

FINAL DRAFT

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MEOB BAY TOURISM DEVELOPMENT

Environmental Scoping, Impact Assessment and Management Plan Report

Prepared for: NAMAB (Pty) Ltd.
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Project Number: 311-00642/03
Revision Number: 3
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311-00642/03

MEOB BAY TOURISM DEVELOPMENT ENVIRONMENTAL SCOPING, IMPACT ASSESSMENT AND MANAGEMENT PLAN

Rev	Description	Date
1	Issued as Draft	October 2019
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EXECUTIVE SUMMARY

Meob Bay is located within the Namib Naukluft Park on the west coast of Namibia (Hardap Region) of Namibia. The proposed site is approximately 190 km south of Walvis Bay and 220 km north of Lüderitz.

The proposed project includes the construction and operation of a lodge near Meob Bay. The project will also include upgrades to an existing and operational tented camp, approximately 5 km from the proposed lodge site.

It is expected that most guests will fly to the airstrip at Fischersbrunn and be transported to the lodge by 4x4 vehicle on the tracks already established. Access to the lodge can also be gained from Lüderitz, Kanaan, Elim and Walvis Bay. The combined footprint of the development infrastructure will be approximately 2 ha.

The applicant for the project is Namibian Affirmative Management and Businesses (NAMAB) (Pty) Ltd. NAMAB was established in 2009 to uplift the quality of life for the people of the south of Namibia by providing work opportunities and opportunities for skills transfer.

In 2009 a concession agreement was signed between NAMAB and the Ministry of Environment, Forestry and Tourism (MEFT) to develop the tourism opportunities in the Park.

The Namib Sand Sea was inscribed on the United Nations Educational, Scientific and Cultural Organisation (UNESCO's) World Heritage List on Friday 21st June 2013.

The Environmental Impact Assessment (EIA) is being undertaken in terms of the Namibian EIA Regulations (2012), and the following listed activities (numbering as per the Regulations) are being applied for:

- 1.a. The construction of facilities for the generation of electricity;
- 2.3. The import processing use and recycling, temporary storage, transit or export of waste;
6. The construction of resorts, lodges, hotels or other tourism and hospitality facilities;
- 8.6 Construction of industrial and domestic wastewater treatment plants and related pipeline systems;
- 10.1.g The construction of communication networks including towers, telecommunication and marine telecom lines and cables;
- 10.1.j the construction of masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission, but excluding (i) flag poles; and (ii) lightning conductor poles; and
- 11.2 Construction of cemeteries, camping, leisure and recreation sites.

It is anticipated that the project will create approximately 35 job opportunities during the construction phase (of six to ten months) and approximately 25 job opportunities during the operational phase (of 20+ years).

Services for the project will be basic and comprise the following:

- Water: groundwater from existing wells with a combined maximum abstraction limited to 4,000 litres per day (ℓ/d), treated through reverse osmosis;
- Sewerage Treatment: Clarus Fusion Treatment Plant;
- Electricity: Solar with backup generator; and

- Communication: Very High Frequency (VHF) radio communication system, satellite and wi-fi.

Two site alternatives were investigated, i.e. North and South. The Northern Site was initially chosen as the preferred site because of its proximity to the beach, better views, and because the Southern Site would be in an area of moving dunes. The Northern Site also has an existing well; is closer to the existing airstrip; and accessible with existing roads. However, following the cultural heritage study undertaken in 2022, the probability of the potential impact on the shell middens within the location of the Northern Site was too likely. The alternative Southern Site was therefore selected for use, as it too has an existing well nearby which would serve as the water source, provides similar beach views, has no shell middens nearby and is in closer proximity to the existing tented camp.

A public participation process was undertaken in 2019 – 2020 and included site notices, advertisements and a public review period for the EIA. Additional studies were undertaken in response to comments received, and another round of consultation is being undertaken in 2022.

The environmental impacts have been assessed and took into consideration that the project is proposed within a proclaimed world heritage site, and that certain aspects are of international importance. In that context, the change in land use is considered to be of a high significance. In parallel, the positive socio-economic impacts of jobs and increased tourism can also be considered as high.

Other potential environmental impacts may include contamination of soil or water through accidental spills, over-abstraction of water leading to impacts on fauna and flora and impacts on shell middens. Apart from the change in land use, all negative environmental impacts can be reduced to a low significance with appropriate mitigation measures.

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Annexure G	Marine Biodiversity Specialist Report
Annexure I	Archaeological Reports

ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ALARP	As Low as Reasonably Practicable
BID	Background Information Document
Cl	Chloride
EAPAN	Environmental Assessment Professionals of Namibia
ECC	Environmental Clearance Certificate
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
Ha	hectares
HDPE	High-density polyethylene
HIV	Human Immunodeficiency Virus
I&APs	Interested and Affected Parties
IFC	International Finance Corporation
kg	kilogram
km	kilometres
km/h	kilometres per hour
l	litre
l/h	litres per hour
LDVs	Light Duty Vehicles
LPG	Liquefied Petroleum Gas
m	metre
m/s	metres per second
MCA	Meob Concession Area
MEFT	Ministry of Environment, Forestry and Tourism
MPA	Marine Protected Area
MFMR	Ministry of Fisheries and Marine Resources
NACOMA	Namibian Coast Conservation and Management
Na	Sodium
NAMAB	Namibian Affirmative Management and Businesses (Pty) Ltd
NCE	Namibian Chamber of Environment
NHC	National Heritage Council of Namibia
NNP	Namib-Naukluft National Park
PV	Photovoltaic
PVC	polyvinyl chloride
PPE	Personal Protective Equipment
SEA	Strategic Environmental Assessment
Sms	short message service
STI	Sexually Transmitted Infections
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UV	Ultraviolet
VHF	Very High Frequency
W	Watt

1 INTRODUCTION

1.1 PROJECT OVERVIEW

Meob Bay is located within the Namib Naukluft Park (NNP) on the west coast of Namibia (Hardap Region). The proposed site is approximately 240 kilometres (km) south of Walvis Bay and 270 km north of Lüderitz (Figure 1).

The proposed project includes the construction and operation of a lodge near Meob Bay. The project will also include upgrades to an existing and operational tented camp, approximately 3.7 km from the proposed lodge site. It is expected that most guests will fly to the airstrip at Fischersbrunn and be transported to the lodge by 4x4 vehicle on the tracks already established. Access to the lodge can also be gained from Lüderitz, Kanaan, Elim and Walvis Bay.

The applicant for the project is Namibian Affirmative Management and Businesses (NAMAB) (Pty) Ltd. NAMAB was established in 2009 to uplift the quality of life for the people of the south of Namibia by providing work opportunities and opportunities for skills transfer.

1.2 PROJECT BACKGROUND AND MOTIVATION

In 2009 a concession agreement was signed between NAMAB and the Ministry of Environment and Tourism (MET) in which: *“the ministry wishes to utilise the inherent natural assets of the area on the state land described in the Annex hereto to stimulate economic development”* (MET & NAMAB, 2009). This concession agreement is one of several documents guiding the construction, operation and closure of the proposed development to which this Environmental Impact Assessment (EIA) Report relates.

Other than the regulatory framework of Namibia, the specific documents guiding the development are:

- MET & NAMAB concession agreement (MET & NAMAB, 2009);
- Namib Naukluft Management Plan (MET, 2013a);
- Eco Awards Good Practices Handbook; and
- Namib Sand Sea Management Plan (MET, 2013b).

The last document in the list above was compiled as part of a successful world heritage nomination. The Namib Sand Sea was inscribed on the United Nations Educational, Scientific and Cultural Organisation (UNESCO's) World Heritage List on Friday 21st June 2013.

The NAMAB concession area covers approximately 25 000 square kilometres (km²) of pristine Namib Desert which incorporates the coastline from Sylvia Hill to Conception Bay, and inland towards Solitaire in the north to the Kanaan gate in the south. The entire area is within the NNP.

Since the signing of the agreement, NAMAB has offered exclusive eco-adventures via the three different access routes and constructed a semi-permanent eco-tented camp near Meob Bay. Due to the success of the tourism activities, and in order to cater for clients that require higher class accommodation, NAMAB is proposing to upgrade the facilities of this tourism development as described further in this EIA Report. It is also anticipated that approximately 70 jobs will be created during the construction phase of the proposed lodge.

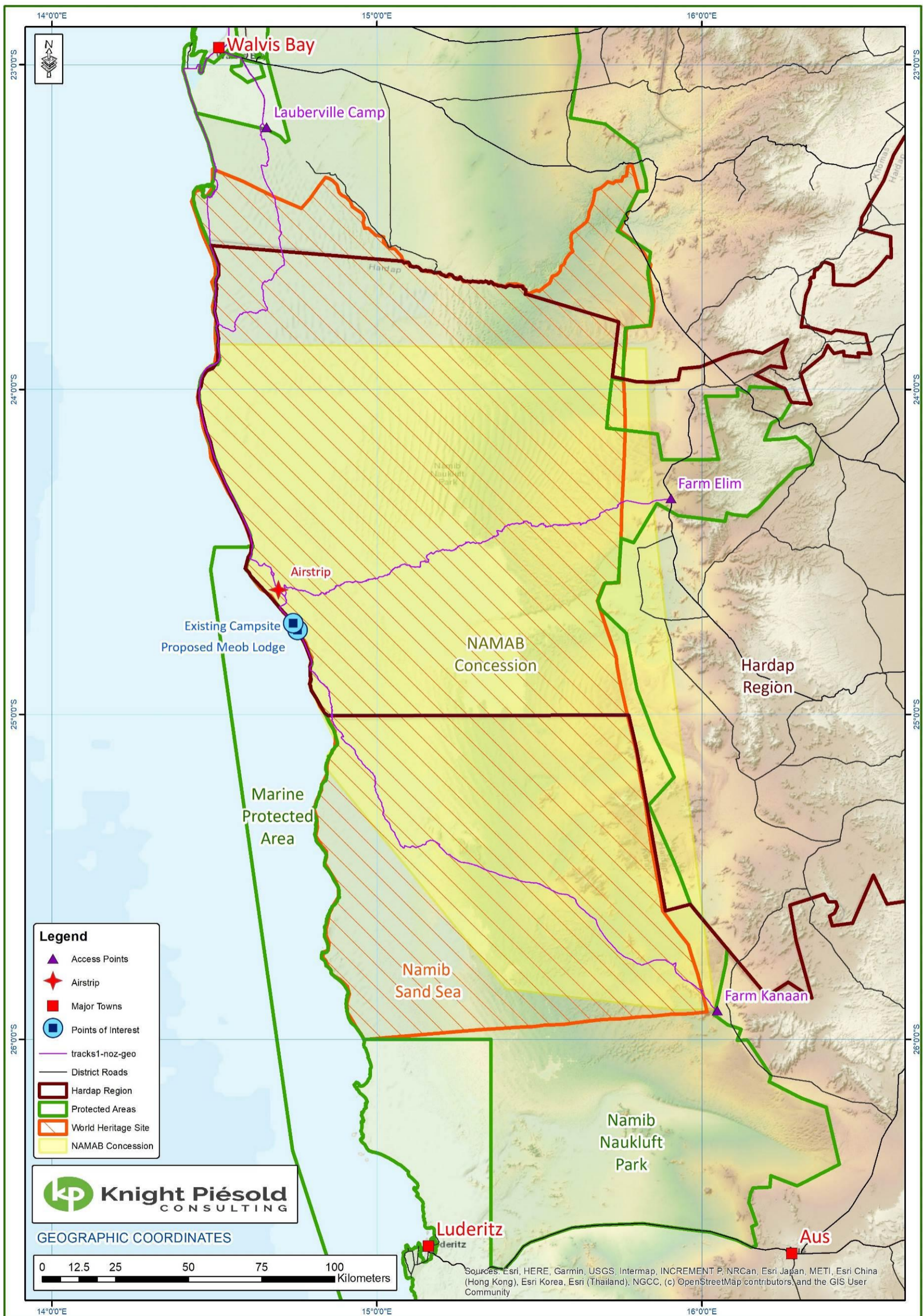


Figure 1: Project location

2 EIA ROADMAP

The EIA was prepared using the requirements of the Namibian EIA Regulations (2012) as well as the Reporting Guideline for Environmental Assessment issued by the MET in 2018. The latter includes a review checklist which is used in this section as a roadmap to locate the sections within the EIA in which the aspects, are addressed, as applicable.

