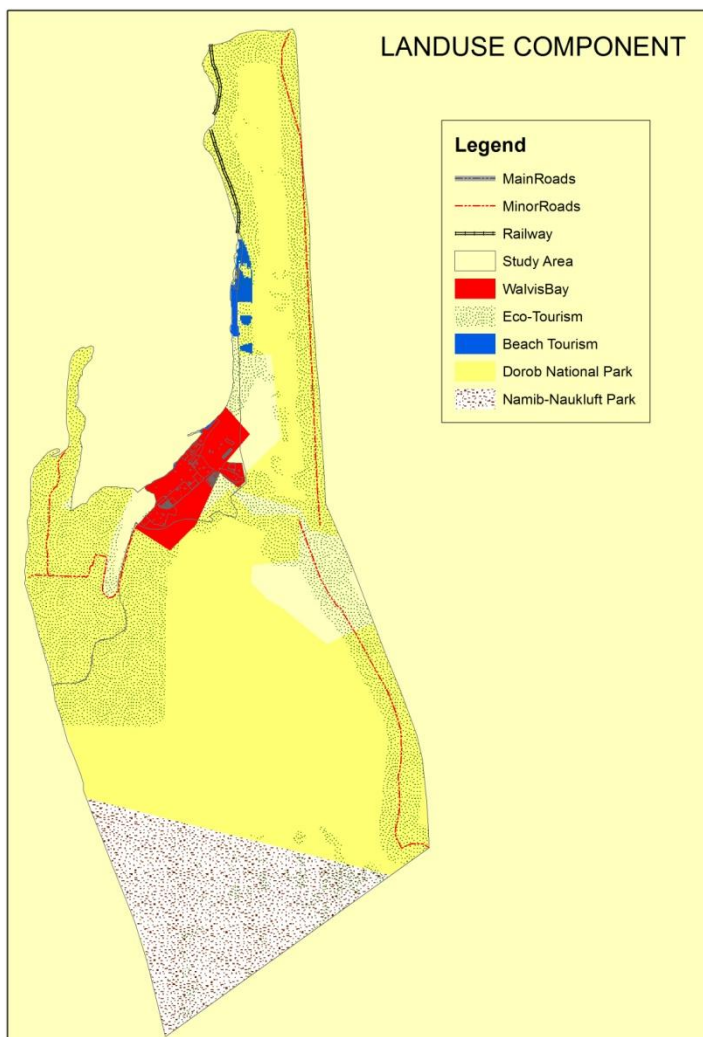
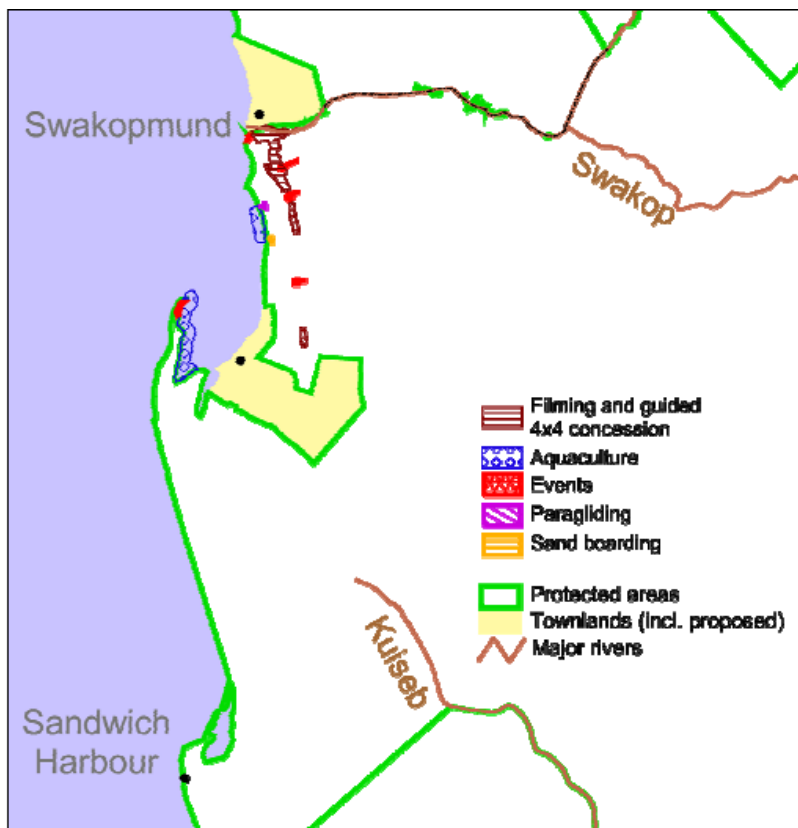


Figure 3.2: Current Land use zones in the study area

The following tourism and recreational activities are identified by (NACOMA, 2007) and NACOMA (2009) studies (refer to Figure 1.5 below):

- Desert tours
- Sightseeing trips
- Tours to Dune 7
- Dune-boarding
- Quad biking
- 4X4 Off-road recreational driving
- Paragliding
- Scenic flights
- Filming and Photography
- Weddings, desert tented bouquets, picnics, annual 4x4 vasbyt events
- Walking, hiking and horse riding



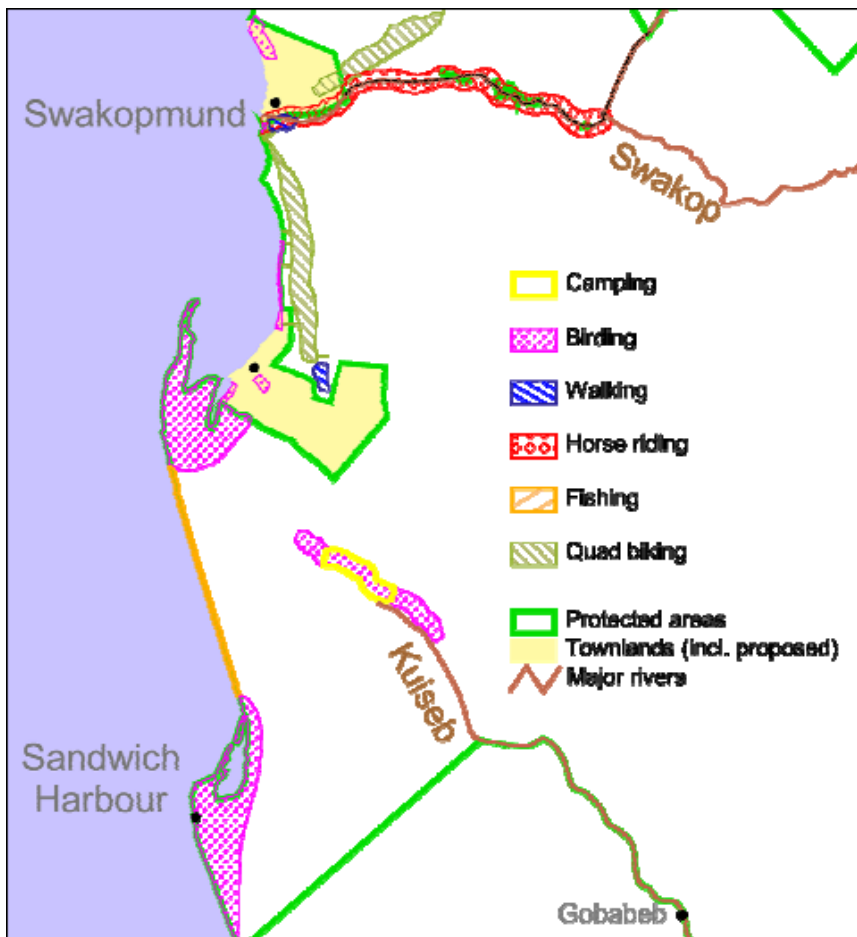
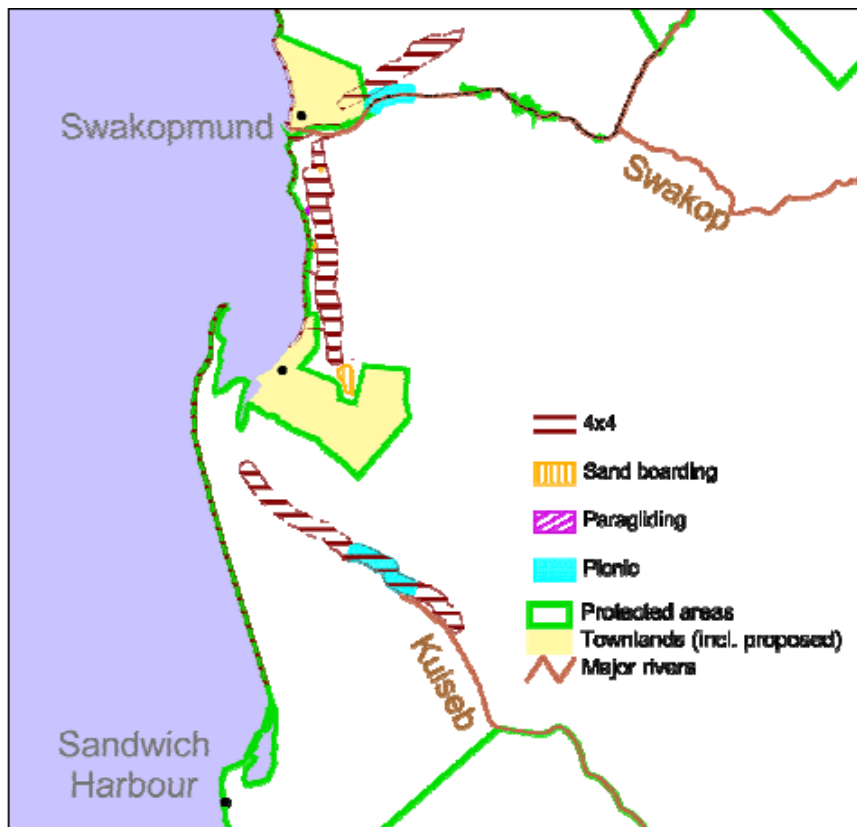


Figure 3.3 : Tourism Business and Recreational Areas in the Dune Belt area (NACOMA, 2009:42, 43 & 46)

As explained earlier, the KDDP and Trust was only established during 2009/10. Therefore, unregulated tourism activities have been taking place in the Delta over the past years. However, there are some regulated tourism-based activities led by Topnaars community. The following activities are currently taking place in the Delta (Mufita, 2011 pers.com):

- Tour guide: 4x4 vehicles and quad bikes off-road driving,
- Bush camps,
- Walking trials, hiking and sand boarding
- Camping site
- Scenic Flights
- Tour operators marketing self-touring products in their itinerary

3.2 Sub Regional Concepts

The sub-regional concept of Walvis Bay as outlined in, provides for demarcation of defined zones to accommodate existing and future land uses. The following is an extract summary from the sub-regional concept document for Walvis Bay outlining the various zones (see also, Figure 3.1 above & Figure 3.4 Below):

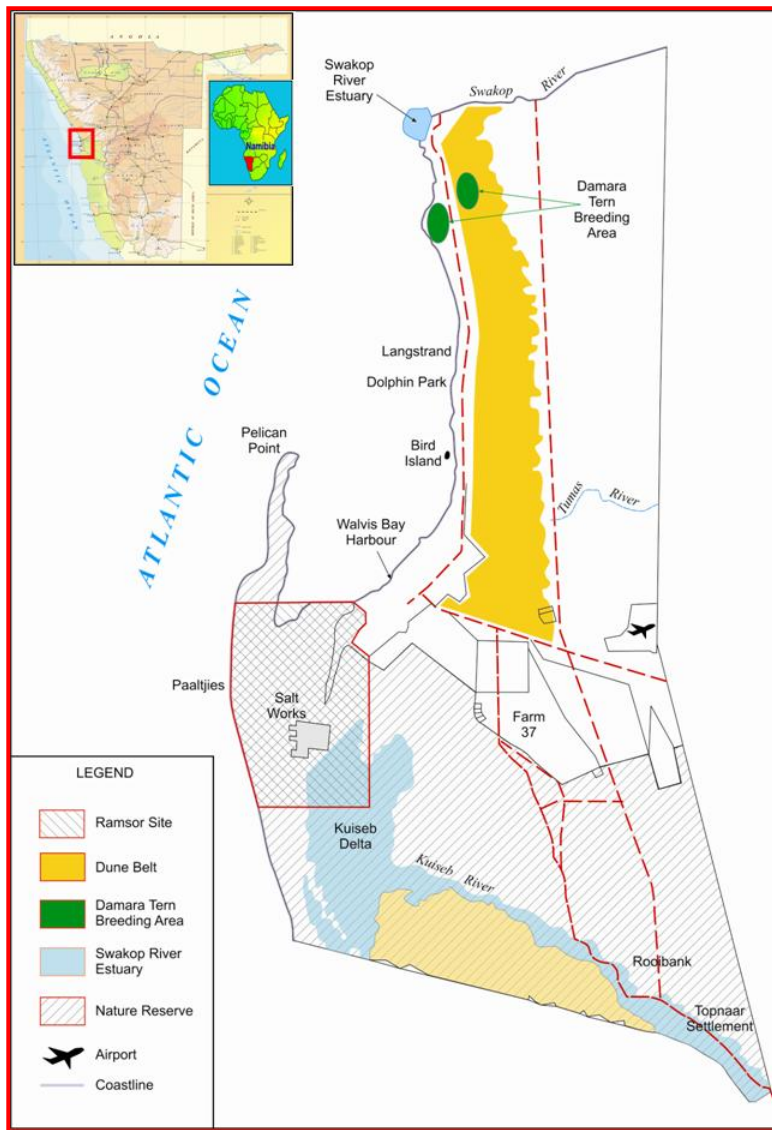


Figure 3.4 : Regional Location

- Walvis Bay Nature Reserve:** The zone is on the southern part of Walvis Bay, roughly from the southern edges of Farms 29, 37 and 38 to the Kuseb River. The Lagoon, the Salt-Works and the Topnaar community settlement are located in this zone... Since this zone is ecologically fragile, in such a way that it supports unique and fascinating ecological communities, it is recommended to be left free of any development other than those relating to cultural and eco-tourism and/or aqua-culture/agriculture. All existing developments located in this area should continue their activities in this area. However, new applications of such kind will not be allowed;
- Conservation:** This area includes Farms owned by Council, part of the coastline between Walvis Bay and Swakopmund, part of the dune belt and the

area immediately adjacent to the Swakop River Bed...Activities relating to environmental conservation education, and/or eco-tourism. Off road vehicles are prohibited in this area. Quad bikes and all other off road vehicles are not allowed in this zone;

- **Recreation:** Five areas are demarcated as recreation zones: South of the Swakop River, East of Long Beach, North – West of the Tumas River, Dune 7, and the coastline along Long Beach and Dolphin Park. Quad bikes as well as all other off road vehicles will only be accommodated in the *dunefield* part of this zone. All off road vehicles are to be led into the dunes via fixed tracks. Quad bikes are prohibited in the beach area (i.e. the coastline along Long Beach/Dolphin Park) of the recreation zone;
- **Industrial:** The zone comprises of the areas demarcated for the heavy industrial development behind the dune belt. Noxious and nuisance creating industries should be located in this area;
- **Government:** The zone is bounded by the Tumas River on the South and the gravel road between Walvis Bay and Swakopmund on the West... Zone 5 will permit only military related activities;
- **Land for Development:** This includes the area just south of the Airport and Dune 7 and South-East of the 'built-up urban area' as well as the Long Beach/Dolphin Park development. The node at Long Beach/Dolphin Park can be strengthened. Developments at Long Beach/Dolphin Park have to abide to this policy...With the exception of the Long Beach/Dolphin Park development, any other proposed development in this area should be: scattered, not agglomerated, to allow the dominant presence of the desert to be maintained, and are subject to an Environmental Impact Assessment.

4. DESCRIPTION OF THE PROPOSED PROJECT

4.1 General Overview

Through the NACOMA Project Co-ordinating Office (PCO) and the Steering Committee, a number of investment proposals were approved for implementation under the World Bank Matching Grant support. The NACOMA Project Sub-component 3.2 is concerned with provision of technical support and small matching grants for targeted investments in specific project intervention sites. Kuiseb Delta Development Trust (KDDT) and Walvis Bay Bird Paradise were among approved proposals and MG's recipients. Part of the technical support is to identify activities to be funded through the NACOMA MG, to facilitate a feasibility study and carry out an EIA screening to determine if there are significant or no significant impacts requiring an assessment. However, the scope of this consultancy is to also focus on other activities currently operating in the area as well as identify potential eco-tourism and recreational activities in the Kuiseb Delta and Dune Belt area.

4.1.1 Kuiseb Delta Development Project/ Trust (KDDP/T)

Kuiseb Delta is located in Erongo region which is considered the hub of tourism in Namibia. KDDP is located in an ideal tourism location - the meeting place of extreme landscapes. On the one side is the Namib Desert, the oldest desert in the world while on the other side is a massive lagoon and harbour flowing from the Atlantic Ocean. Both of these landscapes lend themselves towards some of the most unique site seeing opportunities in Namibia. The lagoon and harbour is home to a variety of species and a large number of sea mammals and bird life. The Namib Desert on the other side is called "The Living Desert", because of the large number of living species found there. Activities include various different water related actions, like shore angling, boat angling, shark angling, sightseeing and photographic boat cruises, sea kayaking and wind- and kite surfing. Walvis Bay houses yearly one of the international legs of speed kite and wind surfing. The proposed project provides additional activities in the coastal area. Envisaged facilities and attendant activities will complement existing offerings. The additional activities will boost current efforts to lengthen the average stay of tourists in the coastal area (Nyakunu and Ndlovu, 2010).