Table 1: EIA Roadmap (using MET Reporting Guideline)

	Aspect to be addressed	Section of EIA
1.	Description of the Project	
	The Objectives and Physical Characteristics of the Project	
1.1	Are the need for and objectives of the project explained?	1.2
1.2	Is the programme for implementation of the project described, detailing the estimated length of time and start and finish dates for construction, operation and decommissioning?	5.2
1.3	Are all the main components of the project described?	5
1.4	Is the location of each project component identified, using maps, plans and diagrams as necessary?	Figure 3
1.5	Is the layout of the site (or sites) occupied by the project described? (including ground levels, buildings, other physical structures, underground works , coastal works, storage facilities, water features , planting, access corridors, boundaries)	Figure 4
1.6	For linear projects, are the route corridor, the vertical and horizontal alignment and any tunnelling and earthworks described? The only linear infrastructure is the water pipeline between the existing well and the proposed lodge.	5.4.1.2
1.7	Are the activities involved in construction of the project all described?	5.2
1.8	Are the activities involved in operation of the project all described?	
1.9	Are the activities involved in decommissioning the project all described? (e.g. closure, dismantling, demolition, clearance, site restoration, site re-use, etc.)	
1.10	Are any additional services required for the project all described? (e.g. transport access, water, sewerage, waste disposal, electricity, telecoms) or developments (e.g. roads, harbours, powerlines, pipelines)	5.2.3
1.11	Are any developments likely to occur as a consequence of the project identified? (e.g. new housing, roads, water or sewerage infrastructure, aggregate extraction)	5.4
1.12	Are any existing activities which will alter or cease as a consequence of the project identified?	No
1.13	Are any other existing or planned developments with which the project could have cumulative effects identified? Meob Bay is already a tourist destination with guided 4x4 trails, and the tented camp is an existing camp.	Yes
	The Size of the Project	
1.14	Is the area of land occupied by each of the permanent project components quantified and shown on a scaled map? (including any associated access arrangements, landscaping and ancillary facilities).	Figure 4
1.15	Is the area of land required temporarily for construction quantified and mapped?	N/A
1.16	Is the reinstatement and after use of land occupied temporarily for operation of the project described? (e.g. land used for mining or quarrying)	5.2.3
1.17	Is the size of any structures or other works developed as part of the project identified? Architectural drawings with measurements are provided.	Ann B

	Aspect to be addressed	Section of EIA
1.18	Is the form and appearance of any structures or other works developed as part of the project described?	Ann B
1.19	For urban or similar development projects, are the numbers and other characteristics of new populations or business communities described?	N/A
1.20	For projects involving the displacement of people or businesses, are the numbers and other characteristics of those displaced described?	N/A
1.21	For new transport infrastructure or projects generating substantial traffic flows, is the type, volume, temporal pattern and geographical distribution of new traffic generated or diverted as a consequence of the project described?	N/A
1.22	Are all the processes involved in operating the project described? (e.g. manufacturing or engineering processes, primary raw material production, agricultural or forestry production methods, extraction processes)	N/A
1.23	Are the types and quantities of outputs produced by the project described?	N/A
1.24	Are the types and quantities of raw materials and energy needed for construction and operation discussed? Only water and electricity are needed. Building materials will be procured from within Namibia.	5.4.1 5.4.2
1.25	Are the environmental implications of the sourcing of raw materials discussed? A geohydrological study was undertaken to determine the implications on groundwater use.	Ann D
1.26	Is efficiency in use of energy and raw materials discussed? Concession agreement places limitations on water use.	5.4.1
1.27	Are any hazardous materials used, stored, handled or produced by the project identified and quantified?	5.2
1.28	Are the transport of raw materials to the project and the number of traffic movements involved discussed? (including road, rail and sea transport) <ul style="list-style-type: none"> • during construction • during operation • during decommissioning 	Yes
1.29	Is employment created or lost as a result of the project discussed? <ul style="list-style-type: none"> • during construction • during operation • during decommissioning 	5.2.3
1.30	Are the access arrangements and the number of traffic movements involved in bringing workers and visitors to the project estimated? <ul style="list-style-type: none"> • during construction • during operation • during decommissioning 	5.2
1.32	Is the housing and provision of services for any temporary or permanent employees for the project discussed? (relevant for projects requiring migration of a substantial new workforce into the area for either construction or the long term)	5.4.5
Residues and Emissions		
1.33	Are the types and quantities of solid waste generated by the project identified? <ul style="list-style-type: none"> • during construction • during operation • during decommissioning 	5.4.4
1.34	Are the composition and toxicity or other hazards of all solid wastes produced by the project discussed?	N/A
1.35	Are the methods for collecting, storing, treating, transporting and finally disposing of these solid wastes described?	5.4.4

	Aspect to be addressed	Section of EIA
1.36	Are the locations for final disposal of all solid wastes discussed?	5.4.4
1.37	Are the types and quantities of liquid effluents generated by the project identified? (including site drainage and run-off, process wastes, cooling water, treated effluents, sewerage) <ul style="list-style-type: none"> • during construction • during operation • during decommissioning 	5.4.1.3
1.38	Are the composition and toxicity or other hazards of all liquid effluents produced by the project discussed? Sewerage effluent is the only liquid waste relevant to project.	N/A
1.39	Are the methods for collecting, storing, treating, transporting and finally disposing of these liquid effluents described?	5.4.1.3
1.40	Are the locations for final disposal of all liquid effluents discussed?	5.4.1.3
1.41	Are the types and quantities of gaseous and particulate emissions generated by the project identified? (including process emissions, fugitive emissions, emissions from combustion of fossil fuels in stationary and mobile plant, emissions from traffic, dust from materials handling, odours) <ul style="list-style-type: none"> • during construction • during operation • during decommissioning Carbon emissions may increase because of the use of 4x4 vehicles, airplanes, and incineration of biodegradable waste. There will also be dust during construction and because of vehicle entrainment from gravel roads.	5.4.5 8.2.9
1.42	Are the composition and toxicity or other hazards of all emissions to air produce by the project discussed?	N/A
1.43	Are the methods for collecting, treating and finally discharging these emissions to air described?	N/A
1.44	Are the locations for discharge of all emissions to air identified and the characteristics of the discharges identified? (e.g. height of stack, velocity and temperature of release)	N/A
1.45	Is the potential for resource recovery from wastes and residues discussed? The only re-use may be if project is decommissioned, and buildings are dismantled.	5.2.3
1.46	Are any sources of noise, heat, light or electromagnetic radiation from the project identified and quantified? (including equipment, processes, construction works, traffic, lighting, etc.) Construction activities will be undertaken during daylight hours.	N/A
1.47	Are the methods for estimating the quantities and composition of all residues and emissions identified and any difficulties discussed?	N/A
1.48	Is the uncertainty attached to estimates of residues and emissions discussed?	N/A
1.49	Are any risks associated with the project discussed? <ul style="list-style-type: none"> • risks from handling of hazardous materials • risks from spills fire, explosion • risks of traffic accidents • risks from breakdown or failure of processes or facilities • risks from exposure of the project to natural disasters (earthquake, flood, etc.) A detailed health and safety plan (including emergency response) must be compiled by the applicant.	The EMP (Section 9) provides some provision in this regard
1.50	Are measures to prevent and respond to accidents and abnormal events described? (preventive measures, training, contingency plans, emergency plans, etc.)	
2.	Consideration of Alternatives	
2.1	Is the process by which the project was developed described and are alternatives considered	5.5

	Aspect to be addressed	Section of EIA
	during this process described?	
2.2	Is the baseline situation in the No Project situation described?	5.5.1
2.3	Are the alternatives realistic and genuine alternatives to the project?	5.5.2
2.4	Are the main reasons for choice of the proposed project explained, including any environmental reasons for the choice?	5.5.2
2.5	Are the main environmental effects of the alternatives compared with those of the proposed project?	5.5.2
3.	Description of Environment Likely to be Affected by the Project	
	Aspects of Environment	
3.1	Are the existing land uses of the land to be occupied by the project and the surrounding area described and are any people living on or using the land identified? (including residential, commercial, industrial, agricultural, recreational and amenity land uses and any buildings, structures, or other property) Existing land use – protected area and tourism Stakeholder database compiled	Ann D
3.2	Are the topography, geology, and soils of the land to be occupied by the project and the surrounding area described?	7.1- 7.4
3.3	Are any significant features of the topography or geology of the area described and are the conditions and use of soils described?	
3.4	Are the fauna and flora and habitats of the land to be occupied by the project and the surrounding area described and illustrated on appropriate maps?	7.5 7.6
3.5	Are species populations and characteristics of habitats that may be affected by the project described and are any designated or protected species or areas defined?	Ann F Ann G
3.6	Is the water environment of the area described? (including running and static surface waters, groundwaters, estuaries, coastal waters and the sea and including run off and drainage. NB not relevant if water environment will not be affected by the project)	Ann E
3.7	Are the hydrology, water quality and use of any water resources that may be affected by the project described? (including use for water supply, fisheries, angling, bathing, amenity, navigation, effluent disposal)	7.11 Ann E
3.8	Are local climatic and meteorological conditions and existing air quality in the area described? (NB not relevant if the atmospheric environment will not be affected by the project)	N/A
3.9	Is the existing noise climate described? (NB not relevant if acoustic environment will not be affected by the project)	N/A
3.10	Is the existing situation regarding light, heat and electromagnetic radiation described? (NB not relevant if these characteristics of the environment will not be affected by the project)	N/A
3.11	Are any material assets in the area that may be affected by the project described? (including buildings, other structures, mineral resources, water resources)	7.11 Ann E
3.12	Are any locations or features of archaeological, historic, architectural or other community or cultural importance in the area that may be bisected the project described, including any designated or protected sites?	7.8 Ann I1 Ann I2
3.13	Is the landscape or townscape of the area that may be affected by the project described, including any designated or protected landscapes and any important views or viewpoints?	7.5 7.6 Ann F Ann G
3.14	Are demographic, social and socio-economic conditions (e.g. employment) in the area described?	7.7

	Aspect to be addressed	Section of EIA
3.15	Are any future changes in any of the above aspects of the environment that may occur in the absence of the project described? (the so- called Moving Baseline or No Project situation) <i>The only change to the socio-economic environment will be a positive impact of some job opportunities that will be created.</i>	N/A
	Data Collection and Survey Methods	
3.16	Has the study area been defined widely enough to include all the area likely to be significantly affected by the project?	Figure 3
3.17	Have all relevant national and local agencies been contacted to collect information on the baseline environment?	Ann D
3.18	Have sources of data and information on the existing environment been adequately referenced?	11
3.19	Where surveys have been undertaken as part of the Environmental Studies to characterise the baseline environment are the methods used, any difficulties encountered and any uncertainties in the data described? <i>No difficulties or uncertainties were noted by the specialists.</i>	App E to Ann I
3.20	Were the methods used appropriate for the purpose?	App E to Ann I
3.21	Are any important gaps in the data on the existing environment identified and the means used to deal with these gaps during the assessment explained? <i>No gaps in data were noted by the specialists.</i>	N/A
3.22	If surveys would be required to adequately characterise the baseline environment but they have not been practicable for any reason, are the reasons explained and proposals set out for the surveys to be undertaken at a later stage? <i>Physical and desktop surveys were undertaken for ecology, archaeology and geohydrology.</i>	N/A
4.	Description of the Likely Significant Effects of the Project	
	Scoping of Effects	
4.1	Is the process by which the scope of the Environmental Studies was defined described?	4
4.2	Is it evident that a systematic approach to scoping was adopted?	
4.3	Is it evident that full consultation was carried out during scoping?	Ann D
4.4	Are the comments and views of consultees presented?	Ann D
	Prediction of Direct Effects	
4.5	Are direct, primary effects on land uses, people and property described and where appropriate quantified?	8.2.1, 8.2.11 Table 9
4.6	Are direct, primary effects on geological features and characteristics of soils described and where appropriate quantified?	8.2.3, 8.2.4 Table 9
4.7	Are direct, primary effects on fauna and flora and habitats described and where appropriate quantified?	8.2.5, 8.2.6 Table 9
4.8	Are direct, primary effects on the hydrology and water quality of water features described and where appropriate quantified?	8.2.11 Table 9
4.9	Are direct, primary effects on uses of the water environment described and where appropriate quantified?	8.2.11 Table 9
4.10	Are direct, primary effects on air quality and climatic conditions described and where appropriate quantified?	8.2.9

	Aspect to be addressed	Section of EIA
		Table 9
4.11	Are direct, primary effects on the acoustic environment (noise or vibration) described and where appropriate quantified?	8.2.10 Table 9
4.12	Are direct, primary effects on heat, light or electromagnetic radiation described and where appropriate quantified?	N/A
4.13	Are direct, primary effects on material assets and depletion of non-renewable natural resources (e.g. fossil fuels, minerals) described?	N/A
4.14	Are direct, primary effects on locations or features of cultural importance described?	8.2.7 Table 9
4.15	Are direct, primary effects on the quality of the landscape and on views and viewpoints described and where appropriate illustrated?	N/A
4.16	Are direct, primary effects on demography, social and socio-economic condition in the area described and where appropriate quantified?	8.2.11 Table 9
	Prediction of Secondary, Temporary, Short Term, Long Term, Accidental, Indirect, Cumulative Effects	
4.17	Are secondary effects on any of the above aspects of the environment caused by primary effects on other aspects described and where appropriate quantified? (e.g. effects on fauna, flora or habitats caused by soil, air or water pollution or noise; effects on uses of water caused by changes in hydrology or water quality; effects on archaeological remains caused by desiccation of soils)	8
4.18	Are temporary, short term effects caused during construction or during time limited phases of project operation or decommissioning described?	
4.19	Are permanent effects on the environment caused by construction, operation or decommissioning of the project described?	
4.20	Are long-term effects on the environment caused over the lifetime of project operations or caused by build-up of pollutants in the environment described?	
4.21	Are effects which could result from accidents, abnormal events or exposure of the project to natural or man-made disasters described and where appropriate quantified?	
4.22	Are effects on the environment caused by activities ancillary to the main project described?	
4.25	Are indirect effects on the environment caused by consequential development described?	
4.24	Are cumulative effects on the environment off the project together with other existing or planned developments in the locality described?	
4.25	Are the geographic extent, duration, frequency, reversibility and probability of occurrence of each effect identified as appropriate?	
	Prediction of Effects on Human Health and Sustainable Development Issues	
4.26	Are primary and secondary effects on human health and welfare described and where appropriate quantified?	N/A
4.27	Are impacts on issues such as biodiversity, global climate change and sustainable development discussed where appropriate?	8
	Evaluation of the Significance of Effects	
4.28	Is the significance or importance of each predicted effect discussed in terms of its compliance with legal requirement and the number, importance and sensitivity of people, resources or other receptors affected?	8
4.29	Where effects are evaluated against legal standards or requirements are appropriate local, national or international standards used and relevant guidance followed?	
4.30	Are positive effects on the environment described as well as negative effects?	

	Aspect to be addressed	Section of EIA
4.31	Is the significance of each effect clearly explained? Impact Assessment Methods	
4.32	Are methods used to predict effects described and are the reasons for their choice, any difficulties encountered and uncertainties in the results discussed?	
4.33	Where there is uncertainty about the precise details of the project and its impact on the environment are worst case predictions described?	Yes
4.34	Where there have been difficulties in compiling the data needed to predict or evaluate effects are these difficulties acknowledged and their implications for the results discussed? No difficulties were identified by specialists in their studies.	N/A
4.35	Is the basis for evaluating the significance or importance of impacts clearly described?	8
4.36	Are impacts described on the basis that all proposed mitigation has been implemented i.e. are residual impacts described?	8
4.47	Is the level of treatment of each effect appropriate to its importance for the development consent decision? Does the discussion focus on the key issues and avoid irrelevant or unnecessary information?	8
4.48	Is appropriate emphasis given to the most severe, adverse effects of the project with lesser emphasis given to less significant effects?	8
5.	DESCRIPTION OF MITIGATION	
5.1	Where there are significant adverse effects on any aspect of the environment is the potential for mitigation of these effects discussed?	9
5.2	Are any measures which the Developer proposes to implement to mitigate effects clearly described and their effect on the magnitude and significance of impacts clearly explained?	
5.3	If the effect of mitigation measures on the magnitude and significance of impacts is uncertain is this explained?	
5.4	Is it clear whether the Developer has made a binding commitment to implement the proposed mitigation or that the mitigation measures are just suggestions or recommendations?	
5.5	Are the Developer's reasons for choosing the proposed mitigation explained?	
5.6	Are responsibilities for implementation of mitigation including funding clearly defined?	
5.7	Where mitigation of significant adverse effects is not practicable, or the Developer has chosen not to propose any mitigation are the reasons for this clearly explained?	
5.8	Is it evident that the EIA Team and the Developer have considered the full range of possible approaches to mitigation including measures to reduce or avoid impacts by alternative strategies or locations, changes to the project design and layout, changes to methods and processes, "end of pipe" treatment, changes to implementation plans and management practices, measures to repair or remedy impacts and measures to compensate impacts?	
5.9	Are arrangements proposed to monitor and manage residual impacts?	
5.10	Are any negative effects of the proposed mitigation described?	
6.	NON-TECHNICAL SUMMARY	
6.1	Does the Environmental information include a Non-Technical Summary?	Executive Summary
6.2	Does the Summary provide a concise but comprehensive description of the project, its environment, the effects of the project on the environment and the proposed mitigation?	
6.3	Does the Summary highlight any significant uncertainties about the project and its environmental effects?	
6.4	Does the Summary explain the development consent process for the project and the role of EIA in this process?	
6.5	Does the Summary provide an overview of the approach to the assessment?	
6.6	Is the Summary written in non-technical language, avoiding technical terms, detailed data	

	Aspect to be addressed	Section of EIA
	and scientific discussion?	
6.7	Would it be comprehensible to a lay member of the public?	

3 DETAILS OF THE APPLICANT AND CONSULTANT

3.1 DETAILS OF THE APPLICANT

Table 2: Details of the Applicant and Environmental Assessment Practitioner

	Applicant	Environmental Assessment Practitioner
Name of company / organization	NAMAB (Pty) Ltd	Knight Piésold Consulting (Pty) Ltd
Contact person	PW van Zyl	Cilliers Mostert / Lloyd Lynch
Telephone	+264 64 500142	+264 61 307297
Fax	+264 64 500334	+27 11 806 7111
Email	info@namabptyltd.com	llynch@knightpiesold.com
Physical address	430 Bamboes Street Henties Bay Namibia	11 Nelson Mandela Avenue, Klein Windhoek Windhoek
Postal address	PO Box 367 Henties Bay Namibia	PO Box 86062 Eros Windhoek

3.2 DETAILS OF THE ENVIRONMENTAL CONSULTANTS

Knight Piésold is an international consulting company providing engineering and environmental services for the mining, power, water, transportation and construction sectors. Knight Piésold was founded in South Africa in 1921 and has expanded over the world in response to project requirements, with 30 offices established in 15 countries, namely Argentina, Australia, Botswana, Canada, Chile, China, Colombia, Ghana, Namibia, Peru, South Africa, Swaziland, the USA, and Vietnam.

Knight Piésold has an office in Windhoek, Namibia and provide engineering and environmental services to the transportation, mining and water sectors. The team has been involved in various environmental projects across Namibia. Knight Piésold Consulting (Pty) Ltd has been appointed as environmental practitioners to undertake the Environmental study for the Meob Tourism Development.

This report was prepared by Lloyd Lynch and Tania Oosthuizen with inputs from Dr Lima Maartens. It was reviewed by Amelia Briel. Curricula vitae of all contributors are available in Annexure A. Specialist inputs were obtained from Peter Cunningham, John Kinahan, Jessica Meyer, Andrea Pulfrich and Jessica Kempner, all of which are annexed to the EIA.

4 POLICY AND LEGAL FRAMEWORK

The overarching legislative requirements for this EIA report are contained within the Environmental Management Act. The regulations under section 56 of the Environmental Management Act (GN No. 30 of 2012) and the “*List of activities that may not be undertaken without Environmental Clearance*” under section 27 of the Environmental Management Act were published (GN No. 29 and 30 of 2012; Government of the Republic of Namibia, 2012).

Table 3 provides the activities that cannot be undertaken without an Environmental Clearance Certificate (ECC), and which are relevant to the proposed project.

Table 3: Listed activities being applied for

Listed activity	Expected activity
Energy generation, transmission and storage	
1.a. The construction of facilities for the generation of electricity	Domestic solar power will be used to provide low voltage electricity to supply lighting and communication needs.
Waste management, treatment, handling and disposal	
2.3. The import processing use and recycling, temporary storage, transit or export of waste	All waste produced on site will be temporarily stored until it is feasible to transport it off site and dispose of it at the Walvis Bay municipal landfill site
Tourism development	
6. The construction of resorts, lodges, hotels or other tourism and hospitality facilities	The primary components of the project include the lodge and the staff housing areas. The lodge will comprise 10 stand-alone units and a central communal area where food and beverages will be served. The development also includes a tented camp with 20 tented chalets and a kitchen area. The combined development area will be approximately 2 ha.
Water resources development	
8.6 Construction of industrial and domestic wastewater treatment plants and related pipeline systems	The lodge will have sewerage reticulation which will be treated on site with a Clarus Fusion Wastewater Treatment Plant.
Infrastructure	
10.1.g The construction of communication networks including towers, telecommunication and marine telecom lines and cables	A two-way radio communication network has been established for communication between the guides for safety and coordination of activities.
10.1.j the construction of masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission, but excluding (i) flag poles; and (ii) lightning conductor poles.	A mast may be needed to install the radio repeater for the radio communications.
Other activities	

Listed activity	Expected activity
11.2 Construction of cemeteries, camping, leisure and recreation sites	The lodge will be a site of leisure and recreation.

Knight Piésold submitted an application form to the MET (in hard copy and via the online system). Refer to Annexure B for first page of Form 1 which shows application form stamped by the MET with revenue stamps. Figure 2 shows the confirmation email received from MET, in which they advise that an EIA/EMP process must be undertaken.

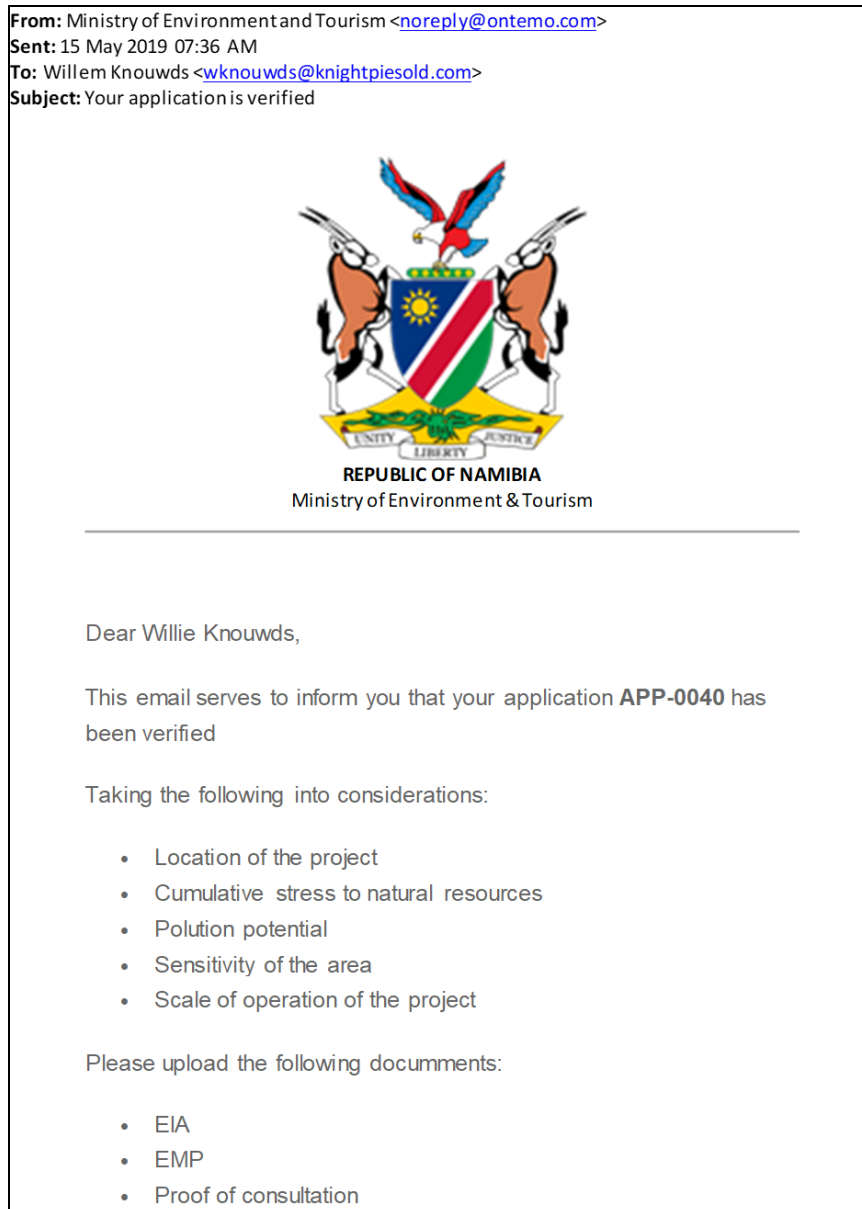


Figure 2: Confirmation of Application

This EIA also recognises that the project is proposed within the context of numerous other legislation, policy and international agreements. Such potentially relevant legislation is listed below. This information has been compiled by Dr Lima Maartens based on her experience as a lead environmental practitioner in Namibia.