The Topnaars community living in the Kuiseb Delta, submitted an application for a Matching Grant to NACOMA with the main aim of establishing Community-Based Tourism (CBT), called the Kuiseb Delta Development Project (KDDP). Upon approval of the Matching Grant the KDDP submitted an application for a concession along the Kuiseb Delta to MET. Conditions for concession applications required a feasibility report and business plan. Subsequently, The Kuiseb Delta Development Trust (KDDT) was registered on April 12, 2010 through a Trust Deed, in terms of the Trust Monies Protection Act. The trust is a legal entity that can venture into formal commercial agreements with business partners. It is an initiative being spearheaded by seven (7) Trustees from the Topnaar community with the consent of the Topnaar Traditional Authority. The trust comprises of 600 registered members. Clear guidelines on benefits distribution, mandates and responsibilities have been drafted and a Steering Committee comprising the Trustees is functioning. The concession which KDDT has applied for spans the area east from Walvis Bay Meersig residential area, starting from the border of Walvis Bay and state lands till Mile 7 reservoir including old Walvis Bay entry route near the MWARD nursery (refer to Figure 4.1 below).

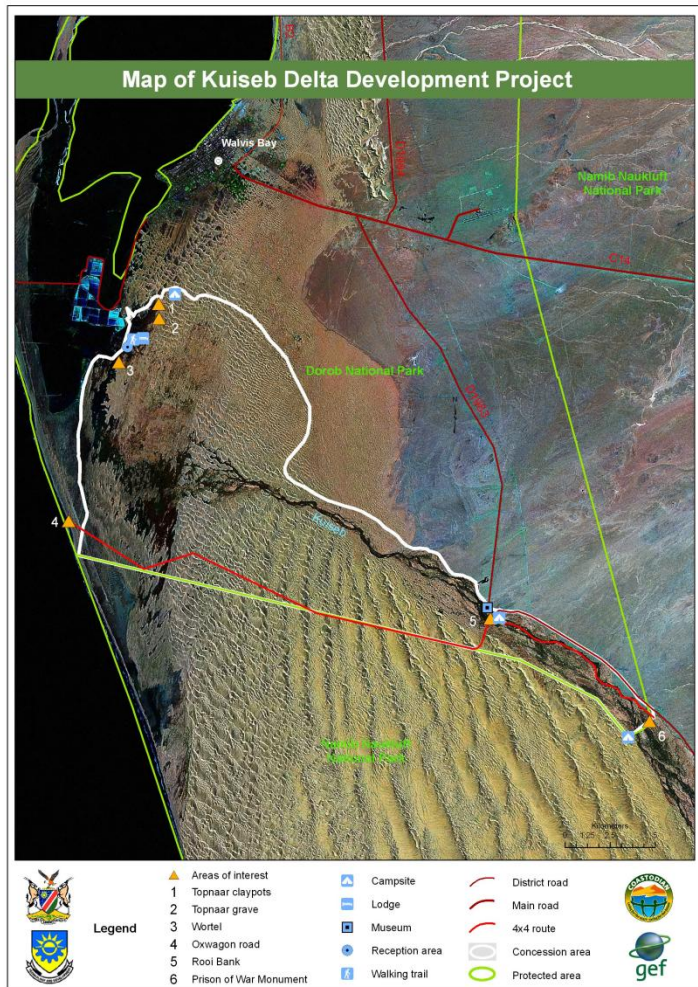


Figure 4.1: Kuiseb Delta Development Trust Concession Area (Nyakunu and Ndlovu, 2010)

The Kuiseb Delta Development Project (KDDP) seeks to offer more specialized tourism services such as cultural tourism, educational/historical tourism and adventure tourism through the provision of walking trails, scenic drives, dune drives, sand boarding, and other activities relevant to its locality (Nyakunu and Ndlovu, 2010).

The feasibility study confirms that the project is significant and reasons for justification are as follow (Nyakunu and Ndlovu, 2010):

KDDP is a significant initiative since:

- The Topnaar community will bring forth a rich cultural component to the trails. The existing traditional customs and cultural harvesting of the !Nara presents another mile stone in the promotion of cultural tourism. The historical and educational component of the trail provides the overall experience.

- The successful launch of the project will be another feature in the cap of CBNRM in Namibia. It will be an additional opportunity to showcase Namibia's international success in the promotion of CBRNMs.
- Focus is on and around ecosystems of biodiversity importance i.e. bio-diversity being conserved includes !Nara melons, Dune lark, Lichen fields, Dune habitats and gravel plain habitats, Landscape aesthetics, Restriction of ORV traffic, etc.
- It is aligned with community / local and national priorities such as empowering rural communities through the provision of consumptive and non-consumptive rights over natural resources, raising standard of living, creating employment opportunities, alleviating poverty, etc.
- The project will also include cottage industries and conservation issues.
- The Kuiseb Delta is unparalleled in Southern Africa for its archaeology which provides a continuum of 2000 years, including detailed evidence from the last 250 years. By 1990s, 235 sites had been identified with 75% being from pre-contact times and 25% showing evidence of contact ranging in age from 15th to 20th century. Though well preserved the sites are vulnerable to natural and human influences. For instance, the removal of items is reducing the archaeological / historical value of the sites which is important to the nation and paramount to the Topnaar people.

KDDT can sell the project and generate funding for both capital and running costs. The KDDP can be easily operated at a marginal cash surplus but would rely heavily on collections from membership fees, labour subsidies for construction and maintenance, donations and subsidized supplies for construction and maintenance. According to the KDDT business plan, it is assumed that revenues will be generated solely from activities such as trails, camping and guiding fees. These income streams will cover sufficiently the capital, construction and operating funding needs of the project (Nyakunu and Ndlovu, 2010).

4.1.2 Walvis Bay Bird Paradise

The application for a Matching Grant to establish a bird watch paradise in Walvis Bay was also submitted to NACOMA PCO. Subsequently, the feasibility and business plan was compiled to guide the construction and operation of the project. Setting up a bird watching camp was welcomed by everybody spoken to, no matter whether they were birders, people involved in tourism & NGO's or officials in government or public institutions. It was actually often queried why a country with a very high ranking in its bird variety has to date not seen an operation of this kind set up.

The Walvis Bay Bird Paradise is situated 1300m from the circle of the intersection of the Swakop – Walvis Bay road (B2) and the road to the Walvis Bay Airport / into the Namib (C14). The Walvis Bay sewerage ponds where the paradise camp is erected is about 200m from the road. The pond is the most north-east of the reticulation pans of the reticulation plant. It is visible from the road; it can be accessed by a short graveled up ramp from the main road. Separated by 2 dunes to the south-east is the water carrying pan with a range of birds, both sweet water and sea water birds.

5. BASELINE ENVIRONMENT

5.1 General Overview

This section presents the description of the natural environment that may be affected by activities proposed in the study area (Cunningham, 2011).

5.2 Climatic Setting

This section presents the climatic system of the Erongo Region where the study area is situated. In essence, Erongo region is characterised by aridity. The following various are described in detail;

5.2.1 Temperature

Maximum and the minimum temperatures in the Namibia Desert near the coast are moderated by the effects of the cold Benguela current and the regular fog bank (Reptile Uranium Namibia, 2010). According to Christian (2006), the hottest month is February, when maximum air temperatures can reach 40°C but the average maximum 25°C – 30°C. The coldest month is August, when the average minimum temperature is between 8°C and 12°C depending on the distance from the coast (Ibid).

5.2.2 Precipitation

The study area falls within a rainfall range averaging 15 mm at coast and 35 mm further inland (Christian, 2006). The rainfall can be described as extremely variable, patchy and unreliable along coastal areas (Mendelsohn et.al, 2009). The coastal area receives fog and extends about 20 Km inland (Mendelsohn et. al, 2009). The fog is sufficient to support at biodiversity in the project area.

5.2.3 Wind

Near the coast strong winds prevail, but westerly to south westerly winds are also frequent. As the distance from the coast towards inland increases, the wind speed generally decreases and its direction become more variable (Christian, 2006).

5.3 Vertebrate fauna expected in the Kuiseb Delta and Dune belt area

5.3.1 Introduction

A desktop study (i.e. literature review) was conducted between 20 and 24 May 2011 on the vertebrate fauna (e.g. reptiles, amphibians, mammals and birds) expected to occur in the general area defined as the Kuiseb River delta and dune belt area between Walvis Bay and Swakopmund.

This literature review was to determine the actual as well as potential vertebrate fauna associated with the general area commonly referred to as the Southern Namib or Southern Desert (Giess 1971, Mendelsohn *et al.* 2002, Van der Merwe 1983). This area is bordered inland by the Central Namib or Central Desert (Giess 1971, Mendelsohn *et al.* 2002). Climatically the coastal area is referred to as Cool Desert with a high occurrence of fog (van der Merwe 1983). The Namib Desert Biome makes up a large proportion (32%) of the land area of Namibia with parks in this biome making up 69% of the protected area network or 29.7% of the biome (Barnard 1998). Four of 14 desert vegetation types are adequately protected with up to 94% representation in the protected area network in Namibia (Barnard 1998). With the exception of municipal land, the area falls within the recently proclaimed Dorob National Park. No communal and freehold conservancies are located in the general area with the closest communal conservancy being the #Gaingu Conservancy in the Spitzkoppe area approximately 100 km to the northeast (Mendelsohn *et al.* 2002, NACSO 2010).

Two important coastal wetlands – i.e. Walvis Bay Wetlands and Sandwich Harbour – both Ramsar sites, occur in the area. According to Curtis and Barnard (1998) the entire coast and the Walvis Bay lagoon as a coastal wetland, are viewed as sites with special ecological importance in Namibia. The known distinctive values along the coastline are its biotic richness (arachnids, birds and lichens) with the Walvis Bay lagoon's importance being its biotic richness and migrant shorebirds as well as being the most important Ramsar site in Namibia. The Ramsar site covers 12 600 ha with regular counts of birds varying between 37 000 and well over 100 000 individuals, albeit mainly migratory species (Kolberg n.d.). The Walvis Bay wetland is considered the most important coastal wetland in southern Africa and one of the top 3 in Africa (Shaw *et al.* 2004). The

Sandwich Harbour Ramsar site covers 16 500 ha and falls within the Namib-Naukluft Park and enjoys full protection (Kolberg n.d.). This area is a centre of concentration of migratory shorebirds, waders and flamingos regularly supporting over 142 000 and 50 000 birds during summer and winter, respectively (Kolberg n.d.).

The area is bordered by the Kuiseb River to the south (Walvis Bay area) and the Swakop River to the north (Swakopmund area) with catchment areas of 15 500 km² and 30 100 km², respectively (Jacobson *et al.* 1995).

The central coastal region and the Walvis Bay area in particular, is regarded as “relatively low” in overall (all terrestrial species) diversity (Mendelsohn *et al.* 2002). Overall terrestrial endemism in the area on the other hand is “moderate to high” (Mendelsohn *et al.* 2002).

The overall diversity and abundance of large herbivorous mammals (big game) is viewed as “low to medium” with 1-2 species while overall diversity of large carnivorous mammals (large predators) is determined at 4 species with brown hyena being the most important with “medium” densities expected in the area (Mendelsohn *et al.* 2002).

It is estimated that at least 54 reptile, 7 amphibian, 42 mammal and 182 bird species (breeding residents) are known to or expected to occur in the general/immediate Walvis Bay/Swakopmund area of which a high proportion are endemics.

5.3.2 Methods

Literature review

A comprehensive and intensive literature review (i.e. desktop study) regarding the reptiles, amphibians, mammals and birds that could potentially occur in the general/immediate Kuiseb delta and dune belt area was conducted using as many references as manageable. A list of the references consulted can be viewed in the Reference section.

5.3.3 Results

5.3.3.1 Reptile Diversity

Table 1 indicates the reptile diversity known and/or expected to occur in the general Kuiseb delta and dune belt area between Walvis Bay and Swakopmund:

Table 5.1. Reptile diversity known and/or expected to occur in the general Kuiseb delta and dune belt area – i.e. Walvis Bay and Swakopmund areas.

Species: Scientific name	Species: Common name	Namibian conservation and legal status	International status
TURTLES AND TERRAPINS			
<i>Pelomedusa subrufa</i>	Marsh/Helmeted Terrapin	Secure	
SNAKES			
Thread Snakes			
<i>Leptotyphlops occidentalis</i>	Western Thread Snake	Endemic; Secure	SARDB Peripheral
<i>Leptotyphlops labialis</i>	Damara Thread Snake	Endemic; Secure	
Burrowing Snakes			
<i>Xenocalamus bicolor bicolor</i>	Bicoloured Quill-snouted Snake	Secure	
Typical Snakes			
<i>Lamprophis fuliginosus</i>	Brown House Snake	Secure	
<i>Lycophidion capense</i>	Cape Wolf Snake	Secure	
<i>Pseudaspis cana</i>	Mole Snake	Secure	
<i>Dipsina multimaculata</i>	Dwarf Beaked Snake	Endemic; Secure	
<i>Psammophis trigrammus</i>	Western Sand Snake	Endemic; Secure	
<i>Psammophis notostictus</i>	Karoo Sand Snake	Secure	
<i>Psammophis leightoni namibensis</i>	Namib Sand Snake	Secure	
<i>Dasypeltis scabra</i>	Common/Rhombic Egg Eater	Secure	
<i>Aspidelaps lubricus infuscatus</i>	Coral Snake	Secure	
<i>Aspidelaps scutatus scutatus</i>	Shield-nose Snake	Secure	
<i>Naya nigricincta</i>	Black-necked Spitting Cobra	Endemic; Secure	
<i>Bitis arietans</i>	Puff Adder	Secure	
<i>Bitis caudalis</i>	Horned Adder	Secure	
<i>Bitis peringueyi</i>	Péringuey's Adder	Endemic; Secure	
LIZARDS			
Skinks			
<i>Typhlosaurus braini</i>	Brains's Blind Legless Skink	Endemic; Secure	
<i>Typhlacontias brevipes</i>	FitzSimmons' Burrowing Skink	Endemic; Secure	
<i>Trachylepis occidentalis</i>	Western Three-striped Skink	Secure	
<i>Trachylepis striata wahlbergi</i>	Striped Skink	Secure	
<i>Trachylepis sulcata</i>	Western Rock Skink	Secure	
<i>Trachylepis variegata variegata</i>	Variiegated Skink	Secure	

Old World Lizards			
<i>Heliobolus lugubris</i>	Bushveld Lizard	Secure	
<i>Meroles anchietae</i>	Shovel-snouted Lizard	Secure	
<i>Meroles cuneirostris</i>	Wedge-snouted Desert Lizard	Endemic; Secure	
<i>Meroles micropholidotus</i>	Small-scaled Desert Lizard	Endemic; Rare?	
<i>Meroles reticulatus</i>	Reticulated Desert Lizard	Endemic; Secure	
<i>Meroles suborbitalis</i>	Spotted Desert Lizard	Secure	
<i>Pedioplanis breviceps</i>	Short-headed Sand Lizard	Endemic; Secure	
<i>Pedioplanis namaquensis</i>	Namaqua Sand Lizard	Secure	
<i>Pedioplanis inornata</i>	Plain Sand Lizard	Endemic; Secure	
Plated Lizards			
<i>Cordylosaurus subtessellatus</i>	Dwarf Plated Lizard	Endemic; Secure	
Monitors			
<i>Varanus albigularis</i>	Rock Monitor	Vulnerable; Peripheral Protected Game	CITES Appendix II Safe to Vulnerable
Agama			
<i>Agama planiceps</i>	Namibian Rock Agama	Secure	
Chameleons			
<i>Bradypodion pumilum</i>	Cape Dwarf Chameleon	Introduced alien Secure	CITES Appendix II
<i>Chamaeleo namaquensis</i>	Namaqua Chameleon	Secure	CITES Appendix II
Geckos			
<i>Afroedura africana africana</i>	African Flat Gecko	Endemic; Rare?	
<i>Chondrodactylus angulifer namibensis</i>	Giant Ground Gecko	Secure	
<i>Narudasia festiva</i>	Festive Gecko	Endemic; Secure	
<i>Pachydactylus bicolour</i>	Velvety Thick-toed Gecko	Endemic; Secure	
<i>Pachydactylus kockii</i>	Koch's Thick-toed Gecko	Endemic; Secure	
<i>Pachydactylus turneri</i>	Turner's Thick-toed Gecko	Secure	
<i>Pachydactylus scherzi</i>	Schertz's Thick-toed Gecko	Endemic; Secure	
<i>Pachydactylus rugosus rugosus</i>	Rough Thick-toed Gecko	Endemic; Secure	
<i>Pachydactylus weberi weneri</i>	Weber's Thick-toed Gecko	Endemic; Secure	
<i>Palmatogecko rangei</i>	Wed-footed Gecko	Endemic; Secure	
<i>Ptenopus carpi</i>	Carp's Barking Gecko	Endemic; Secure	
<i>Ptenopus garrulus maculatus</i>	Common Barking Gecko	Secure	
<i>Ptenopus kocki</i>	Kock's Barking Gecko	Endemic; Secure	
<i>Rhoptropus afer</i>	Common Namib Day Gecko	Endemic; Secure	
<i>Rhoptropus boultoni</i>	Boulton's Namib Day Gecko	Endemic; Secure	
<i>Rhoptropus bradfieldi</i>	Bradfield's Namib Day Gecko	Endemic; Secure	

Namibian conservation and legal status according to the Namibian Conservation Ordinance of 1975 – Griffin (2003)

Source for literature review: Alexander and Marais (2007), Branch (1998), Branch (2008), Boycott and Bourquin 2000, Broadley (1983), Buys and Buys (1983), Cunningham (2006), Griffin (1998a), Griffin (2003), Hebbard (n.d.), Marais (1992), Tolley and Burger (2007)

Approximately 261 species of reptiles are known or expected to occur in Namibia thus supporting approximately 30% of the continents species diversity (Griffin 1998a). At least 22% or 55 species of Namibian lizards are classified as endemic. The occurrence of reptiles of “conservation concern” includes about 67% of Namibian reptiles (Griffin 1998a). Emergency grazing and large scale mineral extraction in critical habitats are some of the biggest problems facing reptiles in Namibia (Griffin 1998a). The overall reptile diversity and endemism in the Walvis Bay/Swakopmund area is estimated at between 31-50 species and 17-24 species, respectively (Mendelsohn *et al.* 2002). Griffin (1998a) presents figures of between 1-20 and 9-10 for endemic lizards and snakes, respectively, from the general central coastal part of Namibia.

According to the literature review at least 54 species of reptiles are expected to occur in the general Walvis Bay/Swakopmund area with 27 species being endemic – i.e. 50% endemic, 1 species (*Varanus albigularis*) as vulnerable, 2 species as rare and insufficiently known while 4 species have some form of international conservation status. These consist of at least 17 snakes (2 thread snakes, 1 burrowing snake, 14 typical snakes) of which 6 species (35%) are endemic, 1 terrapin, 16 lizards (50% endemic), 1 monitor, 1 agama, 2 chameleons (although the Cape Dwarf Chameleon is endemic to South Africa it was introduced to gardens in the Walvis Bay area and thus does not occur there naturally – i.e. alien) and 16 geckos (81% endemic).

Lizards (16 species with 8 species being endemic) and Gecko's (16 species with 13 species being endemic) are the most important group of reptiles expected from the Walvis Bay/Swakopmund area. Namibia with approximately 129 species of lizards (Lacertilia) has one of the continents richest lizard fauna (Griffin 1998a). Geckos expected and/or known to occur in the Walvis Bay/Swakopmund area have the highest occurrence of endemics (81%) of all the reptiles in this area. Griffin (1998a) confirms the

importance of the gecko fauna in Namibia. Both thread snakes expected from the area are classified as endemic.

Due to the fact that reptiles are an understudied group of animals, especially in Namibia, it is expected that more species may be located in the general Walvis Bay/Swakopmund area than presented above.

5.3.3.2 Amphibian Diversity

Table 2 indicates the amphibian diversity known and/or expected to occur in the general Kuiseb delta and dune belt area between Walvis Bay and Swakopmund:

Table 5.2. Amphibian diversity known and/or expected to occur in the general Kuiseb delta and dune belt area – i.e. Walvis Bay and Swakopmund areas.

Species: Scientific name	Species: Common name	Status
Toads		
<i>Poyntonophrynus dombensis</i>	Dombe Toad	Endemic
<i>Poyntonophrynus hoeschi</i>	Hoesch's Toad	Endemic
<i>Amietophrynus poweri</i>	Power's Toad or Western Olive Toad	
Rain Frogs		
<i>Breviceps adspersus</i>	Common/Bushveld Rain Frog	
Rubber Frog		
<i>Phrynomantis annectens</i>	Marbled Rubber Frog	Endemic
Bull and Sand Frogs		
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	
Platannas		
<i>Xenopus laevis</i>	Common Platanna	

Source for literature review: Carruthers (2001), Channing (2001), Channing and Griffin (1993), Du Preez and Carruthers (2009), Passmore and Carruthers (1995)

Amphibians are declining throughout the world due to various factors of which much has been ascribed to habitat destruction. Basic species lists for various habitats are not always available with Namibia being no exception in this regard while the basic ecology of most species is also unknown. Approximately 4 000 species of amphibians are known worldwide with just over 200 species known from southern Africa and at least 57 species expected to occur in Namibia. Griffin (1998b) puts this figure at 50 recorded species and a final species richness of approximately 65 species, 6 of which are endemic to Namibia. This “low” number of amphibians from Namibia is not only as a result of the generally marginal desert habitat, but also due to Namibia being under studied and under collected.

Most amphibians require water to breed and are therefore associated with the permanent water bodies, mainly in northeast Namibia.

The dry sandy coastal desert (Namib) and saline coastal areas are poor habitat for amphibians. Although the ephemeral Kuiseb and Swakop Rivers reach the sea in the Walvis Bay and Swakopmund areas, it seldom flows with temporary freshwater pools being rare close to the coast. Other water bodies in the area are saline of nature and not suitable habitat for amphibians. Gardens in Walvis Bay, Lang Strand and Swakopmund can be suitable habitat and amphibians are known to occur here usually after having being transported from elsewhere (Pers obs.). Overall, the saline coastal habitats are marginal for amphibians. According to Mendelsohn *et al.* (2002), the overall frog diversity in the Walvis Bay/Swakopmund area is estimated at between 1-3 species. Griffin (1998b) puts the species richness in the general area between 1-2 species.

According to the literature review, up to 7 species of amphibians can occur in suitable habitat in the general Walvis Bay/Swakopmund area. The area is under represented, with 3 toads and 1 species each for rain, rubber and sand frog and platanna known and/or expected (i.e. potentially could be found in the area) to occur in the area. Three species (43%) namely *Poyntonophrynus dombensis*, *Poyntonophrynus hoeschi* and *Phrynomantis annectens* are classified as endemic to Namibia (Griffin 1998b) while all 7 species are classified as “least concern” by the IUCN (IUCN 2010).

The Kuiseb and Swakop Rivers flooded for lengthy periods during the unusually high 2011 rainy season. This could have resulted in amphibians being transported into the area which otherwise remains generally poor habitat.

5.3.3.3 Mammal Diversity

Table 3 indicates the mammal diversity known and/or expected to occur in the general Kuiseb delta and dune belt area between Walvis Bay and Swakopmund:

Table 5.3. Mammal diversity known and/or expected to occur in the general Kuiseb delta and dune belt area – i.e. Walvis Bay and Swakopmund areas.

Species: Scientific name	Species: Common name	Namibian conservation and legal status	International Status

Moles			
<i>Eremitalpa granti</i>	Grant's Golden Mole	Endemic; Secure	¹ Vulnerable
Elephant Shrews			
<i>Macroscelides proboscideus flavicaudatus</i>	Round-eared Elephant-shrew	Endemic; Secure	
Bats			
<i>Lissonycteris angolensis</i>	*Angolan Soft-furred Fruit Bat	Not listed	
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	Secure	
<i>Cistugo seabrai</i>	Namibian Wing-gland Bat	Endemic; Rare	¹ Vulnerable; ² Near Threatened
<i>Laephotis namibensis</i>	Namib Long-eared Bat	Endemic; Insufficiently known	
<i>Nycteris thebaica</i>	Common Slit-faced Bat	Secure	
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	Secure	¹ Near Threatened
<i>Rhinolophus darling</i>	Darling's Horseshoe Bat	Secure	¹ Near Threatened
<i>Rhinolophus capensis</i>	*Cape Horseshoe Bat	Secure	¹ Near Threatened; ² Near Threatened
<i>Taphozous mauritanus</i>	*Mauritanian Tomb Bat	Secure	
<i>Chaerephon ansorgei</i>	*Ansorge's Free-tailed Bat	Not listed	
<i>Sauromys petrophilus</i>	Roberts's Flat-headed Bat	Secure	
<i>Miniopterus natalensis</i>	Natal Long-fingered Bat	Secure	¹ Near Threatened
<i>Eptesicus hottentotus</i>	Long-tailed Serotine	Secure	
<i>Neoromicia zuluensis</i>	*Zulu Serotine	Secure	
<i>Pipistrellus rueppellii</i>	*Rüppell's Pipistrelle	Insufficiently known; Peripheral	
Hares and Rabbits			
<i>Lepus capensis</i>	Cape Hare	Secure	
Rodents			
Rats and Mice			
<i>Parotomys littledalei namibensis</i>	Littledale's Whistling Rat	Endemic; Secure	¹ Near Threatened
<i>Rhabdomys pumilio</i>	Striped Mouse	Secure	
<i>Mus musculus</i>	House Mouse	Invasive alien	
<i>Aethomys chrysophilus</i>	Red Veld Rat	Secure	
<i>Micaelamys (Aethomys) namaquensis</i>	Namaqua Rock Mouse	Secure	
<i>Rattus rattus</i>	House Rat	Invasive alien	
<i>Rattus norvegicus</i>	Brown Rat	Invasive alien	
<i>Desmodillus auricularis</i>	Short-tailed Gerbil	Secure	
<i>Gerbillurus paeba infernus</i>	Hairy-footed Gerbil	Endemic; Insufficiently known	
<i>Gerbillurus tytonis</i>	Dune Hairy-footed Gerbil	Endemic; Secure	
<i>Gerbillurus setzeri</i>	Setzer's Hairy-footed Gerbil or Namib Brush-tailed Gerbil	Endemic	
<i>Petromyscus collinus</i>	Pygmy Rock Mouse	Endemic; Secure	
<i>Mastomys coucha</i>	Southern Multimammate Mouse	Secure	
<i>Petromys typicus</i>	Dassie Rat	Endemic; Secure	¹ Near Threatened
Carnivores			
<i>Hyaena brunnea</i>	Brown Hyena	Insufficiently	¹ Near Threatened

		known; Vulnerable? Peripheral	² Near Threatened
<i>Crocuta crocuta</i>	Spotted Hyena	Secure? Peripheral	¹ Near Threatened
<i>Felis silvestris</i>	African Wild Cat	Vulnerable	CITES Appendix II
<i>Vulpes chama</i>	Cape Fox	Vulnerable?	
<i>Canis mesomelas</i>	Black-backed Jackal	Secure; Problem animal	
<i>Ictonyx striatus</i>	Striped Polecat	Secure	
<i>Suricata suricatta marjoriae</i>	Suricate	Endemic; Secure	
Antelopes			
<i>Sylvicapra grimmia</i>	Common Duiker	Secure	
<i>Antidorcas marsupialis</i>	Springbok	Secure; Huntable game	
<i>Oryx gazelle</i>	Gemsbok	Secure; Huntable game	

¹SARDB (2004); ²IUCN (2010)

* Unconfirmed bat species although potentially could occur in area according to habitat modelling (Monadjem *et al.* 2010)

Source for literature review: De Graaff (1981), Griffin (2005), Estes (1995), Joubert and Mostert (1975), Monadjem *et al.* (2010), Skinner and Smithers (1990), Skinner and Chimimba (2005) and Taylor (2000)

Namibia is well endowed with mammal diversity with at least 250 species occurring in the country. These include the well known big and hairy as well as a legion of smaller and lesser-known species. Currently 14 mammal species are considered endemic to Namibia of which 11 species are rodents and small carnivores of which very little is known. Most endemic mammals are associated with the Namib and escarpment with 60% of these rock-dwelling (Griffin 1998c). According to Griffin (1998c) the endemic mammal fauna is best characterized by the endemic rodent family *Petromuridae* (Dassie rat) and the rodent genera *Gerbillurus* and *Petromyscus*. The overall mammal diversity in the Walvis Bay area is estimated at between 16-30 species with 3-4 species being endemic to the area (Mendelsohn *et al.* 2002).

Overall terrestrial diversity – all species – is classified as “low” in the western coastal parts of Namibia (Mendelsohn *et al.* 2002). The overall diversity (1-2 species) and abundance of large herbivorous mammals is low in the Walvis Bay area with Springbok and Oryx having the highest density of the larger species (Mendelsohn *et al.* 2002). The overall abundance and diversity of large carnivorous mammals is relatively high (4 species) in the Walvis Bay area with Brown Hyena having the highest density of the larger species (Mendelsohn *et al.* 2002).

According to the literature review, up to 42 species of mammals are known and/or expected to occur in the general Walvis Bay/Swakopmund area of which 11 species (29.1%) are classified as endemic. According to the Namibian legislation 1 species is classified as rare, 3 species as vulnerable, 4 species as insufficiently known, 3 species as invasive aliens, 2 species as huntable game, 1 species as problem animal while 2 species (both bats) are not listed. Eleven species are listed with various international conservation statuses of which 2 species are classified as vulnerable (*Eremitalpa granti* and *Cistugo seabrai*) and 8 species as near threatened by the SARDB (SARDB 2004). The IUCN (IUCN 2010) classifies 3 species as near threatened (*Cistugo seabrai*, *Rhinolophus capensis* and *Hyaena brunnea*) while 1 species is classified as a CITES Appendix II species.

The House Mouse (*Mus musculus*) and the rats *Rattus rattus* and *Rattus norvegicus* are viewed as invasive aliens to the area. *Mus musculus* are generally known as casual pests and not viewed as problematic although they are known carriers of “plague” and can cause economic losses. The biggest problem with the *Rattus* species is economic losses and garden pests along the coast (Griffin 2003). Mammal species probably underrepresented in the above mentioned table for the general area are the bats as this group has not been well documented from the arid western parts of Namibia.

At least 40.5% and 35.7% of the mammalian fauna that occur or are expected to occur in the Walvis Bay/Swakopmund area are represented by rodents (17 species) and bats (15 species) of which 9 species (21.4%) are endemic to Namibia. Some species such as *Petromys typicus* are not expected to occur in the dune belt area as they typically favour rocky habitat and are known to occur behind the dune belt in such habitat. Habitats often not valued as unique are the dune hummocks and seemingly barren gravel plains along the coast. Habitat alteration and overutilization are the two primary processes threatening most mammals (Griffin 1998c).

5.3.3.4 Avian Diversity

Table 4 indicates the bird diversity known and/or expected to occur in the general Kuiseb delta and dune belt area between Walvis Bay and Swakopmund:

Table 5.4. Bird diversity known and/or expected to occur in the general Kuiseb delta and dune belt area – i.e. Walvis Bay and Swakopmund areas. This table excludes migratory birds (e.g. Petrel, Albatross, Skua, etc.) and species breeding extralimital (e.g. stints, sandpipers, etc.) and rather focuses on birds that are breeding residents or can be found in the area during any time of the year. This would imply that many more birds (e.g. Palaearctic migrants) could occur in the area depending on “favourable” environmental conditions.

Table 5.4. Bird diversity known and/or expected to occur in the general Kuiseb delta and dune belt area – i.e. Walvis Bay and Swakopmund areas.

Species: Scientific name	Species: Common name	Status: Namibia	Status: Southern Africa
<i>Struthio camelus</i>	Common Ostrich		
<i>Podiceps cristatus</i>	Great Crested Grebe		
<i>Tachybaptus ruficollis</i>	Little Grebe		
<i>Podiceps nigricollis</i>	Black-necked Grebe		
<i>Pelecanus onocrotalus</i>	Great White Pelican		
<i>Pelecanus rufescens</i>	Pink-backed Pelican		
<i>Phalacrocorax lucidus</i>	White-breasted Cormorant		
<i>Morus capensis</i>	Cape Gannet	Specially protected	Vulnerable; Breeding endemic
<i>Phalacrocorax capensis</i>	Cape Cormorant		Near-threatened; Breeding endemic
<i>Phalacrocorax neglectus</i>	Bank Cormorant	Specially protected	Endemic; Endangered
<i>Phalacrocorax africanus</i>	Reed Cormorant		
<i>Phalacrocorax coronatus</i>	Crowned Cormorant		Endemic; Near-threatened
<i>Anhinga melanogaster</i>	Darter		
<i>Ardea cinerea</i>	Grey Heron		
<i>Ardea melanocephala</i>	Black-headed Heron		
<i>Ardea purpurea</i>	Purple Heron		
<i>Egretta garzetta</i>	Little Egret		
<i>Egretta intermedia</i>	Yellow-billed Egret		
<i>Egretta alba</i>	Great Egret		
<i>Egretta ardesiaca</i>	Black Egret		
<i>Bubulcus ibis</i>	Cattle Egret		
<i>Ardeola ralloides</i>	Squacco Heron		
<i>Ixobrychus minutus</i>	Little Bittern		
<i>Scopus umbretta</i>	Hamerkop		
<i>Ciconia nigra</i>	Black Stork		
<i>Phoenicopterus ruber</i>	Greater Flamingo	Vulnerable	
<i>Phoenicopterus minor</i>	Lesser Flamingo	Vulnerable	Near-threatened
<i>Dendrocygna viduata</i>	Whitefaced Duck		
<i>Alopochen aegyptiacus</i>	Egyptian Goose		
<i>Anas capensis</i>	Cape Teal		
<i>Anas hottentota</i>	Hottentot Teal		
<i>Anas erythrorhyncha</i>	Redbilled Teal		
<i>Anas smithii</i>	Cape Shoveller		
<i>Netta erythrophthalma</i>	Southern Pochard		
<i>Sagittarius serpentarius</i>	Secretarybird		
<i>Gyps africanus</i>	White-backed Vulture		