Table 4: Other potentially relevant legislation (Dr Lima Maartens)

National Law
Acts of Parliament, Regulations, Ordinances, Proclamations
The Constitution of the Republic of Namibia 1990
Employees' Compensation Act 30 of 1941 (and General Regulations 1961) (Amendment Act 5 of 1995, that came into force on 1 March 1995, amends the Act substantially and changes its name from the Workmen's Compensation Act to the Employees' Compensation Act)
Water Act 54 of 1956 (as made applicable in Namibia)
Sea Shore Ordinance 37 of 1958
Aviation Act 74 of 1962 (as last amended by the Aviation Amendment Act 10 of 1991 and the Aviation Amendment Act 27 of 1998) (and the Namibian Civil Aviation Regulations 2001, as amended by GN 57/2006 (GG 3615) and GN 201/2006 (GG 3741)).)
Soil Conservation Act 76 of 1969 (as amended; Section 13 is amended by the Forest Act 12 of 2001) (and the Regulations 1973))
General Health Regulations (Government Notice 121 of 14 October 1969 as amended)
Accommodation Establishments and Tourism Ordinance 20 of 1973 (and Amendments 25 of 1973, 17 of 1974, 12 of 1975, 5 of 1977, 14 of 1977, 4 of 1978, 11 of 1978 and 14 of 1979) (and the Regulations on Tourist Recreation Areas 1974 and the Regulations relating to Accommodation Establishments and Tourism 1974))
Hazardous Substance Ordinance 14 of 1974 (and the General Regulations 1979)
Nature Conservation Ordinance 4 of 1975 (and the Regulations Relating to Nature Conservation 1976 and the Amendment of Regulations 2010)
Atmospheric Pollution Prevention Ordinance 11 of 1976 (and the Regulations concerning the Form of an Application for a Registration Certificate or Provisional Registration Certificate and the Form of the Registration Certificate and Provisional Registration Certificate 1976)
Regional Councils Act 22 of 1992 (and Amendment Acts 17 of 1997, 30 of 2000, 12 of 2002, 12 of 2010 and the Second Regional Councils Amendment Act 16 of 2010)
Local Authorities Act 23 of 1992 (and Local Authorities Amendment Act 3 of 1997 and Second Amendment Act 14 of 1997, and the Local Authorities Amendment Acts 24 of 2000, 17 of 2002, 14 of 2004, and 2 of 2009) (and the Model Water Supply Regulations 1996, the Model Sewerage and Drainage Regulations 1996, and the Model Electricity Supply Regulations 1996)
Local Authorities Act 23 of 1992 Walvis Bay Municipality: Solid and Hazardous Waste Management Regulations
Social Security Act 34 of 1994 (as amended by the State-owned Enterprises Governance Act 2 of 2006 and the Labour Act 11 of 2007 (and the General Regulations 1995))
Nature Conservation Amendment Act 5 of 1996
Arms and Ammunition Act 7 of 1996 (and the General Regulations 1998)
Affirmative Action (Employment) Act 29 of 1998 (as amended by Act 6 of 2007 and the Labour Act 11 of 2007) (and the General Regulations 1999)
Roads Authority Act 17 of 1999 (and the Roads Authority Amendment Act 20 of 2004)
Namibia Tourism Board Act 21 of 2000 (as amended by the State-owned Enterprises Governance Act 2 of 2006) (and the Regulations relating to the Registration of Regulated Businesses 2004; the Regulations relating to Levy Payable by Accommodation Establishments 2004; and the National

Star Grading Regulations relating to Accommodation Establishments 2012)
Marine Resources Act 27 of 2000 (and the Regulations relating to the exploitation of marine resources 2001; the Regulations to reduce incidental by-catch of seabirds in the hake demersal trawl vessels 2015; and the Regulations to reduce incidental by-catch of seabirds in the hake demersal longline vessels 2015)
National Heritage Act 27 of 2004 (as amended by the State-owned Enterprises Governance Act 2 of 2006) (and the National Heritage Regulations 2005)
Environmental Management Act 7 of 2007 (and the Environmental Impact Assessment Regulations 2012)
Labour Act 11 of 2007 (and the Labour Amendment Act 2 of 2012) (and the Regulations relating to the Health and Safety of Employees at Work 1997; and Labour General Regulations 2008)
Plant Quarantine Act 7 of 2008
Namibian Islands' Marine Protected Area 2009
Disaster Risk Management Act 10 of 2012 (and the Disaster Risk Management Regulations 2013)
Water Resources Management Act 11 of 2013 (promulgated, but not yet implemented)
Public and Environmental Health Act 1 of 2015 (promulgated, but not yet implemented)
Civil Aviation Act 6 of 2016
Policies, Guidelines, National Strategies & Action Plans
Policies
Conservation of Biotic Diversity and Habitat Protection 1994
Namibia: National Code on HIV/AIDS in Employment 2000
National Policy on HIV/AIDS 2007
Policy on Tourism and Wildlife Concessions on State Land 2007
National Policy on Tourism for Namibia 2008
National Policy on Human-Wildlife Conflict Management 2009
National Gender Policy 2010 - 2020
National Health Policy Framework 2010-2020 - "towards quality health and social welfare services"
National Policy on Climate Change for Namibia 2011
The National Policy on Coastal Management for Namibia 2012
National Policy on Filming and Photography in Protected Areas 2013
Guidelines
Draft Water Quality Guidelines and Standards for Potable Water, as well as Water Quality Standards for Effluent 2008
Petroleum Products Regulations, 2000 Guidelines for Consumer Installations
National Strategies & Action Plans
Namibia's Green Plan 1992
Vision 2030 2004
Towards a Coastal Policy for Namibia, Green Paper, 2009
Namibia's 5th National Development Plan (NDP5) – Working together towards prosperity (2017/18)

– 2021/22)
National Parks Environmental Management Plans (EMPs)
Management Plan Dorob National Park Reformatted Final Draft: 05 April 2012 for the Period 2010 - 2017
Management Plan Namib Naukluft Park 2013
Management Plan Namib Sand Sea World Heritage Site 2013 - 2018
Strategic Environmental Assessments (SEAs)
SEA for the coastal areas of the Hardap and //Karas Regions 2012
Good Industry Practice
Good Practices Handbook Eco Awards Namibia 2005
International Law
African Union (AU)
African Charter on Human and Peoples' Rights 1981
Revised (Algiers) Convention on the Conservation of Nature and Natural Resources 2003
Southern African Development Community (SADC)
Protocol on Tourism 1998
Protocol on Fisheries 2001
United Nations (UN) / International Conventions
International Plant Protection Convention (IPPC) 1951 (as last amended in 1997)
Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (The Ramsar Convention on Wetlands) 1971
Declaration of the United Nations Conference on the Human Environment 1972
Vienna Convention for the Protection of the Ozone Layer 1985 and Montreal Protocol on Substances that Deplete the Ozone Layer 1987; Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Adopted at the Fourth Meeting of the Parties at Copenhagen on 25 November 1992; Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Adopted by the Ninth Meeting of the Parties at Montreal on 17 September 1997; and Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Beijing, 3 December 1999
Convention on Biological Diversity (CBD) 1992
United Nations (UN) Framework Convention on Climate Change 1992; Kyoto Protocol to the UN Framework Convention on Climate Change 1997; Paris Agreement (United Nations Framework Convention on Climate Change) 2016
Convention for the Safeguarding of the Intangible Cultural Heritage 2003
Convention on the Protection and Promotion of the Diversity of Cultural Expressions 2005
International Best Practice
International Finance Corporation (IFC) Environmental Health and Safety (EHS) Guidelines 2007 and the EHS Guidelines for Tourism and Hospitality Development 2007

5 PROJECT DESCRIPTION

Information for this chapter was obtained from the Design Report compiled by Knight Piésold in 2019. To avoid duplication of information, the full Design Report is not Annexed to this EIA. However, pertinent information from it, such as the Architectural Drawings is annexed in Annexure C.

5.1 PROJECT OVERVIEW

The proposed project includes the construction and operation of a lodge near Meob Bay, and general workers will reside in staff quarters approximately 600 m from the proposed lodge site. An existing, operational tented camp will be upgraded into accommodation for the pilots and tour guides. Construction workers will reside at a temporary construction camp which has been used as a camp site for over ten years for travellers between Lüderitz and Walvis Bay. It is expected that most guests will fly to the airstrip near Fischersbrunn and be transported to the lodge by 4x4 vehicle on already established tracks. Access to the lodge can also be gained from Lüderitz, Kanaan, Elim or Walvis Bay. Refer to Figure 3 for a view of the proposed lodge, staff quarters and existing tented camp in relation to the existing Fischersbrunn camp and airstrip. Figure 4 provides a detailed view of the proposed lodge development. The combined footprint of the development infrastructure will be approximately 2 ha.

5.2 PROJECT PROGRAMME AND ACTIVITIES

5.2.1 CONSTRUCTION ACTIVITIES

The duration of the construction phase will be approximately six to ten months. The construction activities will entail the building of an eating and reception area, 10 chalets and services. It will also include some upgrading work and activities at the existing tented camp. In terms of the transportation of raw materials to the project, two to three trips per week by Light Duty Vehicles (LDVs) on the 4x4 track is anticipated during the construction phase.

The only hazardous substances used will be liquefied petroleum gas (LPG) for cooking and diesel for back-up energy (generator) and vehicles. The gas and diesel will be transported, stored and handled in terms of the manufacturers' specifications. It is estimated that 60 kilogrammes (kg) of LPG and 200 litres (ℓ) of diesel will be required per month.

5.2.2 OPERATIONAL ACTIVITIES

The duration of the operational phase is expected to be 20+ years. During this phase, the lodge and tented camp will operate with approximately 20 permanent staff members who will reside at the staff quarters near the lodge site. From time to time maintenance activities will be undertaken on the facilities.

During the operational phase, it is expected that tourists will visit the lodge, and undertake recreational activities such as mining town- dune- and shipwreck excursions. In terms of the transportation of raw materials to the lodge, one trip per week with LDVs on the 4x4 track is anticipated during the operational phase. The same quantity of gas and diesel required during the construction phase, will be required in the operational phase.