<i>Aegypius tracheliotus</i>	Lappet-faced Vulture		
<i>Circaetus pectoralis</i>	Black-chested Snake-Eagle		
<i>Elanus caeruleus</i>	Black-shouldered Kite		
<i>Aquila verreauxii</i>	Verreaux's Eagle		
<i>Aquila rapax</i>	Tawny Eagle		
<i>Polemaetus bellicosus</i>	Martial Eagle		
<i>Buteo augur</i>	Augur Buzzard		
<i>Melierax canorus</i>	Southern Pale Chanting Goshawk		Near endemic
<i>Falco peregrines</i>	Peregrine Falcon		
<i>Falco biarmicus</i>	Lanner Falcon		
<i>Falco chicquera</i>	Red-necked Falcon		
<i>Falco rupicolus</i>	Rock Kestrel		
<i>Falco rupicoloides</i>	Greater Kestrel		
<i>Francolinus adspersus</i>	Red-billed Francolin		
<i>Trunix sylvatica</i>	Kurrichane Buttonquail		
<i>Porphyrio porphyrio</i>	African Purple Swamphen		
<i>Gallinula chloropus</i>	Common Moorhen		
<i>Fulica cristata</i>	Red-knobbed Coot		
<i>Ardeotis kori</i>	Kori Bustard		
<i>Neotis ludwigii</i>	Ludwig's Bustard		Endangered; Near endemic
<i>Eupodotis rueppellii</i>	Rüppell's Korhaan	Endemic	Near endemic
<i>Eupodotis afra</i>	Black Korhaan		
<i>Actophilornis africanus</i>	African Jacana		
<i>Rostratula benghalensis</i>	Painted Snipe		
<i>Haematopus moquini</i>	African Black Oystercatcher	Vulnerable	Near threatened; Endemic
<i>Charadrius marginatus</i>	White-fronted Plover		
<i>Charadrius pallidus</i>	Chestnut-banded Plover		Near threatened
<i>Charadrius pecuarius</i>	Kittlitz's Plover		
<i>Charadrius tricollaris</i>	Three-banded Plover		
<i>Vanellus armatus</i>	Blacksmith Lapwing		
<i>Recurvirostra avosetta</i>	Pied Avocet		
<i>Himantopus himantopus</i>	Black-winged Stilt		
<i>Burhinus capensis</i>	Spotted Thick-knee		
<i>Cursorius rufus</i>	Burchell's Courser		
<i>Rhinoptilus africanus</i>	Double-banded Courser		
<i>Larus dominicanus</i>	Kelp Gull		
<i>Larus cirrocephalus</i>	Grey-headed Gull		
<i>Larus hartlaubii</i>	Hartlaub's Gull		Endemic
<i>Sterna bergii</i>	Swift Tern		
<i>Sterna balaenarum</i>	Damara Tern	Endemic; Endangered	Near threatened; Breeding endemic
<i>Chlidonias hybridus</i>	Whiskered Tern		
<i>Pterocles namaqua</i>	Namaqua Sandgrouse		Near endemic
<i>Pterocles bicinctus</i>	Double-banded Sandgrouse		Near endemic
<i>Columba guinea</i>	Speckled Pigeon		
<i>Columba livea</i>	Rock Dove		
<i>Streptopelia capicola</i>	Cape Turtle Dove		
<i>Streptopelia senegalensis</i>	Laughing Dove		
<i>Streptopelia capicola</i>	Cape Turtle-Dove		
<i>Oena capensis</i>	Namaqua Dove		
<i>Agapornis roseicollis</i>	Rosy-faced Lovebird	Endemic	Near endemic
<i>Corythaixoides concolor</i>	Grey Go-away-bird		
<i>Tyto alba</i>	Barn Owl		
<i>Otus leucotis</i>	Southern White-faced Scops-Owl		

<i>Glaucidium perlatum</i>	Pearl-spotted Owlet		
<i>Bubo africanus</i>	Spotted Eagle Owl		
<i>Bubo lacteus</i>	Giant Eagle Owl		
<i>Caprimulgus tristigma</i>	Freckled Nightjar		
<i>Apus bradfieldi</i>	Bradfield's Swift		Near endemic
<i>Colius colius</i>	White-backed Mousebird		Endemic
<i>Urocolius indicus</i>	Red-faced Mousebird		
<i>Ceryle rudis</i>	Pied Kingfisher		
<i>Merops hirundineus</i>	Swallow-tailed Bee-eater		
<i>Upupa epops</i>	Hoopoe		
<i>Phoeniculus cyanomelas</i>	Scimitar-billed Woodhoopoe		
<i>Tockus monteiri</i>	Monteiro's Hornbill	Endemic	
<i>Tockus nasutus</i>	African Grey Hornbill		
<i>Lybius leucomelas</i>	Pied Barbet		
<i>Dendropicos fuscescens</i>	Cardinal Woodpecker		
<i>Mirafraba sabota</i>	Sabota Lark		
<i>Mirafraba curvirostris</i>	Long-billed Lark		
<i>Calendulauda erythrochlamys</i>	Dune Lark	Endemic	Endemic
<i>Chersomanes albofasciata</i>	Spike-heeled Lark		Near endemic
<i>Calandrella cinerea</i>	Red-capped Lark		
<i>Alauda starki</i>	Stark's Lark		Endemic
<i>Ammomanopsis grayi</i>	Gray's Lark	Endemic	Near endemic
<i>Certhilauda subcoronata</i>	Karoo Long-billed Lark		Endemic
<i>Eremopterix verticalis</i>	Grey-backed Sparrowlark		Near endemic
<i>Hirundo fuligula</i>	Rock Martin		
<i>Riparia paludicola</i>	Brown-throated Martin		
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo		
<i>Corvus capensis</i>	Cape Crow		
<i>Corvus albus</i>	Pied Crow		
<i>Parus cinerascens</i>	Ashy Tit		Near endemic
<i>Anthoscopus minutes</i>	Cape Penduline Tit		Near endemic
<i>Turdoides bicolor</i>	Pied Babbler		
<i>Pycnonotus nigricans</i>	African Red-eyed Bulbul		Near endemic
<i>Monticola brevipes</i>	Short-toed Rock Thrush		
<i>Namibornis herero</i>	Herero Chat	Endemic	Near endemic
<i>Oenanthe monticola</i>	Mountain Wheatear		Near endemic
<i>Cercomela familiaris</i>	Familiar Chat		
<i>Cercomela tracterac</i>	Tracterac Chat		Near endemic
<i>Cercomela schlegelii</i>	Karoo Chat		Near endemic
<i>Myrmecocichla formicivora</i>	Ant-eating Chat		Endemic
<i>Erythropygia paena</i>	Kalahari Robin		
<i>Parisoma subcaeruleum</i>	Chestnut-vented Tit-Babbler		Near endemic
<i>Parisoma layardi</i>	Layard's Tit-Babbler		Endemic
<i>Zosterops pallidus</i>	Orange River White-eye		Endemic
<i>Sylvietta rufescens</i>	Long-billed Crombec		
<i>Eremomela icteropygialis</i>	Yellow-bellied Eremomela		
<i>Eremomela gregalis</i>	Karoo Eremomela		
<i>Acrocephalus baeticatus</i>	African Reed-Warbler		
<i>Acrocephalus gracilirostris</i>	Lesser Swamp-Warbler		
<i>Cisticola aridulus</i>	Desert Cisticola		
<i>Cisticola subruficapilla</i>	Grey-backed Cisticola		Near endemic
<i>Cisticola juncidis</i>	Zitting Cisticola		
<i>Prinia flavicans</i>	Black-chested Prinia		
<i>Melaenornis mariquensis</i>	Marico Flycatcher		Near endemic
<i>Bradornis infuscatus</i>	Chat Flycatcher		Near endemic
<i>Muscicapa striata</i>	Spotted Flycatcher		
<i>Batis pririt</i>	Pririt Batis		Near endemic

<i>Motacilla capensis</i>	Cape Wagtail		
<i>Anthus navaeseelandiae</i>	Richard's Pipit		
<i>Anthus similes</i>	Long-billed Pipit		
<i>Anthus vaalensis</i>	Buffy Pipit		
<i>Tchagra australis</i>	Brown-crowned Tchagra		
<i>Lanius collaris</i>	Common Fiscal		
<i>Laniarius atrococcineus</i>	Crimson-breasted Shrike		Near endemic
<i>Nilaus afer</i>	Brubru		
<i>Telophorus zeylonus</i>	Bokmakierie		Near endemic
<i>Creatophora cinerea</i>	Wattled Starling		
<i>Lamprotornis nitens</i>	Cape Glossy Starling		
<i>Onychognathus naborououp</i>	Pale-winged Starling		Near endemic
<i>Chalcomitra senegalensis</i>	Scarlet-chested Sunbird		
<i>Nectarinia mariquensis</i>	Marico Sunbird		
<i>Nectarinia fusca</i>	Dusky Sunbird		Near endemic
<i>Passer domesticus</i>	House Sparrow		
<i>Passer motitensis</i>	Great Sparrow		Near endemic
<i>Passer melanurus</i>	Cape Sparrow		Near endemic
<i>Passer griseus</i>	Southern Grey-headed Sparrow		
<i>Sporopipes squamifrons</i>	Scaly-feathered Finch		Near endemic
<i>Plocepasser mahali</i>	White-browed Sparrow-Weaver		
<i>Philetairus socius</i>	Sociable Weaver		Endemic
<i>Ploceus velatus</i>	Southern Masked Weaver		
<i>Quelea quelea</i>	Red-billed Quelea		
<i>Euplectes orix</i>	Southern Red Bishop		
<i>Estrilda erythronotos</i>	Black-faced Waxbill		
<i>Estrilda astrild</i>	Common Waxbill		
<i>Amadina erythrocephala</i>	Red-headed Finch		Near endemic
<i>Vidua regia</i>	Shaft-tailed Whydah		
<i>Serinus alario</i>	Black-headed Canary		
<i>Serinus flaviventris</i>	Yellow Canary		Near endemic
<i>Crithagra atrogulariis</i>	Black-throated Canary		
<i>Serinus albogularis</i>	White-throated Canary		Near endemic
<i>Emberiza capensis</i>	Cape Bunting		Near endemic
<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting		
<i>Emberiza impetuani</i>	Lark-like Bunting		Near endemic

Endangered, vulnerable, near threatened, etc. (IUCN 2010) – status international

Endemic, near endemic (Hockey *et al.* 2006) – status southern Africa

Source for literature review: Brown *et al.* (1998), Hockey *et al.* (2006), Komen (n.d.), Maclean (1985) and Tarboton (2001)

The Walvis Bay Wetland is viewed as the most important coastal wetland in southern Africa attracting between 80 000 (winter) and 250 000 (summer) individual birds of 40-50 species in some places (Shaw *et al.* 2004). Although Namibia's avifauna is comparatively sparse compared to the high rainfall equatorial areas elsewhere in Africa, approximately 658 species have already been recorded with a diverse and unique group of arid endemics (Brown *et al.* 1998, Maclean 1985). Fourteen species of birds are endemic or near endemic to Namibia with the majority of Namibian endemics occurring in the savannas (30%) of which ten species occur in a north-south belt of dry savannah in

central Namibia (Brown *et al.* 1998). Bird diversity is viewed as medium in the Walvis Bay/Swakopmund area with 141-170 species (this would include migrant species) estimated with at least 1-3 species being endemic to the general area (Mendelsohn *et al.* 2000).

According to the literature review, at least 182 species of terrestrial [“breeding residents”] birds occur and/or could occur in the general Walvis Bay/Swakopmund area at any time (Hockey *et al.* 2006, Maclean 1985, Tarboton 2001). Although many of the species mentioned in Table 4 do not occur permanently in the general area, environmental conditions such as “berg winds” (“East weather” – local vernacular) often brings unexpected avian guests to the coastal areas although these are not resident all year (Pers obs). All the migrant species (Walvis Bay and surroundings is world renowned for its Palaearctic migrants) have been excluded here, although the Bay area serves as an important feeding ground for a variety of mainly aquatic species.

Seven of the 14 Namibian endemic bird species (50% of all Namibian endemic species or 4% of the species expected to occur in the area) can or are likely to occur in the general Walvis Bay/Swakopmund area. Furthermore, 2 species are classified as specially protected; 3 species as vulnerable and 1 species as endangered (IUCN 2010). According to the southern African status for birds, 5 species are classified as near-threatened, 3 species as vulnerable, 34 species as near endemic, 12 species as endemic and 3 species as breeding endemics (Hockey *et al.* 2006).

The Walvis Bay wetland is considered the most important coastal wetland in southern Africa and one of the top 3 in Africa (Bethune *et al.* 2007) and supports mainly Palaearctic migrants, often comprising up to 88% of the birds – e.g. up to 1% of the global Chestnut-banded Plover (approximately 2 000 individuals) are expected to occur in the Walvis Bay area (Whitelaw *et al.* 1978). Between 70 000 and 100 000 birds in winter and up to 250 000 in spring are supported by the wetland (Bethune *et al.* 2007). The Namib coast is especially important for 8 species and in terms of global populations it supports >90% of the world’s Chestnut-banded Plovers (*Charadrius pallidus*); 31% of Cape Teals (*Anas capensis*); and 26% of African Black Oystercatchers (*Haematopus moquini*). In terms of African endemic races it supports: >90% of the Black-necked Grebe (*Podiceps nigricollis gurneyi*); and 33% of the White-fronted Plover (*Charadrius m. Marginatus*); and in terms of southern African sub-continental populations it supports 31% of Pied Avocets

(*Recurvirosta avocetta*), 13.7% of Greater Flamingos (*Phoenicopterus roseus*) and 10.3% of Lesser Flamingos (*Phoenicopterus minor*) (Williams and Simmons 2008a). Furthermore, up to 200 000 Holarctic shorebirds are supported seasonally along the Namibian coast belonging largely to 12 annually occurring species, of which 5 species occur in numbers that form a significant proportion of the southern African flyway populations – e.g. Curlew Sandpiper (*Calidris ferruginea* 35%); Sanderling (*C. alba* 32%); Ruddy Turnstone (*Arenaria interpres* 17.5%); Grey Plover (*Pluvialis squatarola* 7.8%) and Red Knot (*Calidris canutus* 1.6%) (Williams and Simmons 2008b). According to Simmons and Brown (2009) 28 wetland bird species are of special concern in Namibia.

The Walvis Bay and Sandwich Harbour wetlands are also classified as Ramsar sites (i.e. Namibia is signatory to the Ramsar Convention protecting important wetland sites) as well as globally Important Birding Area (IBA's) (Simmons 1998a). Another IBA in close proximity to Walvis Bay and the Sandwich Harbour area (Global IBA, Marine Reserve and Namib-Naukluft Park) are the Mile 4 Salt works (Swakopmund area – Global IBA, Private Nature Reserve) (Simmons 1998a). Coastal areas and wetlands are immensely important as 8 and 34 bird species are classified as Critically Endangered, Endangered or Vulnerable in each of the biomes (i.e. Coastal areas and Wetlands), respectively (Simmons 1998a).

A recently published summer bird count from the general area indicate 38 species (116 118 individuals) at Walvis Bay; 24 species (1 464 individuals) at the Walvis Bay sewerage ponds; 18 species (134 individuals) at the Swakop River mouth and 34 species (84 011 individuals) at Sandwich Harbour (Kolberg 2010). Of these, waders/shorebirds (~50 000), gulls/terns/skimmers (~30 000) and grebes (~10 000) were the most numerous at Walvis Bay indicating the importance of the general area for a variety of birds.

5.3.3.5 Important Species

Reptiles

The high percentage of endemic reptile species (50%) known and/or expected to occur in the general Walvis Bay/Swakopmund area underscores the importance of this area for reptiles. Reptile species of concern are the 2 thread snakes (*Leptotyphlops occidentalis* and *L. labialis*) as well as the sand burrowing/dwelling species such as *Bitis peringueyi*

and the various *Meroles* species, especially *Meroles micropholidotus* classified as endemic and rare, as well as the high proportion (81%) of endemic gecko (e.g. *Pachydactylus* species) species of which very little is known about their ecological role and actual status in Namibia. The seemingly barren sandy dune and gravel plain areas around Walvis Bay/Swakopmund are host to a variety of reptile fauna not often expected and/or acknowledged. Poorly planned and executed development and recreation activities could affect these species negatively.

Amphibians

Amphibians are generally not viewed as extremely important in saline coastal areas which are marginal habitat for most amphibians. Although 43% of the amphibians expected to occur in the general area are endemic to Namibia they are expected to occur further inland – i.e. the Kuiseb and Swakop Rivers and rocky outcrops with temporary pools associated with these landforms, etc. – and not directly associated with the dune belt between Walvis Bay and Swakopmund. The endemic *Phrynomantis annectens* is probably the amphibian of greatest concern in the area although it occurs widespread throughout large parts of Namibia.

Mammals

Endemic mammals expected to occur in the general Walvis Bay area make up a relatively large percentage (29%) of the mammals known and/or expected from the area. Endemic mammal species of concern include the mole *Eremitalpa granti* and the two bats *Laephotis namibensis* and *Cistugo seabrai* as well as the Hairy-footed Gerbils (*Gerbillurus* sp.). Both bats are very poorly known with only a few records from the general area making them particularly important. The predator of concern is *Hyaena brunnea* which is classified locally as Insufficiently Known, probably Vulnerable; with an international status of Vulnerable (SARDB 2004, IUCN 2010).

Birds

The high proportion of endemic birds of which 50% (7 of 14 species) are endemic to Namibia and which are known and/or expected to occur in the general Walvis Bay/Swakopmund area is important and should be taken into consideration regarding development in the area. Seabirds tend to be more mobile than most other birds with the highest species diversity and abundance along nutrient-rich waters such as the Benguela upwelling system along the Namibian coastline (Hockey et al. 2006). Species of greatest

concern include all the endemics (e.g. Dune and Gray's Larks) as well as *Morus capensis* (Vulnerable – IUCN 2010), *Phalacrocorax capensis* (Near threatened – IUCN 2010), *Phalacrocorax neglectus* (Endangered – IUCN 2010), *Phalacrocorax coronatus* (Near threatened – IUCN 2010), *Phoenicopterus minor* (Endangered – IUCN 2010), *Haematopus moquini* (Near threatened – IUCN 2010), *Charadrius pallidus* (Near threatened – IUCN 2010) and *Sterna balaenarum* (Near threatened – IUCN 2010).

The Namibian coast is extremely important for the Chestnut-banded Plover (*Charadrius pallidus*) with Walvis Bay and Sandwich Harbour home to more than 80% of the species in Africa during certain parts of the year (Simmons *et al.* 2007). Cape Cormorant (*Phalacrocorax capensis*) and Crowned Cormorant (*Phalacrocorax coronatus*), which breed at the guano platforms along the Namibian coast, are other species of concern as fluctuating numbers are often a result of anthropomorphic influences (Crawford *et al.* 2007, Hamukwaya and Cunningham 2007). However, the Damara Tern (*Sterna balaenarum*) which breeds in the gravel plain and sandy beach areas in the general area is the species possibly most threatened by development in the immediate Walvis Bay/Swakopmund area. With 98% of the Damara Tern breeding population being in Namibia (Braby 2010a; Braby 2011; Crawford and Simmons 1997); very low inter-colony dispersal rates with only 70 known colonies (Braby 2011), the importance of the general Walvis Bay/Swakopmund cannot be stressed enough. Furthermore, some of the densest colonies – Caution Reef/Horse Graves – are located in this area (Braby 2010b). Disturbance and urbanisation, especially off-road vehicles, impact on breeding success and consequently pose the biggest threat to Damara Terns along the Namibian coast (Braby *et al.* 2001, Braby 2011, Braby and Braby 2002). Another species threatened by off-road driving, which also occur along Walvis Bay/Swakopmund coast, are African Black Oystercatchers (*Haematopus moquini*) (Watson *et al.* 1996).