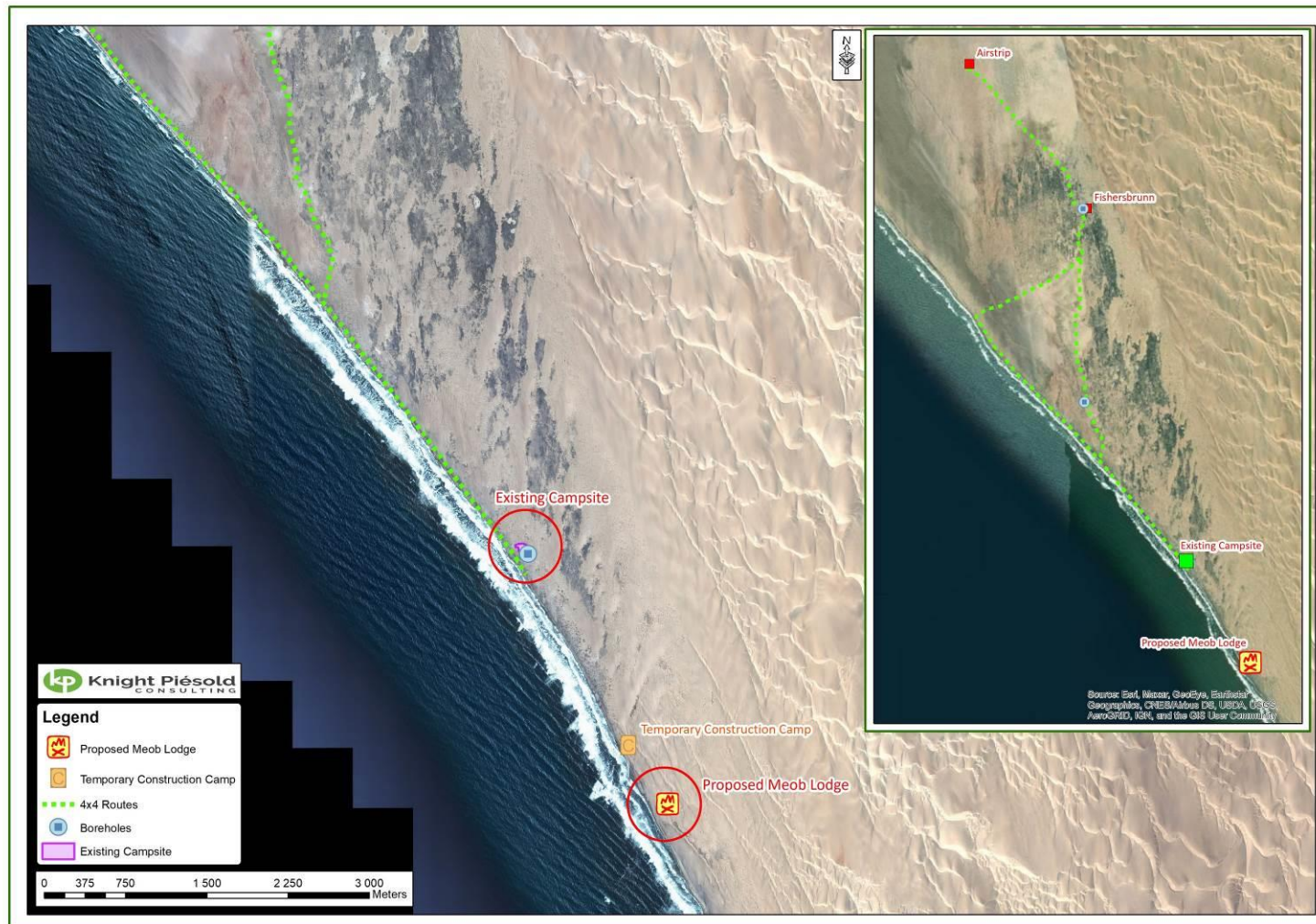


Figure 3: Proposed lodge and existing tented camp in relation to Fischersbrunn and airstrip

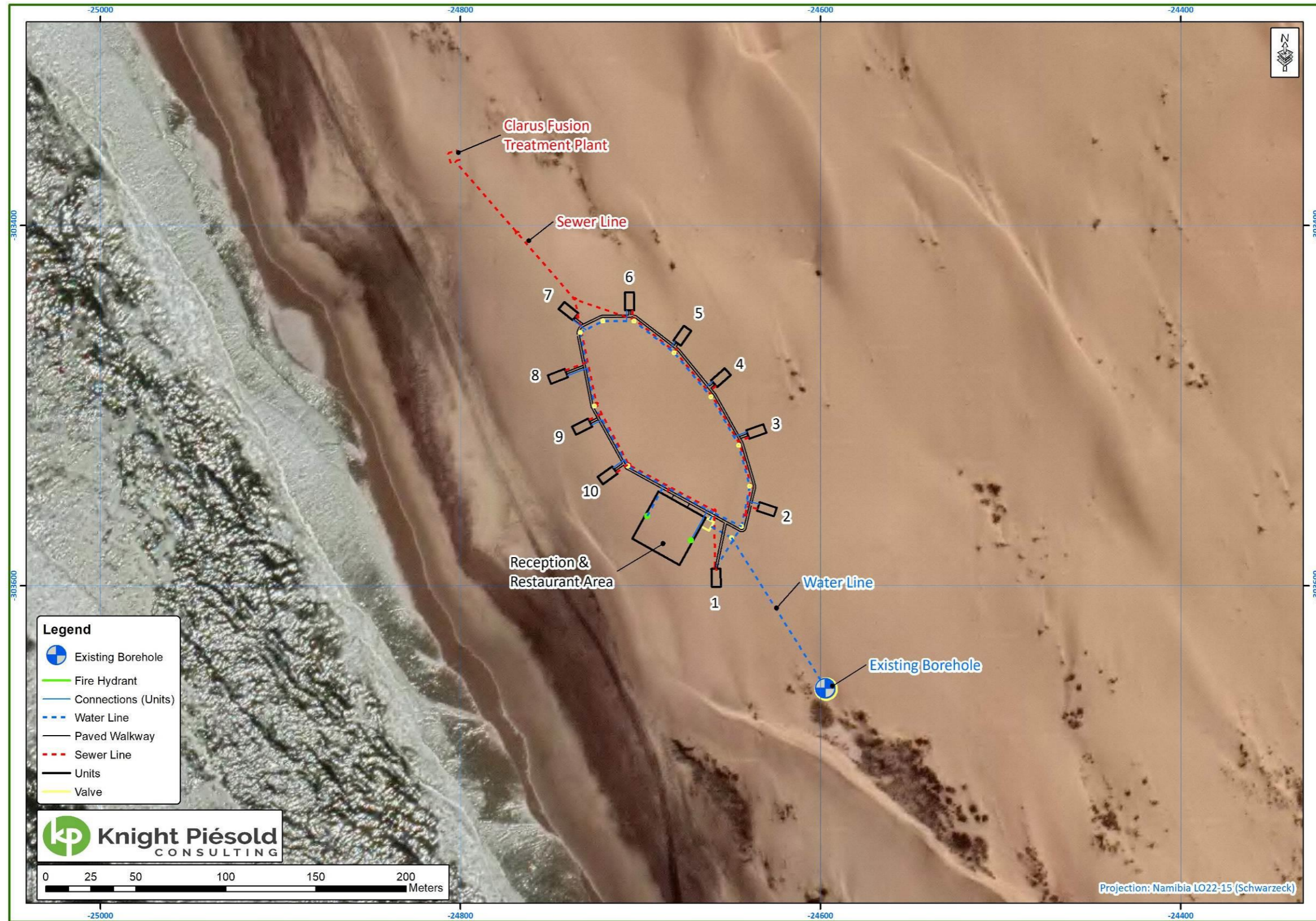


Figure 4: Lodge layout

5.2.3 DECOMMISSIONING ACTIVITIES

Decommissioning activities will take no more than 40 days (in line with concession agreement). Materials will be demolished and removed off-site for re-use and/or safe disposal. Should the project be decommissioned, the project-area will be returned to its natural / wilderness state.

In terms of the transportation of disassembled buildings and materials from the project, two trips per week (4x4 track) is anticipated during the decommissioning phase.

The same quantity of gas and diesel required during the construction and operational phases, will be required in the decommissioning phase.

5.2.4 EMPLOYMENT

It is anticipated that the following number of employment opportunities will be provided during the project phases:

- during construction (+70 workers);
- during operation (+/- 20 staff); and
- during decommissioning (+/- 25 workers).

5.3 STRUCTURES

Structures will be as prescribed in the concession agreement, Annexure 2 – Special Conditions. Clause 20 states the following:

“20. Structures

20.1. No fixed structures may be erected in the Concession Area without written permission from the Minister. All structures must be of a temporary nature, with no concrete or stone foundations and no brick, rock and/or cement and/or concrete walls or floors.

20.2. Where upright poles are used as supports to structures, suitable methods such as gabions may be used to prevent poles from sinking.

20.3. All structures must be appropriate to the prevailing environmental conditions and sited in unobtrusive localities. This includes staff housing, maintenance and storage facilities.

20.4. The outer shell of any structure must blend in and harmonise with the surrounding environment.

20.5. Visitor accommodation must enhance the "sense of place" attraction of the Concession Area.

20.6. No "local" materials, defined as materials taken from a location within the Park, are to be used in any structure without the prior written approval of the Concessor.

20.7. Designs with alternatives, materials lists, along with site plans, and an EIA must be submitted to the Concessor for approval prior to the construction or redevelopment of any new or existing facility.

20.8. Staff quarters, storage facilities, maintenance area and other support facilities must be sited away from and out of sight of visitor facilities bearing in mind prevailing weather conditions.”

No concrete will be used for construction. All structures will be non-permanent and be entirely removable within a period of 40 days.

Construction materials will include wood and lightweight steel. Gabions will be used where required as support for structures.

The architect will be responsible to ensure that the outer shell of any structure blend in and harmonise with the surrounding environment.

5.4 SERVICES

The services required for the Meob project include water and sewerage; electricity; communication; and waste management.

5.4.1 WATER AND SEWERAGE MANAGEMENT

5.4.1.1 WATER SOURCE

The Meob Bay area has shallow groundwater at about 1-1.5 metres (m) below ground level. There are existing wells near the within the project area, located at the Northern Site (Plate 1), at the existing tented camp as well as close to the preferred Southern Site. This water is treated at the tented camp with a small reverse osmosis undercounter system. A groundwater specialist study was undertaken for the purpose of this project and can be found in Annexure E. This study found that the quality of the water after treatment is suitable for drinking. It also determined the safe yield to be extracted in order to not influence the water table and the ingress of saltwater.

The existing well at the tented camp is pumped at a rate of about 800 litres per hour (ℓ/h) using a centrifugal pump.

Water use will be limited to 100 ℓ/person as per the concession agreement. Maximum twenty guests and twenty staff members will stay at the lodge. A maximum of 20 people will stay at the proposed lodge, 30 people will stay at the existing campsite, and a maximum of 30 people (± 17 tents) will stay at the temporary construction camp. Therefore, the total water demand during the construction phase will not exceed 8,000 ℓ/d. After the construction phase, during the operational phase only approximately 6,000 ℓ/d will be required.



Plate 1: Existing well at the existing tented camp

5.4.1.2 WATER DISTRIBUTION

The existing well will be used for the lodge area and will be pumped over a distance of 130 m through a 50 millimetres (mm) High-density polyethylene (HDPE) pipe by a solar pump into a 10,000-litre storage tank near the main Lodge Area. The 10,000-litre tank will be mounted 9 m high on a wooden tank stand. These details are shown on Figure 4. The tank will be concealed, and the water tower could also be used as look-out point. The stand could also be used to mount any communication devices, should it be required.

Water will be distributed from the 10,000-litre tank to the chalets in a 50 mm HDPE pipe with off-takes to each unit consisting of 25 mm HDPE pipes.

A reverse osmosis system will be installed in the kitchen to provide safe water for drinking and cooking. This system can also be used to provide drinking water for the guests in rooms.

The tented camp has an existing 2,500-litre tank mounted on a wooden stand that supplies water to the kitchen and bathroom facilities by 25 mm HDPE pipe. The pump at the tented camp will be upgraded to a solar pump and the tank upgraded to a 5 000-litre tank. Refer to Figure 5 which shows the position of the existing well and tank at the tented camp.



Figure 5: An aerial view of the existing tented camp

The staff quarters will be located near the existing well to be used for the lodge. The staff quarters will also be supplied from the well with a solar pump and panels at the well, feeding a 5,000-litre ground level tank with pressure pump to supply water to the kitchen and bathroom facilities by 25 mm HDPE

pipe. The staff quarters will accommodate 20 staff. It will consist of 10 double rooms, 20 single rooms or a combination thereof and will have a communal kitchen / lounge area.

The temporary tented camp for construction workers is situated about 1.9 km south of the NAMAB Tented Camp. This temporary camp consists of 17 tents and communal area. The camp is serviced by a well with centrifugal pump and 2,500-litre tank similar to the NAMAB tented camp.

5.4.1.3 CLARUS FUSION TREATMENT

The lodge will generate a maximum of 4,000 l/d wastewater. This wastewater will be collected via 110 mm PVC piping and treated by a Clarus Fusion Treatment Plant situated about 100 m from the site. Refer to Figure 6 and Plate 2 for an illustration and photo example of the system. The position of the treatment plant is downwind of the dominant wind direction. The Clarus Fusion is a factory built activated sludge sewerage treatment plant. The plant comprises of a sealed plastic tank that is buried below ground level with only the lid visible. Disinfection of the final product is done by UV sterilisation.

The ZF 1120 DE system will be installed and is able to handle 4,200 l/d.

The same model will be installed at the existing tented camp to replace the septic tank system. At the temporary construction camp, a plastic septic tank system is proposed to collect sewerage.

The Clarus Fusion System has the following advantages:

- Enables the reuse of treated wastewater for purpose of irrigation. Treated wastewater meets the Namibian General Standards;
- Low power consumption (60 Watt (W)) and can work from solar panels;
- Low maintenance and does not require qualified persons. Requires semi-annual maintenance with desludging once every five to six years. Once in operation, very little maintenance is required;
- The system is self-monitoring; an alarm provides a pre-warning;
- Available in solar / DC power;
- Low noise factor as there are no mechanical parts or electrical motors driving pumps;
- Easy installation requiring basic skills. The most important requirement during installation is that the plant is installed level to ensure natural gravitation of water through the system;
- Treated water can also be reused for flushing of toilets, washing of vehicles or dust suppression;
- Moving media bed in aeration chamber prevents sludge build-up having far less maintenance requirements and secondary environmental impacts;
- Out-of-sight and harm's way avoiding any possible visual impact or physical obstruction;
- It does not require a continuous inflow to operate. The Clarus Fusion is the only plant of this nature that can cope with the long breaks while the biomass will remain healthy. All other plants will suffer, and the biomass will die after two to three weeks of no inflow;
- All materials in the septic environment are noncorrosive; and
- Disinfection can be done with either Chlorine dosage, UV sterilisation or Ozone treatment.

The System will be provided with maintenance contract. A six-monthly service is required.

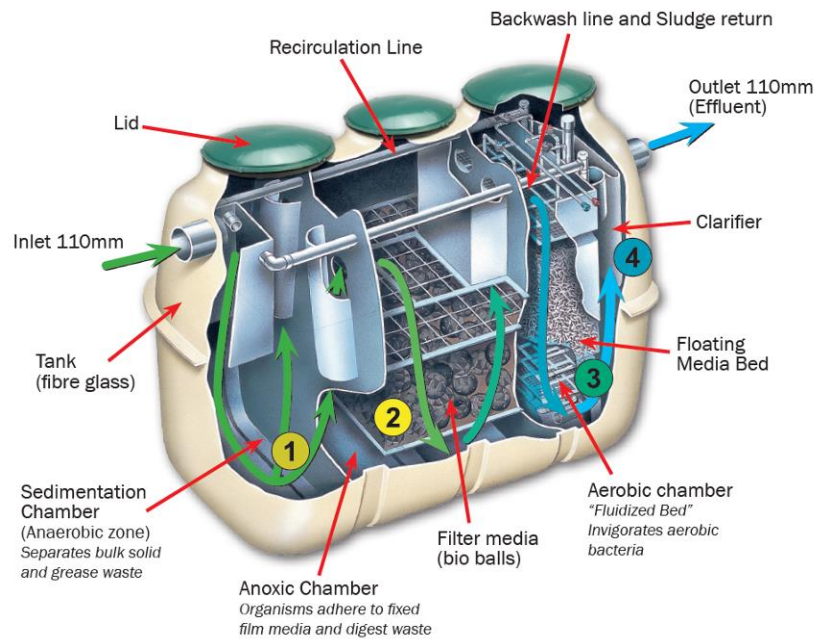


Figure 6: Illustration of the Clarus Fusion Treatment Plant



Plate 2: Example of installed plant with low visual impact

5.4.2 ELECTRICITY

The lodge electrical requirements can be categorised into three components: firstly, the primary functions such as the water and sewerage pumps, secondly the communal area operational requirements, and finally the room electrical requirements.

The electrical usage of each of these elements are plotted over a day based on their expected times of use, in order to generate a load profile. From this the combined solar and back-up generator system is sized to ensure the lodge is always provided with power. It is proposed to place the generators on damp-proof course (DPC) plastic liner with sand and interlocks on top.

The solar system consists of three main components, the panels, the inverters, and the batteries. Each of these are selected specifically based on the unique requirements of the lodge. The panels will only be washed with clean water, no added chemicals. The amount of water should be limited to just getting any dirt build off the glass. Wastewater should be able to run-off to the ground, as it will be similar to run-off from mist.

The panels are high efficiency devices to ensure maximum power production with the minimum number of panels. The total number of panels are based on the above-mentioned load profile, which determines the required power for daily use and the amount required to charge the battery system.

A minimum of four (separate) inverters will be used, to ensure that in case one fails, the proposed lodge is still provided with 75% of the required maximum power demand. Monitoring of the system will be part of the inverters, to give the client the ability to see the amount of power generated by the solar panels as well as the current state of the batteries.

Lithium-ion batteries will be installed, as they provide the best lifetime and Depth of Discharge for the price, with no maintenance requirements. The batteries will be sized to provide power to the lodge for multiple days, in the case of cloudy or misty weather, while taking into consideration any system losses.

The solar photovoltaic (PV) system will be centrally located at the communal area buildings, as this will be the most practical location for the following reasons:

- The majority of power will be consumed at the communal area;
- Easy distribution and control of electrical infrastructure;
- Cost effective versus multiple smaller systems; and
- Sufficient roof space for PV panels.

The solar system will have a diesel generator back-up with an auto-changeover for when the battery levels are low, and the system cannot meet the lodge's electrical needs. The size of the generator will be based on the load profiles and the additional requirement of charging the batteries. The generators used will be sound proofed in accordance to the concession agreement.

Furthermore, the electrical design of the lodge will be primarily focused on energy efficiency, to reduce the total electrical need for the site.

While there is sufficient wind along the coast, the use of wind generators is not considered an ideal solution for power generation. Due to the limited number of suitable qualified suppliers, installers and services technicians in Namibia, regular service and maintenance will incur high maintenance costs. Furthermore, the adverse weather conditions along the coast wear out movable parts faster, and wind turbines pose a major visual intrusion. Therefore, wind power is not considered a viable option at this stage.

5.4.3 COMMUNICATION

The lodge will have Very High Frequency (VHF) radio communication and the mast will be integrated with the lodge building or possibly the water tower in order to keep the visual impact and potential impact on avifauna as low as possible. Wi-fi will also be available on site.

Should a satellite communication device be installed for telecom and internet connection, it will be out of sight and strategically placed in order to ensure no negative visual impact.

The guide vehicles will have radio communication and satellite phone connection in the event of any emergencies.

5.4.4 SOLID WASTE MANAGEMENT

Solid waste will be treated as prescribed in the concession agreement. Environmentally friendly packaging and products, and environmental consciousness will be promoted among the staff and guests. Unavoidable waste will be disposed of at Walvis Bay dumping site and recycled waste will be disposed in Walvis Bay at the approved agents. Waste will be transported by the Concessionaire on a weekly basis or as required with the guided 4x4 route from Meob to Walvis Bay. This includes the Construction and Operational Phases of the project.

Suitable waste storage and separation facilities which are fully enclosed and inaccessible by any wildlife will be provided on site. Storage containers will have proper lids to prevent wind dispersal of waste.

Biodegradable waste and paper products may be burned in a suitable incinerator, such as a “donkey” used to heat water. Incinerated waste will exclude plastic, rubber, Styrofoam, waste oil or lubricants. The incinerator will be at the staff housing and placed with cognisance of prevailing wind directions.

Toxic and hazardous waste will be disposed at Walvis Bay dumping site. It will be transported in sealed containers with the guided 4x4 route on a weekly basis, or as required.

5.4.5 ACCESS

People will only enter the NNP with the appropriate permits. The gravel airstrip located near Fischersbrunn will be used for transporting guests and evacuations in case of emergencies. Otherwise, only the three vehicular routes recognised and authorised by the MET in the Head Agreement will be used for transporting personnel, equipment and materials. Refer to Figure 1. These include:

- Entering the park from the Farm Kanaan and following the track towards Sylvia Hill and then northwards to Meob Bay;
- Entering the park from the Farm Elim and proceeding westwards towards Meob Bay; and/or
- Entering the park from Walvis Bay from a camp known as Louberville and traveling southwards towards Meob Bay.

The name of the airstrip is “Airport Meob Bay Landing Site”. It is classified as “small” by the International Civil Aviation Organization (ICAO) and is located at coordinates -24.617°(S) and 14.683° (E).

5.4.6 GUEST RECREATIONAL ACTIVITIES

As required by the Management Plan for the NNP (MET, 2013a) the theme of “desert discovery” will be adhered to. Various activities are envisaged to introduce tourists to the natural and heritage resources in the area. Guests can be shown the marine and terrestrial animals. Guided visits to the nearby shipwrecks, diamond processing areas, and the police outpost can be conducted.

5.5 ALTERNATIVES

5.5.1 NO-PROJECT

If the project does not go ahead, the full tourism potential of the site, and the objective of the MET as stated in the concession agreement, i.e. “...to utilise the inherent natural assets of the area on the state land ... to stimulate economic development” (MET & NAMAB, 2009) will not be realised.

5.5.2 SITE ALTERNATIVES

Two sites were considered, a Northern Site and a Southern Site, refer to Figure 7.

5.5.2.1 NORTHERN SITE

The Northern Site is located about 4.4 km south-west of the Fischersbrunn Camp and about 4.8 km North of the existing tented camp of NAMAB.

The Northern Site is located on a slightly raised but flat sand dune with some minor bush growth. The slightly raised elevation (1.5 – 2 m) provides a good view of the ocean. It also provides slopes which ease the drainage of sewerage. The flat sand dune appears to be stable and not moving. The site is close to the beach (+/- 100 m). Other advantages of the Northern Site are that the proposed lodge site is only approximately 680 m from an existing well; it is closer to the existing airstrip; and accessible with existing roads.

The key disadvantage of the Northern Site is that it is in immediate proximity to the existing shell middens, and construction activities could have a permanent impact on the shell middens directly through construction activities and indirectly through the alteration of sand mobility within the area. The Northern Site, though advantageous, could not serve as the preferred site due to the impact on these heritage resources. Following the second heritage study undertaken for the project area, and discussions with the heritage specialist, it was agreed that the Southern Site would be utilized as the proposed lodge location.



Plate 3: The Northern Site Alternative

5.5.2.2 SOUTHERN SITE

The Southern Site is located about 3.7 km south of the existing tented camp of NAMAB and is “located near an area called “Wolfnes” (Plate 4).

The Southern Site is located on a raised but flat sand dune with some minor bush growth and a higher dune towards the south-west. This is at the starting point of the “Langewand”, which is the high dune adjacent to the sea (Plate 5). The disadvantage is that dunes appear to be moving in this area and not as stable as the Northern Site.

The slightly raised elevation (1.5 – 2 m) provides a good view of the ocean but not the full 180 degrees as at the Northern Site. It also provides slopes which ease the drainage of sewerage. The site is also close to the beach (+/- 100 m).

The moving sand dunes prove to be the single biggest disadvantage of this site; however, the Southern Site has a few advantages. Existing wells are present near the existing tented camp in proximity to the Southern Site location, with plant growth indicative of the existence of fresh water. The Southern Site also has fewer shell middens present within the proximity of the proposed lodge location, existing 4x4 trails are present heading towards the site, and is closer to some of the proposed infrastructure such as the water distribution system (Section 5.4.1.2).



Plate 4: The Southern Site Alternative



Plate 5: The “Langewand”



Figure 7: Meob Lodge Site Alternatives

6 PUBLIC PARTICIPATION PROCESS

A public participation process was undertaken in accordance with regulation 21 of the EIA Regulations (GN No. 30 of 2012). Relevant proof is contained in Annexure D.

6.1 NOTIFICATION

The project notification comprised the following actions:

- A notice board was fixed on site (Annexure D-1);
- Advertisements were placed in two Namibian newspapers once a week for two consecutive weeks (9 and 16 May 2019) (Annexure D-2); and
- A second round of advertisements were placed in two Namibian newspapers once a week for two consecutive weeks (12 and 19 December 2022)
- E-mails were sent to pre-identified and other Interested and Affected Parties (I&APs) who requested to be registered on the project. The email included a Background Information Document (BID) (as shown in Annexure D-4) and a map.

6.2 MEDIA COVERAGE

An article was placed by The Republikein newspaper (in Afrikaans) regarding the project on 22 May 2019, and a post was placed by the Namib Times on their Facebook page about the project on 17 May 2019. Refer to Annexure D-3.

The post by The Namib Times on their Facebook page about the project on 17 May 2019 reflects a large public response, with several comments, see:

<https://www.facebook.com/NamibTimes/posts/2174878425892634>.

6.3 REVIEW PERIOD

The Draft EIA Report was made available for public review from 4 October 2019 to 25 October 2019. It was placed on the Knight Piésold website and registered I&APs were notified of the availability by means of e-mail and short message service (sms).