The Palaearctic migrants visiting the Walvis Bay lagoon area – mainly during the summer – are also of great importance with disturbance to the feeding area impacting globally on these birds. The larger birds which follow local migration patterns such as the 2 Flamingo species (Walvis Bay – Etosha NP – Botswana) and the Great White Pelican (Walvis Bay – Etosha NP – Hardap Dam) would also be of concern. Flamingos have shown a downward trend in southern Africa with the Namibian coast regularly supporting 84% (40 000 to 47 000) of the Greater Flamingos and 85% (34 000 to 40 000) of the Lesser

Flamingos, respectively (Simmons 1998c). This indicates the importance of the coastal areas for these species.

5.3.4 Conclusion

It is estimated that at least 54 species of reptile, 7 amphibian, 42 mammal and 182 bird (breeding residents) species occur in the general/immediate Walvis Bay/Swakopmund area of which a large proportion are endemics. Endemics include at least 50% of the reptiles, 43% of the amphibians, 29% of the mammals and 4% (7 of 14 endemic species) of all the breeding and/or resident birds known and/or expected to occur in the general Walvis Bay/Swakopmund area.

The reptile diversity is varied in the area with a high percentage of unique and/or endemic species (50%). Species such as the well known sidewinder or Péringuey's Adder as well as the sand diving *Meroles* species and the various unique and mostly endemic *Pachydactylus* geckos, are important in the general area.

Due to the general saline and sandy conditions as well as the lack of permanent surface water, amphibians are not well represented in the general area.

Mammals, especially small mammals (bats and rodents) are well represented in the area with 29% classified as endemic to Namibia.

Aquatic birds, especially migrant waders, are well represented in the Bay area with many more species known and expected to occur in the area, but excluded here due to being highly nomadic and not necessarily permanently associated with the area. A high percentage of endemic species (7 of the 14 Namibian endemic species) are known or expected to occur in the general Walvis Bay/Swakopmund area. The most problematic species are those associated with and/or reliant on the mud flats in the Bay area (e.g. migrant waders) or coastal breeding species such as the endemic Damara Tern and species following local movement patterns between the coast and inland water bodies (e.g. Flamingo's and Pelicans).

Development and recreation (e.g. “dune bashing” and quad bikes) are possibly the biggest threats to vertebrate fauna, especially reptiles and ground breeding birds, in the Kuiseb delta and dune belt area between Walvis Bay and Swakopmund.

Species most likely to be adversely affected by coastal development would be the avian fauna specifically associated with these areas. As all development have potential negative environmental consequences, identifying the most important faunal species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development.

5.4. Flora expected in the Kuiseb delta and dune belt area

5.4.1 Introduction

A desktop study (i.e. literature review) was conducted between 20 and 24 May 2011 on the flora (e.g. trees/shrubs and grass) expected to occur in the general area defined as the Kuiseb River delta and dune belt area between Walvis Bay and Swakopmund.

This literature review was to determine the actual as well as potential flora associated with the general area commonly referred to as the Southern Namib or Southern Desert (Giess 1971, Mendelsohn *et al.* 2002, van der Merwe 1983). Climatically the coastal area is referred to as Cool Desert with a high occurrence of fog (van der Merwe 1983). The Namib Desert Biome makes up a large proportion (32%) of the land area with parks in this biome making up 69% of the protected area network or 29.7% of the biome (Barnard 1998). Four of 14 desert vegetation types are adequately protected with up to 94% representation in the protected area network in Namibia (Barnard 1998). No communal and freehold conservancies are located in the general area with the closest communal conservancy being the #Gaingu Conservancy in the Spitzkoppe area approximately 100 km to the northeast (Mendelsohn *et al.* 2002, NACSO 2010).

According to Curtis and Barnard (1998) the entire coast and the Walvis Bay lagoon as a coastal wetland, are viewed as sites with special ecological importance in Namibia. The known distinctive values along the Coastline are its biotic richness (arachnids, birds and lichens) and the Walvis Bay lagoon are its biotic richness and migrant shorebirds and being the most important Ramsar site in Namibia.

According to Maggs (1998) there are approximately 4344 higher plant species with the most species being within the grasses (422), composites (Asteraceae) (385), legumes (Fabaceae) (377) and figs (Moraceae) (177), recorded from Namibia. Total species richness depends on further collecting and taxonomic revisions. High species richness is found in the Okavango, Otavi/Karsveld, Kaokoveld, southern Namib and Central Highland (Windhoek Mountains) areas. Endemic species – approximately 687 species in total – are mainly associated with the Kaokoveld (northwestern) and the succulent Karoo (southwestern) Namibia. The major threats to the floral diversity in Namibia are:

- 1). Conversion of the land to agriculture (with associated problems) and,
- 2). poorly considered development (Maggs 1998, Mendelsohn *et al.* 2002).

The vegetation in the Desert Biome is characterised by a dominance of therophytes which persist in the form of seeds during unfavourable conditions (Lovegrove 1999). According to Mendelsohn *et al.* (2002) the dominant vegetation structure in the Southern Desert is grassland and dwarf shrubland. These Namib grasslands – mainly annual species – are very sparse, but nevertheless still dominate the little vegetation that grows there. The average plant production is extremely low with 0-5% variation in green vegetation biomass (Mendelsohn *et al.* 2002). The overall plant diversity (all species) in the general Walvis Bay/Swakopmund area is estimated as <50 species (Mendelsohn *et al.* 2002). These estimates are limited to “higher” plants as information regarding “lower” plants is sparse. Burke (2003) estimates that over 400 species – 10% of the flora of Namibia – occur in the central Namib and although it has not been identified as a centre of endemism, it is dominated by endemics such as *Arthroerua leubnitziae*. The greatest variants affecting the diversity of plants are habitat and climate with the highest plant diversity generally associated with high rainfall areas.

The area is bordered by the Kuiseb River to the south (Walvis Bay area) and the Swakop River to the north (Swakopmund area) with common riparian species including Ana tree, Tamarix, Camelthorn, Salvadora, Fig, Euclea, !Nara and Mesquite (Jacobson *et al.* 1995). Pockets of high diversity are found throughout Namibia in “unique” habitat – often transition zones – e.g. mountains, inselbergs, etc. Plant endemism is viewed as “medium” – with between 1-15 endemics expected from the general area (Mendelsohn *et al.* 2002). Furthermore, Mendelsohn *et al.* (2002) views the grazing and browse as virtually nonexistent in the general area. The tourism potential of this area is viewed as moderate (Mendelsohn *et al.* 2002, van der Merwe 1983).

It is estimated that up to 39 species of larger trees and shrubs and up to 48 grasses are known to or expected to occur in the general/immediate Walvis Bay/Swakopmund area.

5.4.2 Methods

Literature review

A comprehensive and intensive literature review (i.e. desktop study) regarding the flora (trees, shrubs and grasses) that could potentially occur in the general/immediate Walvis Bay/Swakopmund area was conducted using as many references as manageable. A list of the references consulted can be viewed in the Reference section.

5.4.3 Results

5.4.3.1 Tree and Shrub Diversity

It is estimated that at least 20-39 species of larger trees and shrubs (>1m) Burke 2003 [24 sp.], Coats Palgrave 1983 [20 sp.], Craven and Marais (1986) [23 sp.], Curtis and Mannheimer 2005 [39 sp.], Mannheimer and Curtis 2009 [26 sp.], Van Wyk and Van Wyk 1997 [20 sp.] occur in the general Walvis Bay/Swakopmund, central coastal Namibia, area.

Southern Namib

According to Giess (1971) the Southern Namib stretches from the Swakop River southwards until Lüderitz. *Stipagrostis sabulicola* (tough dune grass) occurs with *Trianthema hereroeensis* on the dunes while the inter-dune flats (streets) are covered with *Stipagrostis gonatostachys* after rains. The eastern inland sections – pro-Namib – are dominated by *Stipagrostis obtusa* and *S. ciliata* after rains while the plains closer towards the coast are dominated by *Mesembryanthemum cryptanthum* (Giess 1971).

An interesting feature of the coastal areas is the extensive formation of gypsum crusts in the soil as a result of sulphur releases during upwelling events in the ocean in the past. These substrates support the most diverse lichen fields in the world (Burke 2003). Namibia has some of the rarest and most interesting species of lichens in the world although many have still not been officially described (Craven and Marais 1986).

Table 5.5 indicates the trees and shrubs known and/or expected to occur in the general Walvis Bay/Swakopmund area and are derived from Curtis and Mannheimer (2005) and Mannheimer and Curtis (2009). Some species indicated to possibly occur in the area

according to Coats Palgrave (1983) and Van Wyk and Van Wyk (1997) are excluded here. Species indicated by Curtis and Mannheimer (2005) below are known from the quarter-degree square distribution principle used and don't necessarily occur at the coast or at Walvis Bay, but rather in the general area. Trees and larger shrubs likely to occur in the general area indicated by Burke (2003) (trees, shrubs and stem succulents) and Craven and Marais (1986).

Table 5.5. Tree/shrub diversity known and/or expected to occur in the general Kuiseb delta and dune belt area – i.e. Walvis Bay and Swakopmund areas.

Species: Scientific name	Expected: Curtis and Mannheimer (2005)	Expected: Mannheimer and Curtis (2009)	Expected: Burke (2003)	Expected: Craven and Marais (1986)	Status
<i>Acacia erioloba</i>	√	√	√	√	Protected (F)
<i>Acacia reficiens</i>	√	√		√	
<i>Acacia tortilis</i>	√	√			
<i>Acanthosicyos horridus</i>	√	√	√	√	Protected (F)
<i>Adenia pechuelii</i>	√				Endemic
<i>Adenolobus garipensis</i>	√	√	√		
<i>Adenolobus pechuelii</i>			√	√	
<i>Aloe asperifolia</i>				√	
<i>Aloe dichotoma</i>	√				NC, C2
<i>Aptosimum spinescens</i>			√		
<i>Arthroerua leubnitziae</i>			√	√	Endemic
<i>Asclepias buchenaviana</i>				√	
<i>Barleria lancifolia</i>			√		
<i>Boscia foetida</i>	√		√		
<i>Cadaba aphylla</i>	√				
<i>Calicorema capitata</i>			√		
<i>Combretum imberbe</i>	√	√			Protected (F)
<i>Commiphora dinteri</i>	√				Endemic
<i>Commiphora glaucescens</i>	√		√		
<i>Commiphora oblanceolata</i>	√				
<i>Commiphora saxicola</i>	√		√	√	Endemic
<i>Commiphora tenuipetiolata</i>	√				
<i>Commiphora virgata</i>	√				Endemic
<i>Commiphora wildii</i>	√	√			
<i>Cordia sinensis</i>		√			
<i>Cyphostemma currorii</i>			√		
<i>Dyerophytum africanum</i>			√		
<i>Euclea pseudebenus</i>	√	√	√	√	Protected (F)
<i>Euphorbia damarana</i>	√				Endemic C2
<i>Euphorbia guerichiana</i>	√				C2
<i>Euphorbia virosa</i>	√		√		C2
<i>Faidherbia albida</i>	√	√		√	Protected (F)
<i>Ficus cordata</i>		√			Protected (F)
<i>Ficus sycomorus</i>	√	√			Protected (F)

<i>Grewia tenax</i>	√	√			
<i>Gymnosporia senegalensis</i>	√				
<i>Hoodia currorii</i>			√	√	
<i>Hyphaene petersiana</i>	√				
<i>Ipomoea adenioides</i>				√	
<i>Lycium bosciifolium</i>	√	√			
<i>Lycium cinereum</i>	√	√		√	
<i>Lycium hirsutum</i>	√	√			
<i>Lycium pumilum</i>		√			
<i>Lycium tetrandrum</i>		√			
<i>Maerua juncea</i>	√				
<i>Maerua schinzii</i>	√		√		Protected (F)
<i>Monechma cleomoides</i>			√		
<i>Moringa ovalifolia</i>			√		
<i>Parkinsonia africana</i>	√	√		√	Protected (F)
<i>Pechuel-Loeschea leubnitziae</i>		√		√	
<i>Petalidium setosum</i>			√	√	
<i>Rhus marlothii</i>	√				
<i>Salsola</i> sp. <i>S. arborea</i> , <i>S. aphylla</i> , <i>S. nollothensis</i>	√	√	√	√	
<i>Salvadora persica</i>	√	√	√	√	
<i>Sarcocaulon marlothii</i>				√	
<i>Searsia marlothii</i>		√			
<i>Tamarix usneoides</i>	√	√	√	√	Protected (F)
<i>Tetragonia reduplicata</i>				√	
<i>Welwitschia mirabilis</i>	√	√	√	√	NC, C2
<i>Zygophyllum stapfii</i>		√		√	

Endemic (Craven 1999)

F – Forestry Ordinance No. 37 of 1952 and/or Forest Act No. 72 of 1968 (Curtis and Mannheimer 2005, Mannheimer and Curtis 2009)

NC – Nature Conservation Ordinance No. 4 of 1975 (Curtis and Mannheimer 2005, Mannheimer and Curtis 2009)

C2 – CITES Appendix 2 (Curtis and Mannheimer 2005, Mannheimer and Curtis 2009)

According to Curtis and Mannheimer (2005) and Mannheimer and Curtis (2009) between 26 and 39 species of larger trees and shrubs are known and/or expected to occur in the general Walvis Bay/Swakopmund area although not all at the coast, but rather inland and/or associated with rocky outcrops or the Kuiseb and Swakop Rivers.

Six species of trees and shrubs (15.4%) expected to occur in the Walvis Bay/Swakopmund area are classified as endemics, 10 species (25.6%) are protected under the Forestry Ordinance No. 37 of 1952 or Forest Act No. 72 of 1968, 2 species (5%) are protected under the Nature Conservation Ordinance No. 4 of 1975 while 5 species (13%) are classified as CITES Appendix II species. *Arthroa leubnitziae* is endemic to the fog zone in the central Namib region (Burke 2003).

5.4.3.2 Grass Diversity

It is estimated that up to 48 grasses – 6 to 37 species – (Burke 2003 [6 sp.], Curtis and Marais 1986 [5 sp.], Müller 2007 [21 sp.], Müller 1984 [24 sp.], Van Oudshoorn 1999 [37 sp.]) occur in the general Walvis Bay/Swakopmund, central coastal, Namibia area.

Southern Namib

Desert grasses are dominated by the genus *Stipagrostis* (Lovegrove 1999). *Stipagrostis sabulicola* (tough dune grass) occurs with *Trianthema hereroeensis* on the dunes while the inter-dune flats (streets) are covered with *Stipagrostis gonatostachys* after rains. The eastern inland sections – pro-Namib – are dominated by *Stipagrostis obtusa* and *S. ciliata* after rains (Giess 1971, Lovegrove 1999). Possibly the most common and well adapted grass in the Walvis Bay/Swakopmund area is the hardy salt loving *Odyssea paucinervis* (Müller 1984, Van Oudtshoorn 1999).

Table 5.6 indicates the grasses known and/or expected to occur in the general Walvis Bay/Swakopmund area and are derived from ¹Müller (1984), ²Van Oudtshoorn (1999), ³Burke (2003), ⁴Curtis and Marais (1986) and ⁵Müller (2007).

Table 5.6. Grass diversity known and/or expected to occur in the general Kuiseb delta and dune belt area – i.e. Walvis Bay and Swakopmund areas.

Species: Scientific name	Status	Ecological Status	Grazing Value
^{2,5} <i>Antheophora pubescens</i>		Decreaser	High
² <i>Aristida adscensionis</i>		Increaser 2	Low
² <i>Aristida congesta</i>		Increaser 2	Low
^{2,5} <i>Bachiaria deflexa</i>		Increaser 2	Average
^{2,3} <i>Cenchrus ciliaris</i>		Decreaser	High
^{1,2,3} <i>Centropodia glauca</i>		Decreaser	High
^{1,2} <i>Chloris virgata</i>		Increaser 2	Average
^{2,4} <i>Cladoraphis spinosa</i>		Increaser 1	Average
^{1,2,5} <i>Cynodon dactylon</i>		Increaser 2	High
^{1,2} <i>Dactyloctenium aegyptium</i>		Increaser 2	Average
^{1,2} <i>Enneapogon cenchroides</i>		Increaser 2	Low
^{1,2,3} <i>Enneapogon desvauxii</i>		Intermediate	Average
^{1,2} <i>Enneapogon scaber</i>		?	Low
² <i>Enneapogon scoparius</i>		Increaser 2	Low
^{1,5} <i>Entoplocamia aristulata</i>		Intermediate	Low
^{1,5} <i>Eragrostis annulata</i>		Increaser 2	Low
² <i>Eragrostis cilianensis</i>		Increaser 2	Low
^{1,2,5} <i>Eragrostis echinochloidea</i>		Increaser 2	Average
² <i>Eragrostis lehmanniana</i>		Increaser 2	Average
^{2,3,5} <i>Eragrostis nindensis</i>		Increaser 2	Average
¹ <i>Eragrostis omahekensis</i>	Endemic	?	Low
^{1,5} <i>Eragrostis porosa</i>		Intermediate	Low
² <i>Eragrostis rotifer</i>		Intermediate	Low
^{2,5} <i>Eragrostis superb</i>		Increaser 2	Average
^{2,5} <i>Fingerhuthia Africana</i>		Decreaser	Average
² <i>Melinis repens</i>		Increaser 2	Low

^{1,4,5} <i>Odyssea paucinervis</i>		?	Low
^{2,5} <i>Panicum repens</i>		Decreaser	High
^{2,4} <i>Phragmites australis</i>		Decreaser	Low
^{1,5} <i>Pogonarthria fleckii</i>		Increaser 2	Low
² <i>Polypogon monspeliensis</i>		?	Average
² <i>Schmidtia kalahariensis</i>		Increaser 2	Low
^{1,2} <i>Schmidtia pappophoroides</i>		Decreaser	High
¹ <i>Setaria appendiculata</i>		Decreaser	High
² <i>Setaria megaphylla</i>		Decreaser	High
^{1,2} <i>Setaria verticillata</i>		Increaser 2	Average
⁴ <i>Sporobolus consimilis</i>		?	Low
² <i>Sporobolus festivus</i>		Increaser 2	Low
⁴ <i>Sporobolus nebulosus</i>		Increaser 2	Low
^{1,2,3,5} <i>Stipagrostis ciliate</i>		Decreaser	High
^{1,2,5} <i>Stipagrostis hirtigluma</i>		Increaser 2	Low
^{1,5} <i>Stipagrostis hochstetteriana</i>		Decreaser	Average
^{1,2,5} <i>Stipagrostis namaquensis</i>		?	Average
³ <i>Stipagrostis sabulicola</i>	Endemic*	?	?
^{1,2,5} <i>Stipagrostis obtuse</i>		Decreaser	High
^{1,2,5} <i>Stipagrostis uniplumis</i>		Increaser 2	Average
^{1,2,5} <i>Tricholaena monachne</i>		Increaser 2	Average
^{2,5} <i>Tragus berteronianus</i>		Increaser 2	Low

Endemic - Müller (1984); Endemic* - Burke (2003)

? – Undetermined in literature

Between 21 and 24 species of grass potentially could occur in the Walvis Bay/Swakopmund area (Müller 1984, Müller 2007). According to Müller (1984) the endemic grass *Eragrostis omahekensis* potentially occurs in the general area although the updated Müller (2007) excludes this species suggesting that it probably does not occur in the area. Burke (2003) describes *Stipagrostis sabulicola* as a “true Namib endemic” which only occurs in the dune fields of the Namib Desert.