Following the first round of public review, it was decided to remove recreational fishing activities by guests of Meob Bay Lodge from the application. Catch and release fishing at the proposed lodge could only be undertaken through strict permitting requirements through provision of the concession permit and individual angling permits for each angler and would need to be undertaken with strict supervision of an authorised person in an effort to obtain research data. Due to the permitting requirements and strict adherence to the relevant angling procedures, recreational fishing has been removed for the proposed lodge. The EIA was again made available for public review from 24 March to 2 April 2020.

The second Draft EIA Report was made available for public review from 12 December 2022 – 10 January 2023. It was placed on the Knight Piésold website and registered I&APs were notified of the availability by means of e-mail and short message service (sms).

6.4 INTERESTED AND AFFECTED PARTIES

The comments received was recorded in the Issues and Concerns Report (Annexure D-6).

The National Heritage Council (NHC) of Namibia, formally responded that they are not in support of the project given the heritage sensitivity of the area. The letter and response is attached in Annexure D-7. A few people expressed excitement about the development and one person emphasised that the proposed project is located in a proclaimed world heritage site.

The EIA was made available for public review in October 2019. During that period the Ministry of Fisheries and Marine Resources commented that fishing within this area is forbidden. This activity was subsequently removed from the EIA.

7 DESCRIPTION OF THE BIOPHYSICAL AND SOCIAL ENVIRONMENT

7.1 LAND USE & AESTHETICS

The project is proposed within a protected area. The site is protected in terms of the NNP; the Marine Protected Area (MPA); and because of the UNESCO world heritage site status of the Namib Sand Sea. Figure 1 shows the various boundaries. The MPA was proclaimed in 2009 (Swart *et al.*, 2012) and stretches from Meob Bay to Chameis Bay for 400 km and includes the rocky islets, guano islands and adjacent areas to 30 km offshore. Fishing and mining are restricted in this area in order to preserve the biological riches of the southern Benguela (Roberston *et al.*, 2012).

The current land use (lodge area) is wilderness with pockets of low impact eco-tourism in adjacent areas, such as the existing tented camp and existing Fischersbrunn camp. Current tourist activities involve camping, recreational designated/guided 4x4-ing and mining town-, dune- and shipwreck excursions.

7.2 TOPOGRAPHY & DRAINAGE

According to Geo Pollution Technologies (2019), the landscape of the site can be described as a mixture of sandy beach, shrub-coppice dunes, gravel plains and salt flats / pans with transverse dunes bordering further inland and to the south. The slope of the area is mainly less than five degrees (Figure 8).

GPT (2019) further state that no real surface drainage features occur on site. The only real drainage in the area occur through the Tsauchab River near Sossusvlei, 60 km east of site. The Tsauchab River is a non-perennial river. The river's catchment starts in the Nubabib and Naukluft Mountains and flows in a westerly direction until it meets the Namib Desert at Sossusvlei, from where the river disappears below the sands of the Namib, see Figure 8.

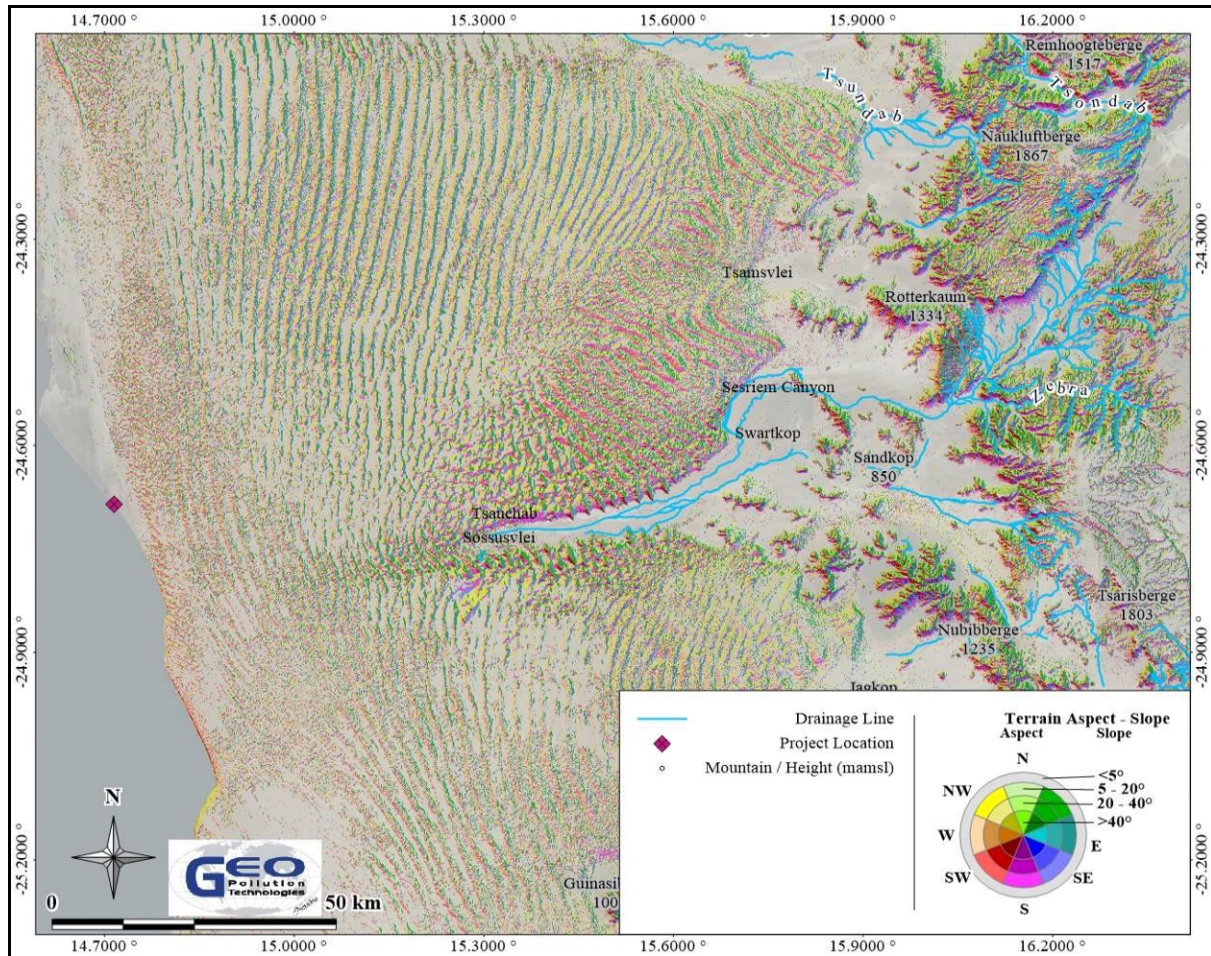


Figure 8: Drainage with terrain aspect and slope (Geo Pollution Technologies, 2019)

7.3 GEOLOGY

GPT (2019) explain that, in terms of stratigraphy, the Namib Desert is dominated by the Namib, Swakop and Nossib groups which are part of the Damara Sequence. The geology of Meob Bay is characterised by dolerite dykes and granite bedrock which is covered with quartz gravel and large sand dunes. Meob Bay also has an isolated outcrop of the Kuiseb Formation bedrock which is mainly made up of sedimentary rocks (argillites, arenites) encroached by Salem type granites (some of which are enriched in uranium); there are also extensive salt pans in the area (Bowell and Davies, 2017) (see Figure 9). Further details on the geology of the area can be found in the Geohydrological Study (Annexure E).

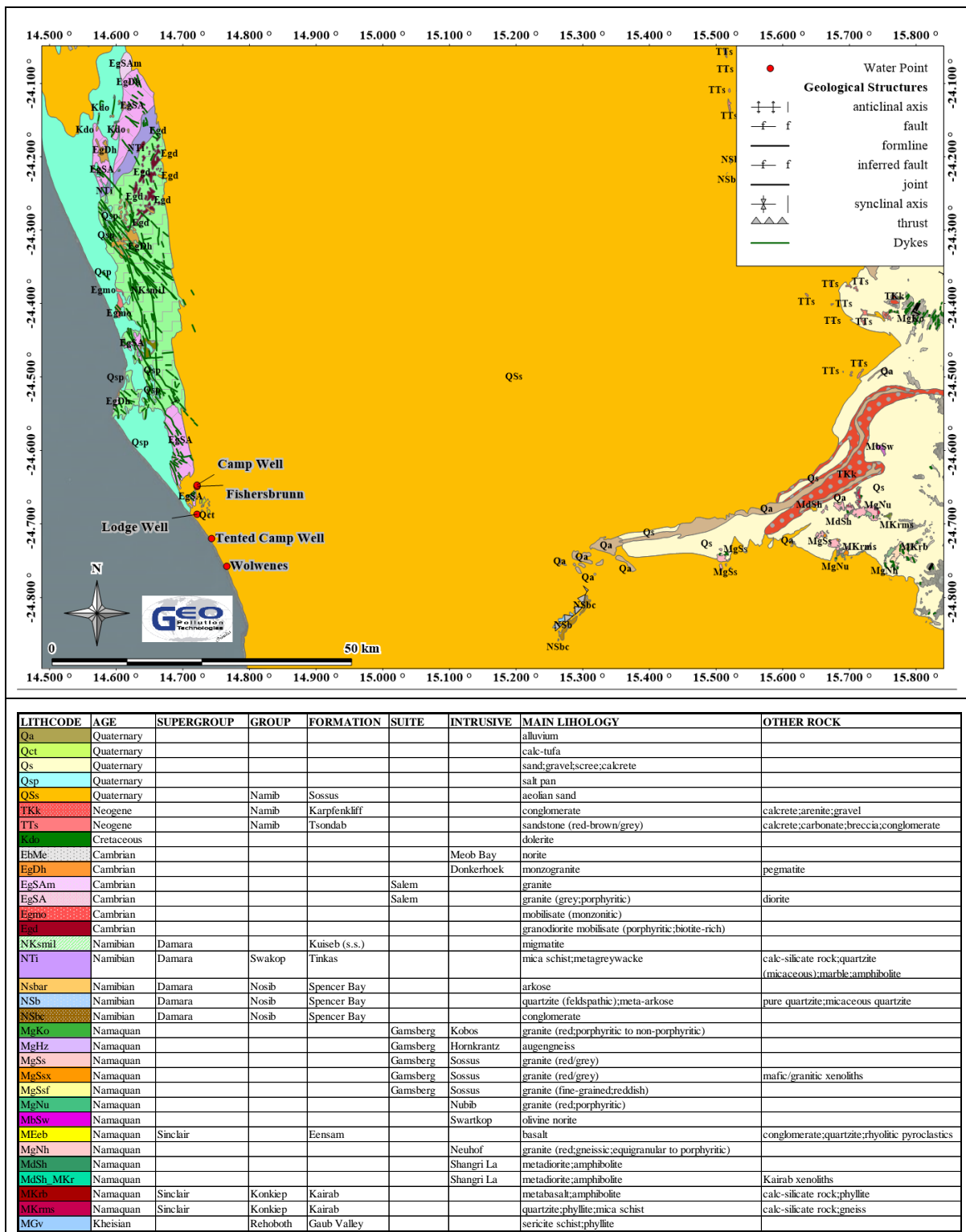


Figure 9: Geology map (Geological Survey of Namibia, 2000)

7.4 SOILS

The soils in Meob Bay are not suitable for commercial dryland agriculture because of their high alkalinity, high potential for salinity, limited soil depth, sodicity, and low fertility. They have low holding capacity and they generally comprise of loose sands that are not suitable for arable and grazing use. The soils are naturally saline (especially near the coast), and can therefore cause corrosion of concrete foundations, pipes, or any other underground component (Walmsley, n.d.).

7.5 FAUNA

According to Walmsley (n.d.), as cited by Cunningham (2019); there has been very little research conducted on the vertebrate fauna and flora from the Meob-Conception Bay areas. In order to determine a biodiversity baseline for the proposed development Mr. Peter Cunningham of Environment and Wildlife Consulting (Namibia) undertook a desktop study and rapid site assessment of the proposed study area. Findings of the study is summarised below. The full report is contained in Annexure F.

7.5.1 REPTILE DIVERSITY

The overall reptile diversity and endemism in the general Meob Bay Tourism Development area is estimated at between 16-20 species and 5-8 species, respectively (Mendelsohn *et al.*, 2002). Griffin (1998a) presents figures of between 1-10 and 1-2 for endemic lizards and snakes, respectively, from the general area. The NNP has an estimated 100 species of reptiles, although the majority of these reptiles are found further inland and not associated with the coastal areas (Griffin, 1998a). Walmsley (n.d.) indicates that the vertebrate fauna in the Meob-Conception Bay areas are expected to be dominated by snakes, lizards and skinks (although this study does not indicate species).