5.4.3.3 Important Species

The Kuiseb delta and dune belt area, with the exception of the Walvis Bay and Swakopmund town lands, is formally protected as it falls within the recently proclaimed Dorob National Park. It is furthermore bordered to the east by the Namib-Naukluft Park. Important tree and shrub species in the general Walvis Bay/Swakopmund area are the endemics (i.e. *Adenia pechuellii*, *Arthroa leubnitziae*, *Commiphora dinteri*, *C. saxicola*, *C. virgata* and *Euphorbia damarana*) as well as the species protected under the Forestry Ordinance No. 37 of 1952, Forest Act No. 72 of 1968, Nature Conservation Ordinance No. 4 of 1975 and CITES Appendix 2. However, only *Arthroa leubnitziae* is expected to occur in the Kuiseb delta and dune belt area, although this would be confirmed during

the envisaged fieldwork. The endemic grasses expected in the area include *Eragrostis omahekensis* (Müller 1984) and *Stipagrostis sabulicola* (Burke 2003).

The flagship plant of the Namib Desert is *Welwitschia mirabilis* (Endemic and CITES Appendix II) with the core populations falling outside the formal protected areas is an important species in the general Walvis Bay/Swakopmund area (Burke 2003). However, *W. mirabilis* is not as common along the coast – i.e. dune belt area – as further inland and its presence in the area would have to be confirmed during the fieldwork.

The lichen fields are difficult although some areas have been fenced off for better protection over the last few years. The overall diversity of lichens is poorly known from Namibia, especially the coastal areas and statistics on endemism is even sparser (Craven 1998). More than 100 species are expected to occur in the Namib Desert with the majority being uniquely related to the coastal fog belt. Lichen diversity is related to air humidity and generally decreases inland from the Namibian coast (Schults and Rambold 2007). Off road driving is the biggest threat to these lichens which are often rare and unique to Namibia. Another importance of the lichens is that the endemic Damara Tern often uses these fields as a breeding ground (Craven and Marais 1986). To indicate how poorly known lichens are from Namibia, the recent publication by Schultz *et al.* (2009) indicating that 37 of the 39 lichen species collected during BIOTO surveys in the early/mid 2000's were new to science (i.e. new species), is a case in point.

Acanthosicyos horridus (!Nara) is endemic to the dunes of the Namib Desert and protected under the Forest Ordinance (Burke 2003) and are important as a source of food to the Topnaar community living in the Kuiseb River area. Destruction and/or unscrupulous harvesting thereof would pose a threat to these plants.

All *Aloe* species are protected in Namibia and thus viewed as important plants (Mendelsohn *et al.* 2002). *Aloe* species occurring in the general area may include *A. asperifolia*, *Aloe dichotoma* and *Aloe namibensis* (Burke 2003, Craven and Marais 1986, Rothman 2004) although they are not as common along the coast – i.e. dune belt area – as further inland and their presence in the area would have to be confirmed during the fieldwork. .

Often deserts and plants associated with this marginal area look “dead” although are not, and thus not viewed as important. All desert vegetation serves as a source of habitat for desert dwelling fauna – e.g. arthropods and reptiles. It is certain that many other plant species will be viewed as economically important in the future, especially if viewed as medicinally important.

5.4.4 Conclusion

It is estimated that at least 20-39 species of larger trees and shrubs (>1m) (Burke 2003, Coats Palgrave 1983, Craven and Marais 1986, Curtis and Mannheimer 2005, Mannheimer & Curtis 2009, Van Wyk and Van Wyk 1997) and at least 6-37 (approximately 48 species) grasses (Burke 2003, Müller 1984, Müller 2007, Craven and Marais 1986, Van Oudshoorn 1999) occur in the general Walvis Bay, central coastal Namibia, area. If herbs and “lower” plants (e.g. algae, lichens, etc.) were to be included, this would undoubtedly increase the floral composition of the area tremendously – e.g. more than 100 lichen species are known from coastal Namibia. Although, the focus for this desktop study was limited to the bigger and thus more obvious species of trees, shrubs and grasses, the importance of lichens is also acknowledged.

According to Mendelsohn *et al.* (2002) the average plant production is extremely low, the overall plant diversity (all species) in the general Walvis Bay/Swakopmund area is estimated as <50 species but are limited to “higher” plants. Plant endemism is viewed as “medium” – with between 1-15 endemics expected from the general area.

The general area – excluding Walvis Bay and Swakopmund town lands – is well protected (Maggs 1998, Mendelsohn *et al.* 2002). Areas of concern are the lichen fields and specific species – e.g. endemics (*Arthraerua leubnitziae* etc.) – the under protected *Welwitschia mirabilis* and economically important species such as *Acanthosicyos horridus* (Burke 2003).

All development have potential negative environmental consequences, but identifying the most important flora species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development

5.5 Heritage Resources

The area covering the study area was proclaimed in 1973 as a recreational area. Since it was not proclaimed as a national park, the regulations under the Accommodation Establishments and Tourism Ordinance No. 20 of 1973 were not strict enough to enforce development and off-road driving as well as other recreational activities that proved to be detrimental to the coastal environment (Oliver, 2010). Furthermore, the Kuseb Delta is unparalleled in Southern Africa for its archaeology which provides a continuum of 2000 years, including detailed evidence from the last 250 years (Kinahan, 2008). By 1990s, 235 sites had been identified with 75% being from pre-contact times and 25% showing evidence of contact ranging in age from 15th to 20th century (Kinahan, 2008 & Nyakunu and Ndlovu, 2010). Therefore, the Kuseb Delta has Heritage/Archaeological sites that have been in existence since 2000 years ago, which include customary land, graves, waterholes, elephant tracks and historical art. The Kuseb Delta is also known for its specialised and habitat specific species like Dune Lark and !Nara Melon. However, there are currently conflicting tourism activities involving Off-Road Vehicles (ORVs) (NACOMA, 2010). These tourism activities also lead to the removal of items reducing the archaeological / historical value of the sites which is important to the nation and paramount to the Topnaar people (Nyakunu and Ndlovu, 2010). Figure 5.1 below illustrate historical and archaeology sites in the study area.

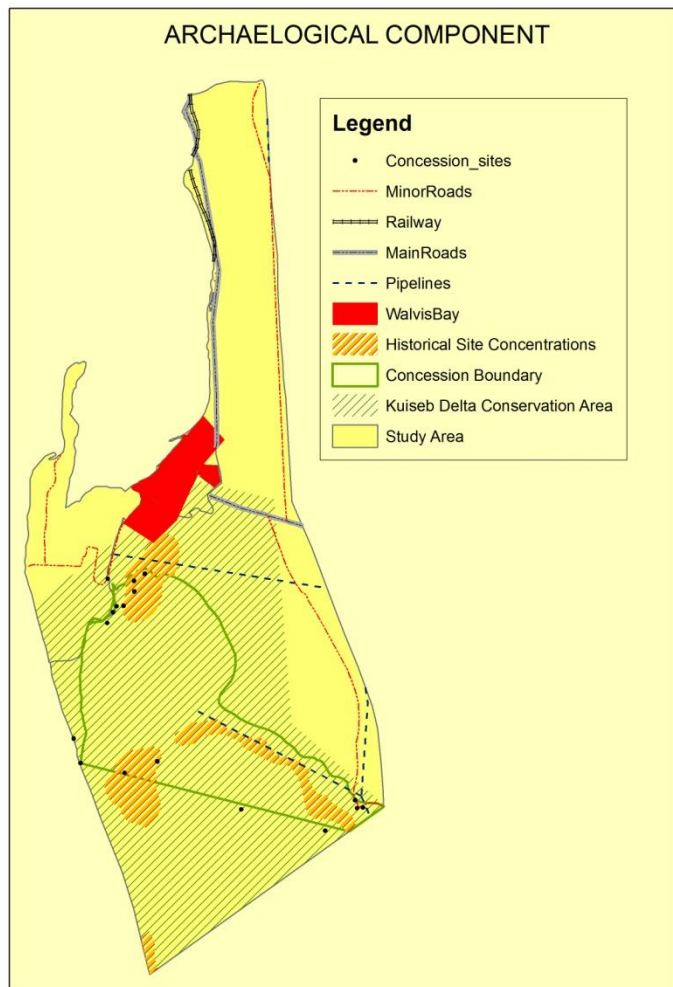


Figure 5.1 Archaeological Setting

The study area has been a traditional range for the Topnaars (“strandlopers”) leading a nomadic lifestyle as hunters and gatherers. However, this range was dramatically reduced by the proclamations of Namib Naukluft and Skeleton Coast National Parks forcing the Topnaars to become permanent settlers. Currently, the Topnaars are marginalized and have only begun to earn income from tourism. They have become a significant part of cultural tourism in Namibia for their donkey carts and cultural performances. A number of operators include visits to the Topnaars in their itineraries. The recent proclamation of community concessions by the Ministry of Environment & Tourism (MET), on which they can earn income from tourism and lead life as a coherent cultural group, holds opportunities to uplift their standard of living (Nyakunu and Ndlovu, 2010).

The Dune belt is a coherent 3-4 km wide zone of relatively high dunes extending along

the 25 km stretch of coastline from Walvis Bay to Swakopmund. The western boundary of the dune area lies approximately 500 m from the seashore (Skov et al, 2007). This coastal “dune belt area” between Swakopmund and Walvis Bay is characterized by unique biodiversity and conservation thereof imperative for Namibia’s biodiversity heritage and sustainable tourism along the coast. The area between the two towns is also part of the newly proclaimed Dorob National Park. However, some areas are set aside for Off-Road Vehicle use for recreational purposes. The area is also frequented by seasonal recreational tourists from inland and abroad, particularly from South Africa. These seasonal or summer recreational tourists practice several leisure activities such as line fishing, water and motor sports, sand boarding, paragliding/sailing, ballooning, and off-road adventures. The use of ORVs, in particular quad-bikes as a hobby and outdoor activity, throughout the year and during peak holiday seasons continues to cause a nuisance to the environment. The NACOMA project through line ministries has drafted draft regulations specific to the Dorob National Park under the Nature Conservation Ordinance No. 4 of 1975 including the Dune Belt area. Several resolutions and proposals have been approved including zonation plans, proclamation of Dorob National Park and off-road vehicles moratorium (Skov, 2007).

5.6 Socioeconomic Environment of the Erongo Region

This section provides a brief introduction on the socio-economic characteristics of the Dorob National Park area for scoping purposes. The information gathered from the literature is based on Erongo Region demographic data. The detailed review of the socio-economic environment for the Kuiseb Delta & Dune Belt Area will be finalised during the EIA. The aim for this review is to identify social and economic trends and anticipate the potential impacts of the proposed community-based tourism project’s on the overall well-being of the region’s population in general and the Topnaars community in particular.

According to NPC (2007), only 0.4% of households in the Erongo Region spend more than 80% of their income on food while 5.3% of households spend 60 – 79% of their income on food. The adjusted per capita income (adjusted for household composition) in the Khomas Region is the highest in the country and set at N\$ 25 427 per annum, while Erongo has the second highest per capita income of N\$ 16 819 per annum. Therefore, Erongo is one of most affluent regions in Namibia (NPC, 2007).

Walvis Bay is located within the web of coastal transportation, communication and utility systems and networks. The following is the summary of the socio-economic and infrastructural settings of the Dorob National Park's Coastal areas and Erongo Region:

- **Governance:** The regional capital of the Erongo Region is Walvis Bay and the region has a total area of 63 586 km²;
- **Population:** Based on 2001 census the region has a total population of 107 663 with 85% of the population living in urban areas;
- **Industries:** Major industries are fisheries, tourism, services, mining and agriculture;
- **Air:** International air connections for both passengers and freight are available at Windhoek's Hosea Kutako International Airport to Walvis Bay. Walvis Bay International Airport is located about 10 km from Walvis Bay and the airport has regular flights to Cape Town, Johannesburg and Windhoek. Direct destinations include the strategic regional hub of Johannesburg, and the European cities of London and Frankfurt. Air Namibia is the national carrier and other international airlines operating in the country are South African Airways, British Airways/Comair, TAAG and LTU. There are also direct flights between Windhoek and Luanda, Lusaka, Harare, Livingstone and Cape Town, as well as domestic flights to local destinations from the Windhoek's Eros Airport.
- **Sea:** As an Operations Base, Walvis Bay, with its world-class standard of cargo handling and sheltered deepwater harbour, is poised to become the most important port on Africa's west coast and a regional container hub for southern Africa. The completion in 2000, of the deepening process and the building of a new enlarged container terminal able to handle vessels with a capacity of some 2000 to 2400 TEUs (Twenty-foot equivalent unit, a measure used for capacity in container transportation) put the port on a par with Cape Town and Durban. Container vessels from Europe can save three days' journey time by loading and/unloading in Walvis Bay, rather than Cape Town, while cargoes for central and Southern Africa from elsewhere in the Atlantic region can gain up to seven days by using Walvis Bay and going further overland.

- The dedicated facilities for a range of commodities, including containerised cargo, refrigerated produce, break bulk, dry bulks, and petroleum products. The port currently handles around 2.5 million tons of cargo annually, with an average turnaround time of about 12-18 hours for container vessels. Products include foodstuffs, marble blocks, lead and copper ingots and an annual 500,000 tons of salt. As well as excellent logistical support services, there is a thriving ship repair and marine engineering industry at Walvis Bay. Walvis Bay Port is administered by the Namibian Ports Authority (NamPort), a state owned organization established in 1994, part of whose role is to ensure the smooth operation of cross-border trade. The ports enjoy good industrial relations, with well-motivated workforces, and are able to offer a high standard of stevedoring to complement their modern dockside equipment;
- **Road:** Walvis Bay is well linked to the developed road network covering more than 40,000 kilometres and providing access to the majority of towns in Namibia. The primary route the B2 connecting Walvis Bay and Swakopmund is tarred and link to the Trans-Caprivi Highway which provides an all weather road link between Walvis Bay and Botswana, Zambia and Zimbabwe, as well as the Democratic Republic of Congo. The Trans-Kalahari Highway links Walvis Bay with South Africa's Gauteng industrial heartland via Botswana. Previously this region used Durban as its natural gateway. The highway is also connected to the Maputo Corridor on Africa's east coast, thus providing a transport link across the entire breadth of the continent;
- **Rail:** A national network of railways covering 2, 382 kilometres connects Walvis Bay and Lüderitz with key destinations in Namibia and South Africa. Much of the containerized traffic at Walvis Bay goes by rail, and the port has its own marshalling yard for maximum operational efficiency. Thousands of tons of bulk minerals from mines in South Africa and Namibia are transported directly to the quayside by rail for export;
- **Walvis Bay Corridor:** The Walvis Bay Corridor is the name for a newly constructed network of transport which has opened up access to landlocked southern Africa for destinations west of the continent by the shortest possible route. Completed in 1998, and using the port of Walvis Bay as the trade gateway,

its main arteries are the Trans-Caprivi and Trans-Kalahari Highways. The Walvis Bay to Grootfontein railway line also forms part of the corridor;

- **Telecommunications:** Walvis Bay and Swakopmund are some of the few towns in Namibia that enjoys world class telecommunications system, with telephone and internet connections widely available, thanks to recent substantial investment in the telecommunications infrastructure including the installation of optical fibre cable networks and broadband systems. An international satellite links Namibia to worldwide telecommunications services. A GSM900 network is operated by Mobile Telecommunications LTD (MTC), Namibia first cellular service provider. About 80 per cent of the population is within reach of this network. MTC currently has roaming agreements with 160 countries worldwide, and visitors from these countries can use their GSM900 phones in Namibia without difficulty;
- **Business Services:** The full range of business support services is available in Walvis Bay, including banking and finance, insurance, stock broking, accountancy, general business consultancy, advertising and marketing agencies and conference facilities. The Country has a well-established banking system. The Bank of Namibia is responsible for issuing currency and is the foreign exchange authority, lender of last resort to banking institutions, banker to the Government and the commercial banks and the supervisory authority on financial institutions and monetary matters. Commercial banks operate through a nationwide network of branches and offer a comprehensive range of banking services, including current account and overdraft facilities, term deposits, discounting of bills, foreign exchange and a variety of loan products.
- The major banks also represented in Walvis Bay are Bank Windhoek Ltd., the Nedbank Bank of Namibia Ltd., First National Bank of Namibia and Standard Bank of Namibia Ltd. Most also provide specialised merchant banking facilities. International services are available through inter-bank arrangements. Electronic banking and teller services are available in Walvis Bay and all major centres in Namibia. The Namibian Dollar (N\$) is divided into 100 cents. It is linked to and on a par with the South African Rand (R) which is also legal tender in Namibia. The Namibian Stock Exchange is Africa's second largest in terms of total market capitalization and among the continent's most technically advanced bourses;

- **Energy:** There is a 66 kV power line linking Walvis Bay and Swakopmund. NamPower which has restructured and repositioned itself to address the challenges of a restructured Namibian electricity supply industry is actively pursuing all avenues for increasing electricity generation capacity in the country. The main sources of power are the thermal, coal-fired Van Eck power station outside Windhoek (120 megawatts), the hydroelectric plant at Ruacana Falls (240 megawatts), the diesel driven Paratus power station at Walvis Bay (24 megawatts) and one interconnecting line from Eskom (South Africa) (200 megawatts). To meet the growing power demand, NamPower commissioned the construction of the 900-kilometer, 400kV interconnector power line from Kenhardt in South Africa to Auas near Windhoek in 2000. In terms of the availability of fuels to run the project in the area, the country has a well-established downstream oil marketing infrastructure that is closely linked with South Africa. There are five main companies distributing and marketing fuel products in Namibia.

5.7 Geological Settings

5.7.1 Geomorphology

The study area is characterized by four distinct geomorphological units. The largest by far is the dune field. Other units include inter-dune plains, gravel / coastal plain, river beds and delta, as well as gently undulating plains dotted with rock outcrops.

From the south, the study area cuts across the sand sea of the southern Namib. The eastern section of this area has longitudinal dunes, oriented north-south, and approximately a kilometre apart. They grade into transverse dunes some 8 km from the coast and as the Kuiseb Delta begins to form. These dunes have their slipface oriented mainly to the north, hence providing comparatively favourable climatic conditions for supporting selected desert dwelling fauna or flora and also sheltered from the strong winds blowing predominantly from the south (Figure 5.2). Whereas transverse and barchans dunes cut across the Kuiseb Delta, longitudinal dunes come to a halt at the Kuiseb River. The Kuiseb Delta is up to approximately 15 km wide at the apex (Figure 5.2). It is characterized by a variety of vegetation, including reeds. This betrays a high water table. Dune hummocks occur in the immediate surroundings of the delta.

Transverse and barchans dunes constitute the dune system between Walvis Bay and Swakopmund. Like the dune system south of the Kuiseb River, interdunal plains occur in this unit. Judging from historical data, bases of dunes are generally stable. Common features in the interdune and gravel / coastal planes are patches of vegetated hummocks (Hipondoka, 2011).

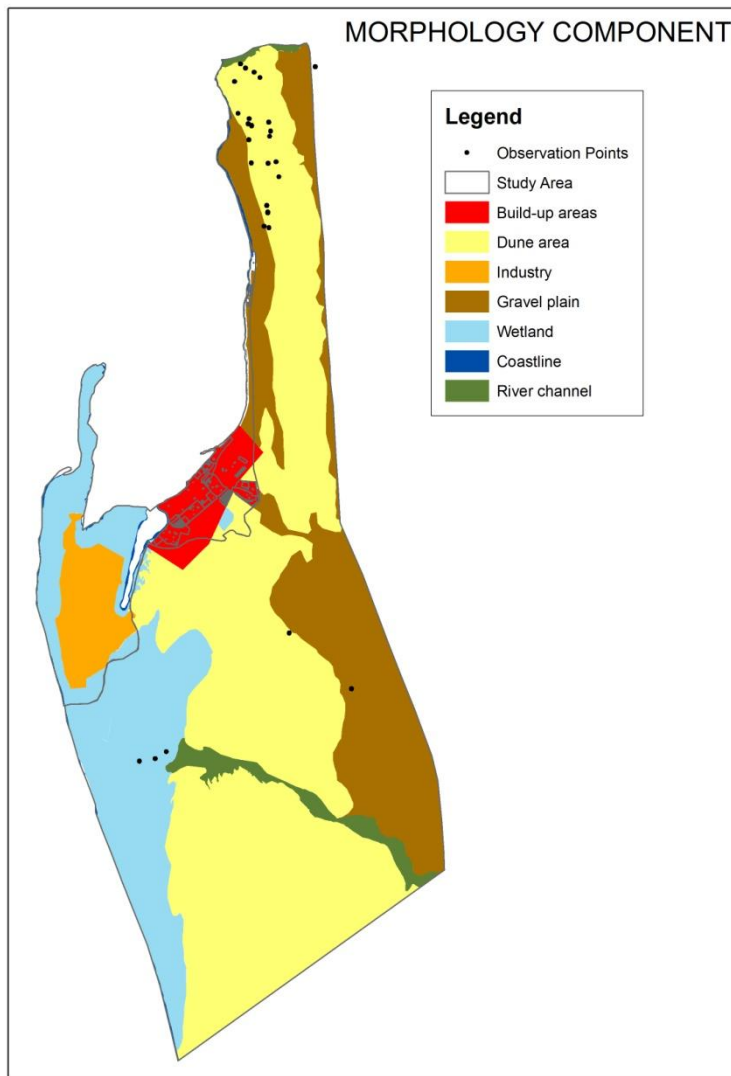


Figure 5.2 Morphology Map

5.7.2 Topography

The proposed study area is highly characterised by sand dunes of the central Namib Sand Sea, which form a narrow coastal belt between Walvis Bay and Swakopmund. On the other hand the area is made up of undulating gravel plains which are seasonally used by the damara tern as breeding areas.

5.7.3 Regional Geology

Regionally, Walvis Bay falls within the Central Zone of the Damara Sequence which underlies most of Central Namibia. The oldest rocks within the Central Zone are the pre-Damaran basement that consists of gneiss and granite lithologies found in different parts of the zone. According to Miller, (1983), the Sequence was deposited during successive phases of rifting, spreading, subduction and continental collision. Much of the basal succession (Nosib Group), laid down in or marginal to intracontinental rifts, consists of quartzite, arkose, conglomerate, phyllite, calc-silicate, subordinate, limestone and evaporitic rocks. Local alkaline ignimbrites with associated subvolcanic intrusions ranging from 840 to 720 million years in age also form part of the regional geology (Miller, 1992).

According to Miller, (1992), widespread carbonate deposition followed and overlapped far beyond early rift shoulders (Kudis, Ugab and basal Khomas Subgroups); interbedded mica and graphitic schist, quartzite (some ferruginous), mass flow deposits, iron-formation and local within-plate basic lava point to fairly variable depositional conditions south of a stable platform where only carbonates with very minor clastics occur (Otavi Group). Near the southern margin of the orogen, deep-water fans, facies equivalents of the carbonates were deposited on either side of a Southern Zone ocean separating Kalahari and Congo Cratons (Auas and Tinkas Formations). Thick schistose metagreywacke and metapelite (Kuseb Formation) overlie the above rocks.

5.7.4 Local Geology

Locally the Walvis Bay area is underlain mainly by biotite schists, quartzites, meta-greywackes, marbles and calc silicates of the Tinkas member of the Karibib Formation, Swakop Group of the Damara. These rocks have been intensely isoclinally folded and locally have a NNE/SSW strike. Dips are generally steep and Salem-type granites and pegmatites have intruded the area, mainly in the West. Karoo-age dolerite dykes intrude the Damara metasediments and trend parallel to the foliation. Surficial sediments of Tertiary to Recent age have been deposited over large parts of the whole of Walvis Bay area, mainly confined to present and paleodrainage features (Ransom, 1981).

The calcareous grit is found around Walvis Bay area comprise relatively of mature sediment containing clasts largely consisting of rounded to subangular quartz and feldspar grains cemented by calcium carbonate. Clasts of Damara metasediments and Karoo dolerite are rarely present. The calcareous grit is preliminarily regarded as the oldest of the surficial sedimentary succession and fills an old paleodrainage feature through which the main present-day Tumas drainage cuts (Ransom, 1981; Bortom, and Ransoh, 1980; Bortom, 1977).

According to Ransom (1981), Bortom and Ransoh (1980) and Bortom, (1977), the other type of surficial deposits found in the Walvis Bay area in general, is the brown calcareous siltstone which is far more immature than the calcareous grit and contains more angular fragments and a higher percentage of mafic minerals. The cement is calcium carbonate and its brown colouration is due to the weathering of mafic minerals. Although it is considered to be younger it is often in direct contact with the basement schist due to overlapping on the edges of minor basins and paleochannels (Ransom, 1981).

The youngest of the surficial sediments is the formation of gypsum which occurs as fibrous veins and as cement to the recent sands, river gravels, and sedimentary breccias. The gypsum appears to be forming at present as a result of the common sulphurous mists blowing off the sea and reacting with the calcareous sediments to form gypsum as a replacement of calcite.

5.7.6 Soils

The soils of the Namib Desert are formed by various processes, both mechanical and chemical. Soils along the coastal parameters have a high concentration of salts and hydrogen sulphide, which has an influence on the fog and in return intensifies chemical processes and soil genesis. Closer to the coast, soils are more likely to be consisting of gypsum while soils further inland are characterised by concrete surfaces. (Christian, 2006)

5.7.7 Water

The study area lies within the most arid part of the country where the mean annual rainfall is less than 50mm per annum. However, due to the good geological setting as well as the

presence of the alluvial aquifers in the Omaruru and Kuiseb Rivers that extend into high rainfall catchment areas, sufficient good quality groundwater is available for different land users in the coastal towns through the water supply scheme (InnoWind Draft Scoping Baseline Report, 2010), (Christian, 2006) and (Heyns et al, 2009) and (Ninham Shand Consulting Services, 2008).

6. ENVIRONMENTAL MANAGEMENT

6.1 Overview

The NACOMA PCO requested that the EIA and EMP for the proposed KDDT and Walvis Bay Bird Paradise community-based activities be compliant with the National regulations. Namibia's Environmental Policy for Sustainable Development and Environmental Conservation (1995) requires that all listed policies, programmes and projects whether initiated by government or the private sector be subjected to an SEA or EIA. The purpose of this policy is seen as: informing decision makers and promoting accountability; ensuring that opinions and alternatives and environmental costs and benefits are considered; striving for a high degree of public participation and involvement of all sectors; incorporating internationally accepted norms and standards; taking into account secondary and cumulative environmental impacts; promoting the user pays principle; and promoting sustainable development.

The Environmental Management Act although not yet implemented provide legal framework for EIA and gives legislative effect to the EIA Policy referred to in the previous paragraph.

6.2 Namibia Environmental Assessment Procedure

Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1995) as well as the Draft Procedures and guidelines for EIA & EMP of 2008 requires the following steps in an Environmental Impact Assessment Procedure (See Figure 1.2):

1. Project Concept / Identification
2. Appoint an Environmental Practitioner
3. Development of Proposal through consultation
4. Application with Baseline Report and Draft Environmental Management Plan for no Formal EIA Process
5. Notification with Baseline Report and Terms of Reference for full EIA
6. Review of Applications / Registrations
7. Full investigation, EIA Report and Draft Environmental Management
8. Plan (Mitigation Plan)
9. Application with Full EIA and Draft Environmental Management Plan

10. Conditions and Approval
11. Record of Decisions
12. Appeal
13. Implementation of proposal
14. Monitoring, auditing and ongoing mitigations

Environmental Management Act 7 of 2007 stress that the twelve principles of environmental management (Part II, Section 3 of Act) should be applied to all projects that may impact on the environment:

- Use renewable resources on a sustainable basis for the benefit of present and future generations
- Involve community in natural resources management and promote and facilitate the sharing of benefits from the use of resources
- Promote Public participation in decisions affecting the environment and ensure that their interests, needs and values are taken into account
- Promote equitable access to environmental resources and consider the functional integrity of ecological systems to ensure the sustainability of the systems and to prevent harmful effects
- Undertake assessments for activities which may have significant effects on the environment or the use of natural resources
- Promote sustainable development in all aspects relating to the environment;
- Protect and respect Namibia's cultural and natural heritage including, its biological diversity for the benefit of present and future generations
- Reduce the generation of waste and polluting substances at source by adopting the option that provides the most benefit or cause the least environmental damage, at cost acceptable by society, in the short and long term
- Promote the reduction, re-use and recycling of waste
- Adopt the "polluter pays principle"
- In cases where there is sufficient evidence which establishes that there are threats of serious or irreversible damage to the environment, lack of full scientific certainty may not be used as a reason for postponing cost-effective measures to prevent environmental degradation
- Prevent damage to the environment and reduce activities which cause such damage limited or controlled.

6.3 Compliance to National and International Requirements

The proposed projects received Matching Grants through NACOMA from the World Bank. Therefore these projects are required as per World Bank requirements to be subjected to an EIA. Moreover, According to the Namibia's EIA procedures the following activities need to take place:

- Submission of Project Proposal
- Registration of the Project with DEA/MET
- Development of Proposal and
- Classification of Proposal

The KDDT and Walvis Bay Bird Paradise will be subjected to the full EIA as their activities fall in the category listed in the Draft Procedures and Guidelines for EIA and EMP "Land use planning and development activities".

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Scoping Study Conclusions

Coastal tourism is a priority economic area for local, regional and national development (NACOMA, 2007). Community-based tourism activities can provide employment but they are also likely to cause social and environmental impact. Biological hotspots, breeding areas, environmental sensitive areas may suffer from uncontrolled tourism development and activities. These impacts however can be effectively mitigated through careful planning and design of sustainable tourism activities.

The likely constraints that may be associated with tourism activities in the study area are:

- Existing tourism infrastructure and the construction processes of tourism structures
- Conflicting overlay activities competing with tourism over similar geographic area. Such conflict may occur between tourism and conservation, farming and mining.
- The surrounding Namib Desert Sand Dunes
- Local biodiversity
- Visual effects especially waste and pollution
- Others to be identified during consultation with full EIA Process to be undertaken

7.2. Scoping Study Recommendations

7.2.1 Full Environmental Assessment

Based on the findings of the scoping study it is recommended that a full EIA and the development of an EMP be undertaken for the proposed eco-tourism and recreational activities in the Kuiseb Delta and Dune Belt area. Draft TOR for the full EIA and EMP include the list of stakeholders, specialist studies to be undertaken, likely positive and negative impacts to be considered as well as draft proposed outline of the EIA and EMP reports.

7.2.2 Aims and Objectives of the Full Environmental Assessment (EA)

The aims and objectives of the full EIA and EMP with respect to the proposed eco-tourism activities in the Kuiseb and Dune Belt areas are:

- To assess all likely positive and negative impacts environmental and social impacts on the local and regional (Erongo Region) and national (Namibia) using

appropriate assessments guidelines, methods and techniques covering the complete project cycle. The EIA and EMP shall be performed in accordance and conforming to national regulatory requirements, process and specifications in Namibia and in particular Ministry of Environment and Tourism and the Namibian Tourism Board as well as draft guidelines for conducting EIA & EMP (MET/DEA, 2008).

- The development of appropriate mitigation of appropriate measures that will enhance the positive impacts and reduce the likely negative impacts anticipated or identified.

7.2.3 Stakeholders

Stakeholders' participation in the EIA process is a critical component in achieving transparent decision-making. Stakeholders' involvement in the EIA process gives all interested and affected parties such as local communities and individuals a voice in issues that may bear directly on their health, welfare, and quality of life. An open flow of environmental information can foster objective consideration of the full range of issues involved in project planning and can allow communities and citizens to make reasoned choices about the benefits and risks of proposed actions (DEA, 20008).

A number of interviews and workshops will be conducted with the members of the local communities and any other stakeholders particularly in Walvis Bay and Institutions from Swakopmund and Walvis Bay. Consultations with stakeholders will cover the following:

- Awareness about the proposed projects
- Expectations of local communities in terms of temporal and permanent contracts/job opportunities as well as local economic benefits
- Worries and concerns of farmers and existing tour operators in Kuiseb Delta and Dune Belt areas
- Views of the various stakeholders, particularly the local communities of Walvis Bay, with respect to the likely positive and negative impacts of the proposed project on the environment and suggestions on the appropriate mitigation measures.

The following is the provisional list of identified interested and affected stakeholders who will be contacted for input/comments to the EIA process:

- MET/DEA/NACOMA
- MET – Parks, CBNRM, Tourism

- Roads Authority
- Ministry of Fisheries and Marine Resources (NATMIRC)
- NACOMA
- Ministry of Regional Local Government Housing and Rural Development
- Erongo Regional Council
- Namibia Wildlife Resorts
- Namibia Tourism Boards
- KDDT and Boards of Trustees
- Topnaars community in the Kuiseb Delta
- Walvis Bay Bird Paradise Caretaker
- Traditional authority
- NamWater
- NamPower
- Coastal Tour Operators Association
- Coastal Environment Trust of Namibia
- Lauberville – in the Kuiseb Delta
- National Heritage Council of Namibia
- Fishing Companies and NamPort (those involved with Topnaars community)
- 18 Tour operators and agencies are identified (Having stake in the KDDT)
- Rossing Foundation/Rio Tinto
- NGOMA Consulting Services
- Local and Tour Operator Organisations and representatives
- Walvis Bay Municipality
- Ministry of Agriculture, Water and Forestry
- National Botanical Research Institute
- Other stakeholders to be identified during newspaper advertisement and to be registered and reflected in the Final EIA report

7.2.4 Specialist Studies to be Undertaken

The specialist studies identified during scoping will be undertaken by specialist consultants and the results of these studies will comprise the full EIA and EMP reports.

- (i) The Archaeology study
- (ii) The Vertebrate Fauna and Flora study
- (iii) Geomorphology study

7.2.5 Likely Positive Impacts to be Considered

The following is the summary of the likely positive impacts that will be assessed at different levels of the current and proposed tourism developmental stages;

- Local and Regional social, economic, and cultural impacts;
- Opportunities for community participation;
- Other issues to be identified during the consultation process.

7.2.6 Likely Negative Impacts to be Considered

The following is the summary of the likely negative impacts that will be assessed at different levels of the existing and proposed tourism activities in the area;

- Current and future land uses, zonation and existing infrastructures and services;
- Threats to biodiversity (habitat alteration and species injury or mortality and disturbance);
- Visual impacts,
- Water use and quality;
- Waste and Sewage management at project sites ;
- Wind situation;
- Tourism activities and quad-biking
- Other issues to be identified during the consultation and full Environmental Assessment process.

7.2.7 Environmental Management Plan (EMP) Considerations

The following is the summary of the likely EMP considerations that will be assessed based on the findings of the EIA:

- Waste and sewerage management
- Wind situation
- Tourism Carrying Capacity

- Facilities and structures at Project sites
- Historic and Archaeology sites
- Implementation of the EMP
- Environmental Awareness and Training
- Off-road Vehicle zones, access and driving
- Tour activities (e.g. hiking and driving trials, archaeology, historical and cultural tourism)
- Dealing with Environmental Complaints Guidance

7.2.8 Proposed Outline of EIA and EMP Reports

The following is the summary of the tentative content lists of EIA, EMP and Final Scoping (Baseline) reports:

VOLUME 1 or Part 1: Environmental Impact Assessment (EIA)

- (xii) EXECUTIVE SUMMARY
- (xiii) PROJECT BACKGROUND
- (xiv) POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK
- (xv) DETAILED PROJECT DESCRIPTION
- (xvi) SOCIO-ECONOMIC ENVIRONMENT
- (xvii) METHODOLOGY
- (xviii) NATURAL ENVIRONMENTS
- (xix) ASSESSMENT OF LIKELY ENVIRONMENTAL IMPACTS
- (xx) ANALYSIS OF ALTERNATIVES
- (xxi) EIA CONCLUSIONS AND RECOMMENDATIONS
- (xxii) REFERENCES

VOLUME 2 OR PART 2: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

- (x) INTRODUCTION TO THE EMP
- (xi) ENVIRONMENTAL POLICIES
- (xii) OBJECTIVES OF THE EMP
- (xiii) THE EMP FRAMEWORK
- (xiv) IMPLEMENTATION OF THE EMP
- (xv) ENVIRONMENTAL MONITORING PLAN

- (xvi) ENVIRONMENTAL MANAGEMENT AND TRAINING
- (xvii) APPENDICES
- (xviii) REFERENCES

VOLUME 3 OR PART 3: FINAL SCOPING REPORT

- (i) EXECUTIVE SUMMARY
- (ii) PROJECT BACKGROUND
- (iii) ENVIRONMENTAL REGULATORY FRAMEWORK
- (iv) DESCRIPTION OF PROPOSED PROJECTS
- (v) BASELINE ENVIRONMENT
- (vi) HERITAGE RESOURCES
- (vii) SOCIO-ECONOMIC ENVIRONMENT
- (viii) GEOLOGICAL SETTINGS
- (ix) ENVIRONMENTAL MANAGEMENT
- (x) CONCLUSIONS AND RECOMMENDATIONS
- (xi) REFERENCES
- (xii) APPENDICES

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9. ANNEXES: Minutes of the Scoping meeting

EIA & EMP for the Kuiseb Delta and the Dune Belt Areas Scoping meeting minutes

First meeting Date: 20 October 2011

Venue: Namib Primary School, Swakopmund

Time: 17h00

Second Meeting Date: 21 October 2011

Venue: Pelican Bay Hotel, Walvis Bay

Time: 17h00

First Meeting – Swakopmund

The meeting started with Mr. Rod Braby introducing the project and presented the main points of the project. Mr. Braby stated that Topnaar community has got a concession to operate tourism activities in the areas and therefore a proper EIA of the activities needs to be done. In this regard the UCCB was consulted by NACOMA to conduct the EIA and EMP studies for the Kuiseb Delta and the Dune Belt area.

Mr. Braby called upon Ms. Magret Angula as the host of the meeting to introduce the purpose for the scoping meeting. Ms. Angula presented a PowerPoint presentation on the draft scoping report. She started by introducing herself and her colleague Ms. Ewaldine Menjono as being from the University of Namibia, Faculty of Humanities and Social Sciences, department of Geography, History and Environmental Studies conducting the meeting and the Scoping meeting under the University's University Central Consultancy Bureau.

Ms. Angula highlighted the reasons of the EIA report as:

- It was strongly recommended by the Erongo SEA
- a need to reconfirm the carrying capacity of the Kuiseb Delta to community based tourism and the Dune Belt Area to various conflicting resource use activities.

The Purpose of the meeting was to **present the Scoping findings**. The Draft Scoping report is available on the NACOMA website and handouts of the presentation were distributed among the present public members.

According to Ms. Angula: - The study commenced in May 2011 and consist of:

- Two completed specialist studies
Archeology study by Dr. John Kinahan

Vertebrae Flora and Fauna by Peter Cunningham

- Geomorphology study conducted in July 2011 by Dr Martin Hipondoka and Johanna Niipele
- The Draft Scoping report

The presentation constitutes the following layout:

- Introducing the study area
- The EIA and EMP teams
- The methodology used
- Scoping Phase
- EIA and EMP Phases.

In her presentation Ms. Angula elaborated on:

- Environmental legislations that are relevant to the study and the study area activities
- Existing and proposed activities in the study area
- Identified stakeholder
- Specialist studies key findings and recommendations
- The likely positive and Negative impacts
- EMP consideration
- EIA and EMP reports outline

During the presentation, especially on the stakeholders, a member of the public suggested that the Salt works be added to the list of stakeholders as they might provide useful information and comments on the study area, although their activities are not within the area.

After her presentation, Ms. Angula opened the floor for comments from the public.

Comment (C) and Respond (R)

C – There are ships going through the study area, were they listed in the stakeholders

R – The area in question falls into the Walvis Bay municipal area,

C – Transnamib to be included as a stakeholder as there are railways passing trough the area.

R – Yes thank you. A lot of stakeholders in that area, also the airport

C – Just want to know if the municipality of Swakopmund covers the Roads authority, will the Ministry of works not be part of the stakeholders since there are some roads

R – Thanks it is going to be added the Ministry of Works and Transport (transport section).

C – NBC to put up towers, don't know if they going to put up on Dune 7 to go digital in the year 2015

R Know of the 4 towers that were going to be put at Rössing mountain, Etosha (Okaukuejo and Halali) and Torra Bay (all protected areas), I (Rod Braby) pointed out to them not to and was told they will look into it.

C – Quarries are there any quarries in the National park that might have negative impacts and how is that going to be resolved. Has the study looked into it?

C – Is there any small scale mining activities in the area? Could have an impact you know.

R – No mining activities found within the study area.

C – What about other productions, like plant, trees, etc.

R - ≠Nara production. But it is in the feasibility study for the area. Community suggested the use of traditional methods of production to be explored, could be more feasible.

C – Any forms of licensed farming activities?

R – A lot is outside the study area and there are no commercial farms within the area of study.

R – Namport and Uranium mines could have something to say. They might have some activities in the area.

R – Need to go to the Ministry of mines; they should have claims that can help with the location on the different mining activities in the study area.

C – Tourism carrying capacity must be considered when it comes to the EMP. Is that something that the EIA will come up clearly with?

R – Yes but it wont be an exact one but as a guide. The guide should have elements to guide people on whether they have reached the capacity or not, depending on the land or habitat.

C – So if they are planning a mass tourism activity in this area another EIA needs to be done for that specific activity and cannot be guided by this one?

R – Very good question. But according to studies done it was decided that mass tourism is not for the Namib Desert. It is not easy to establish the carrying capacity of an area but these studies can provide a good bench mark for the limit of activities the area can carry.

C – I (Mr. Kauvee) think carrying capacity is a very good point to consider for this study as one of the objectives was to assess the impact of the current activities determine whether the impact was as such that you need to limit the activities for prospective award of concessions. So as an objective you need to come up with a method that will give us an indication of what is the carrying capacity

C – Consider researchers in the area as stakeholders as they might provide more information.

R – Will add them, thanks.

R – I think that's a good point, I think they have done a study on the Topnaars so I think it's a good idea that we consult them

The meeting concluded and closed with a few general discussions and comments on the activities that have got negative impacts on the coastal environment and a further invitation for the next days meeting.

Second meeting – Walvis Bay

Ms. Angula opened the meeting by welcoming everyone and introducing the outline of the scoping meeting for the night. She introduced herself and the organizations she is representing and called upon Mr. Ignatius Kauvee to give introduced NACOMA and what they do and why they do what they do.

Mr. Kauvee introduced himself as the Senior Technical Advisor of NACOMA. He introduced The Namibian Coast Conservation and Management Project (NACOMA) was a 5 year project that was officially launched in March 2006, it is funded by the Global Environmental Facility (GEF) and co-funded by the Government of the Republic of Namibia (GRN); implemented by the GRN (through National Planning Commission) and the World Bank on behalf of GEF. The project has received a year extension phase, up to April 2012.

He stated that the NACOMA project is part of the GRN's strategy to promote sustainable economic development in the coastal zone and address its local, regional, national and global environmental responsibilities. The project is designed to run parallel with Namibia's decentralization process, which aims to transfer more responsibility and authority to the Regional Councils and Local Authorities.

After introducing the NACOMA project and its team Mr. Kauvee gave the floor back to Ms. Angula, who opened the floor for some comments from the public.

C – Where did you get your information form? Did you consult people on the ground like tourists or tour guides?

R – We did a desk study where we did a literature review because a number of studies have been done in the area. Specialist studies did field work. But the stakeholders' consultation has not yet been done. It will be done after the scoping meeting after more stakeholders have been identified in the meeting.

C – The stakeholders need to be consulted as it is good to get information from people on the ground that knows the area. The study might not be valid after 5 years. Nothing done on desktop in this country lasts (*John- Photo Ventures*)

After those comment and responds Ms. Angula resumed with the PowerPoint presentation on the Introduction of the Scoping meeting and the Draft Scoping report findings.

During the presentation a question was asked if it is possible to get copies of the specialise reports. And it was promised that they will be put on as soon as the whole study is complete so that it can be a complete package.

Information was also presented form the public that there came people doing research saying they are form UNAM and the public wanted to know if it is true. After a brief discussion on the subject it was concluded that NACOMA will see if they can find anything about it just in case something fishy is being planed in the area. It was concluded that actually no one knows anything about that and Ms. Angula continued with her presentation.

After the presentation the floor was opened for public comments:

C – Consider local authority regulations because of Walvis Bay Bird Paradise falls within municipal boundaries and it can cause waste, use water and so on.

-there are some mining activities taking place in the Dune Belt. Look at regulations that deals with mining

-look at Tourism regulations

(*David Uushona- Walvis Bay municipality*)

C- Look at the fisheries act due to the agricultural and fishing activities (*John Paterson- CETN*)

C- You deal with the area on the land and not where the sea meets the land. There are activities such as surfing that people do all along the lagoon. People park on the land and do activities on the sea. (*Susan Roux- CETN/KBMC*).

C – NACOMA, are you busy with the sea or only land?

R – We have got our toes on the sea but our feet on the land. We do deal with fisheries issues, but this EIA is looking for issues on the land. (Rod Braby - NACOMA).

C – I will assume that the two projects, the Kuiseb Delta and the Bird Paradise were found feasible, that is why we are in the environment phase? (*David Uushona- Walvis Bay municipality*).

R – We are confirming the feasibility (*Mr. Kauvee- NACOM*) and how the projects can be feasible (*Ms. Angula – UCCB/UNAM*).

C – Consider rural constituency council as stakeholders.

- Look at sand movement studies because some of the archeological sites might have been covered by sand.

(*David Uushona- Walvis Bay municipality*)

R – Yes we have a geomorphology study, we just did not call it a specialist study but it is one of the components (*Ms. Angula – UCCB/UNAM*).

C – It shows that the specialist studies have only concentrated on the Kuiseb Delta area and not so much on the Dune Belt area, but there are horse graves which are also of heritage importance. (*David Uushona- Walvis Bay municipality*)

C – The area just south of Walvis Bay, is that all John Kinahan identified? Nothing north of Walvis Bay up to Swakopmund? (*Susan Roux- CETN/KBMC*).

R – It is obviously an archeological site. But maybe he ranked it of less importance in his ranking, maybe it is of low importance. I think the Dune Delta has been studied extensively more than the other side, could be another reason. (*Rod Braby - NACOMA*).

C – Looking at density and tourism dynamics the Dune Belt, is visited more and will be affected more. (*Susan Roux- CETN/KBMC*)

C – UNAM must maybe take it up with Mr. Kinahan (*Mr. Kauvee- NACOM*).

C – The issue of signage in the area should be looked at (*David Uushona- Walvis Bay municipality*).

R – Yeah maybe I just did not mention it, but one of the recommendations was to put something like a museum or information center where there is more information on the area. Maybe it will stop people from wanting to explore and touching things on the site (*Ms. Angula – UCCB/UNAM*).

C – John Kinahan once said to me, if he's got a place he thinks is of importance he won't tell anyone about it. And up to today he has sites that he is keeping a secret. I personally agree with

him. One must weigh up the sensitivity, value, the risk of the site and see if it worse putting it up for educational purposes or tourism activities (*Susan Roux- CETN/KBMC*).

C – One should identify areas that have not been proclaimed. Some areas of heritage importance do not have any status and therefore they are not protected by any laws. I recommend the whole site should be proclaimed (*David Uushona- Walvis Bay municipality*).

R – A map is included to show the whole area proposed as a conservation area and this map covers the whole area (*Ms. Angula – UCCB/UNAM*).

C – I read the report by Dr. John Kinahan and he said they are very sensitive and no one should know about them, referring to some of the areas of sensitivity (*Fanny du Preez – Kuiseb Delta Adventure*).

C – To add to the likely negative impacts in the area look at the distance as a negative impact. Because, in case of an emergency it will be risky and catastrophic if there is no immediate response or close response. (*David Uushona- Walvis Bay municipality*).

C – You say wind situation as a negative impact, but in the past couple of years we have had a water situation Kuiseb Delta flooding just about every year now, affecting example tourism activities. So you can add that to your negative impacts.

- I would like you to add to the stakeholders the KBMC- Kuiseb Basin Management Committee; we deal with the flood contingency plans and so on. So we could help in a small way there. (*Susan Roux- CETN/KBMC*).

C - Sue said about the flooding. I think you need to have a GIS layer of the 2011 flood to guide your planning cause I think what I have seen on the report are areas that are all now under water in your plan, so it would be useful to consider the potential flooding of the river.

- Stakeholders put in the Phosphorus mining company (Sandpaper), and keep a close eye on what they are doing and what they are planning.
- Just a question on the endemics mentioned in the report, is it Namibian endemics or is they endemics to the study area; it was not clear in the presentation maybe it is clear in the report. Because if one is putting endemics in the report one should be clear on that, cause people might think the area has got all that endemics while the once referred to are for the whole country.
- Ticks in the Delta should be taken in consideration. When doing Tick control in camps and so on, how it is going to be done, it might have an impact.
- Methodology – consider doing a thresh analysis of activities currently undertaken and proposed, an analysis of each activity on the environment. It will be a good thing to do; one might come up with good findings.

(*John Paterson- CETN*)

C – I second that notion, because there some activities that goes on here with no known impacts (*Susan Roux- CETN/KBMC*).

C – I think it is better to classify activities according the area they occur, example like this the Dune Belt and these are the activities or this is the Kuiseb Delta and these are the activities. Because it's totally different. (*John Paterson- CETN*)

C – All the things down here. The impact of tourism what they talk about is controlled; people come look at the things take photos appreciate it and leave it. What are not controlled is the local people; these are the guys that do all the damage. They drive everywhere and what we find or see and leave, they pick up then we are coming under the belt. I find people on the dunes and the nature conservation desk told me, sorry it's my weekend of I can't come. Where are the municipal lines where are the defined lines, no body can tell you. And the operators who drive there with cars or quad bikes drives in a straight line it's from one of the rules. But we cannot operate and go by law and the guy next door drive everywhere and the whole mess falls back on tour operators. We just want to know now were we stand as ever thing now falls on us, we are the culprits

(H Neethling - Photo Ventures)

R – Yeah but you can also get people, you get even a corrupt policeman.

C – In the Kuiseb Delta we take guests there almost every day. So I would like us to be put up there somewhere. Because can provide a lot of input, positive input, but we don't belong anywhere, we don't belong to a tour operate association or whatsoever.

C - I think there is a problem with the setting of these committees that have been set up. To try and get representatives of each group with C10, they are supposed to represent tour operators (*Du Preez- Kuiseb Delta Adventures*).

C – Has anybody studied the Topnaar trust, how are they going to operate. Where is the money going to, is it going to the community?

R – There was a meeting held at Cashmere, where they tried to explain the trust, who is benefiting and so on through Polytechnic. Filming activities where not mentioned in your list of activities, I think you should add it on. Let's also look at the big issues on climate change that might impact our activities in the area. (*David Uushona- Walvis Bay municipality*).

The meeting concluded and closed with a few general discussions and comments on the activities that have got negative impacts on the coastal environment and legal issues concerning tour operators and the sea at large.

From: Ingrid Scholz
Sent: 21 October 2011 11:47 AM
To: Raili Hasheela
Subject: Please put my name on your mailing list

Good day,

As I had no idea about the meeting last night about the scoping report etc., I would appreciate it if my name can be included on NACOMAs mailing list for any events, meetings etc.

Furthermore please register me as an interested party.

As for any comment:

- How will the EIA and subsequently the EMP be managed and by whom? MET is understaffed and does not really react on reports about misconduct of people.
- How will the ever-increasing waste disposed of at the coast, blown inwards into the dunes or washed up on the beaches be managed? I find this a huge problem now, and it will increase.
- Is there any plan to utilise the Topnaar community in the Kuiseb to eradicate invasive plants and trees like the prosopis? The Swakop River has the same problem, but as it has no community based project, little can be done about it.

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