At least 26 species of reptiles are expected to occur in the general Meob Bay Tourism Development area with 12 species being endemic – i.e., 46.2% endemic. The leatherback turtle (*Dermochelys coriacea*) is known to occur offshore and although it is not classified under the Nature Conservation Ordinance No 4 of 1975, it is protected under the Sea Fisheries Regulations of 2001 (Griffin, 2003).

The 26 species known/expected to occur in the general area consist of at least one turtle; one blind snake; seven typical snakes; six skinks; four old world lizards; one chameleon and six geckos.

From a conservation point of view, the endemic *Bitis peringueyi*s is viewed as the most important snake occurring in the area although it occurs between the Kunene River and Lüderitz with 90% of the taxon's range within Namibia. Similarly, the most important lizard is viewed as the small-scaled desert lizard (*Meroles micropholidotus*) which occurs in widely isolated populations dependent on vegetation and is classified as endemic, "insufficiently known" and "rare". This small-scaled desert lizard and occurs between Walvis Bay and Lüderitz.



Plate 6: Pèringuey's adder (*Bitis peringueyi*) in coastal dune hummock areas

7.5.2 AMPHIBIAN DIVERSITY

The area is extremely marginal with very little rainfall (<50 mm annual average) generally occurring in the area and being highly variable (>100% coefficient of variation) and sporadic of nature (Mendelsohn *et al.*, 2002). The lack of open surface water, no inland connectivity of drainage lines, and saline coastal conditions, result in a lack of suitable amphibian habitat in the general area and make the area marginal for amphibians. Even artificial water points at Fischersbrunn and isolated wells are deemed marginal habitats.

7.5.3 MAMMAL DIVERSITY

The overall mammal diversity in the general area is estimated at between 9-15 species with 1-2 species being endemic to the area (Mendelsohn *et al.*, 2002). Griffin (1998b) puts the species richness distribution of endemics also between 1-2 species in the general area while the NNP, of which the coastal area forms part of, is expected to have up to 80 species of mammals. Walmsley (n.d.) indicates that gemsbok, brown hyena, black-backed jackal, golden mole, gerbils and mice (not identified to species level) occur in the Meob-Conception Bay area.

During the fieldwork 10 species were confirmed to occur in the general area, although one species – South African (Cape) fur seal – is a marine species observed between Meob and Conception Bay; two species – brown hyena and African wild cat – confirmed by Jacques Delpont (pers. comm.) and one species – Cape fox – confirmed by Piet van Zyl (pers. comm.) albeit from the general area and not at the proposed coastal development sites. The most important species confirmed in/around the proposed development sites would be the brown hyena, African wild cat, and Cape fox.

7.5.4 AVIAN DIVERSITY

Simmons *et al.* (2015) indicate that three endemic avian species (Rüppels korhaan, dune and gray's larks) are expected to occur in the general area while Damara tern is viewed as a near endemic species.

According to Swart *et al.* (2012), the extensive salt pans in the Meob-Conception Bay area provide a valuable summer stop over for migrating birds with bird counts in the Conception Bay area typically recording about 17,000 birds (25 species) and often including large numbers of terns (e.g. 13,000 common terns recorded in one July count). Other species recorded in significant numbers include Sandwich tern, Cape cormorant, kelp gull and greater flamingo, while Damara terns breed in the salt flats. The importance of the salt flats for Palaearctic birds in the general Meob-Conception Bay area is confirmed by Walmsley (n.d.).

During the fieldwork 18 species were confirmed to occur in the general area with Cape turtle dove, Karoo long-billed lark and dusky sunbird not previously recorded from the area. The most important species confirmed from the area was Cape cormorant ("endangered") and greater flamingo ("vulnerable") although these marine species were typically observed flying offshore and/or along the coast or basking with kelp gull on the sandy beaches. With the exception of the Greater Crested (Swift) Tern, Kelp Gull and White-breasted Cormorants all the breeding species are listed Red Data species in Namibia.

Most seabirds breeding in Namibia are restricted to areas where they are safe from land predators, although some species are able to breed on the mainland coast, either cryptically on the open ground (e.g. Damara Tern) or in inaccessible places. The near-endemic Damara Tern is considered a flagship species in Namibia. Its conservation importance has been flagged by the MEFT, favouring gravel and gypsum plains, and occasionally salt pans. In general most breed on the islands off the southern Namibian coast, or on the man-made guano platforms in Walvis Bay, Swakopmund and Cape Cross.

7.5.5 MARINE ECOLOGY

A detailed desktop study was undertaken by Pisces Environmental Services (Pty) Ltd (Pisces, 2022) for the project area, utilizing historical site information obtained on surveys undertaken for the Benguela Current Convention Coastal Biodiversity Survey undertaken in 2019 whereby the specialists had surveyed the Namibian coastline from Lüderitz to Henties Bay. The sections below highlight the key areas associated with the project area. The full report is contained in Annexure G.

7.5.5.1 INTERTIDAL SANDY BEACHES

Sandy beaches are one of the most dynamic coastal environments. The composition of their faunal communities is largely dependent on the interaction of wave energy, beach slope and sand particle size, which is called beach morphodynamics. Most beaches on the central Namibian coastline are open ocean beaches receiving continuous wave action. They are classified as exposed to very exposed, and intermediate to reflective and composed of well-sorted medium to coarse sands. The beaches tend to be characterised by well-developed berms and are well-drained and oxygenated.

The supralittoral zone is situated above the high water spring tide level, and receives water input only from large waves at spring high tides or through sea spray. The supralittoral is characterised by a mixture of air breathing terrestrial and semi-terrestrial fauna, often associated with and feeding on algal wrack deposited near or on the driftline. Terrestrial species include a diverse array of beetles

and arachnids and some oligochaetes, while semi-terrestrial fauna include the oniscid isopod *Tylos granulatus*, the talitrid amphipods *Africorchestia quadrispinosa*, *A. skoogi* and *Talorchestia* sp., and the gamarrid amphipod *Bathyporeia griffithsi*. Community composition depends on the nature and extent of wrack, in addition to the physical factors structuring beach communities, as described above. Evidence of substantial populations of *Tylos granulatus* were observed at Meob Bay and along the sandy shoreline to and beyond Conception Bay, suggesting that this species contributes significantly to the macrofaunal biomass on the high shore.

The intertidal zone, also termed the mid-littoral zone, has a vertical range of about 2 m. This mid-shore region is characterised by the cirrolanid isopods *Eurydice (longicornis=) kensleyi*, *Excirolana latipes* and *Excirolana natalensis*, the deposit-feeding polychaetes *Scolecopsis squamata* and the amphipod *Griffithsius latipes*. In some areas, juvenile and adult sand mussels *Donax serra* (Bivalvia, Mollusca) may also be present in considerable numbers.

The surf zone in the study area is rich in phytoplankton (primarily dinoflagellates and diatoms) and zooplankton. Particulate organic matter is commonly deposited on the beaches as foam and scum. The organic matter, both in suspension and deposited on the sand, is thought to represent the main food input into these beaches, thereby accounting for the dominance of filter-feeders in the macrofaunal biomass (McLachlan 1985).

Most of the macrofaunal species recorded from beaches in central Namibia are ubiquitous throughout the biogeographic province, and no rare or endangered species are known.

7.5.5.2 INTERTIDAL ROCKY SHORES

The central coast of Namibia is bounded to the east by the Namib Desert and is characterised primarily by shifting dunes. In common with most semi-exposed to exposed coastlines on the southern African west coast, the rocky shores that occur in the region are strongly influenced by sediments, and include considerable amounts of sand intermixed with the benthic biota. This intertidal mixture of rock and sand is referred to as a mixed shore, and constitutes only 6.3% to the total Namibian shoreline habitats (Holness *et al.* 2014). In the study area, mixed shores are limited to the headlands at Meob Bay and Black Rock.

Typically, the intertidal area of rocky shores can be divided into different zones according to height on the shore. Each zone is distinguishable by its different biological communities, which is largely a result of the different exposure times to air. The rocky shores along the coastline around Meob Bay are heavily influenced by mobile sediments. Patchy dominance in the mid- and low-shore by ephemeral green algae (*Ulva* spp., *Cladophora* spp.) also suggest that these shores are periodically smothered by sands, as these algae proliferate as soon as sediments are eroded away.

7.6 FLORA

Mr. Peter Cunningham of Environment and Wildlife Consulting (Namibia) undertook a desktop study and rapid site assessment of the proposed study area. Findings of the study is summarised below. The full report is contained in Annexure F.

7.6.1 TREE AND SHRUB DIVERSITY

It is estimated that at least 14 species of larger trees and shrubs (>1 m) occur in the general area (Mannheimer and Curtis, 2018) (Table 5).

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: Tree and shrub diversity known and/or expected and confirmed

Species: Scientific name	Species confirmed	Namibian conservation and legal status
<i>Acacia erioloba</i>		Protected (F)
<i>Acanthosicyos horridus</i>		Protected (F); N-end
<i>Adenolobus pechuelii</i>		
<i>Capparis hereroensis</i>	√	End
<i>Faidherbia albida</i>		Protected (F)
<i>Gossypium anomalum</i>		
<i>Lycium cinereum</i>		
<i>Lycium hirsutum</i>		
<i>Lycium tetrandrum</i>	√	
<i>Pechuel-Loeschea leubnitziae</i>		
<i>Salsola nollothensis</i>	√	
<i>Salvadora persica</i>		
<i>Tamarix usneoides</i>		Protected (F)
<i>Zygophyllum stapffii</i>		End

Endemic (Craven, 1999)

F – Forest Act No. 12 of 2001

End; N-end – Endemic and Near-endemic (Mannheimer and Curtis, 2018)

The most important species expected to occur in the area are *Acanthosicyos horridus* (Protected F; N-end) which could be considered one of Namibia's most characteristic plants (Seely, 2010) and remains an important commodity to the local Topnaar people (Burke, 2003) and *Capparis hereroensis* (End).

During the fieldwork only three species were confirmed to occur in the general area with the endemic *Capparis hereroensis* viewed as the most important species (Plate 7). The *Salsola nollothensis* coastal dune hummocks serve as an important habitat to a variety of vertebrate (and invertebrates); food for grazers (e.g. gemsbok) as well as stabilise dunes (Plate 8). The Namib coastal areas are not suitable habitat to larger tree/shrub species, especially those which cannot tolerate saline conditions, and which require much underground water and/or rainfall to survive.



Plate 7: *Capparis hereroensis* in a saline depression east of proposed lodge



Plate 8: *Salsola nollothensis* hummocks frequented by gemsbok (see tracks) throughout the area

7.6.2 GRASS DIVERSITY

It is estimated that up to 29 grasses are expected in the general area. Of these, one species is alien, one species endemic (*Stipagrostis sabulicola*) and one species near endemic (*Stipagrostis geminifolia*). Burke (2003) describes *Stipagrostis sabulicola* as a “true Namib endemic” which only occurs in the dune fields of the Namib Desert and although viewed as the most important species in the general area, it occurs widespread in the dune areas.

During the fieldwork only three species were confirmed to occur in the general area while two more species were observed further east behind the true mobile coastal dune belt. Extensive patches of

the salt loving *Odyssea paucinervis* occurs in saline depressions east of the proposed Lodge development area, together with the reed *Phragmites australis*, all heavily utilised by gemsbok and Cape hare. Extensive patches of the sedge-like *Cladoraphis cyperoides* occurs around Fischersbrunn and the tented campsite.

The Namib coastal areas are not suitable habitat to grass species, especially those which cannot tolerate saline conditions, and which require much underground water and/or rainfall to survive. However, although grasses are typically not viewed as an important component of the vegetation along saline coastal areas, its soil stabilisation effect; habitat to a variety of vertebrates (and invertebrates); and overall lack of vegetation, including fact that the vegetation is extensively utilised by gemsbok and Cape hare, makes it important.

7.6.3 LICHENS

More than 120 species are expected to occur in the Namib Desert with the majority being uniquely related to the coastal fog belt (Wirth, 2010). Lichen diversity is related to air humidity and generally decreases inland from the Namibian coast (Schultz and Rambold, 2007). Many lichens look similar, are highly variable in appearance, and notoriously difficult to identify unless with the use of a microscope (e.g. crustose lichens) or certain chemical tests.

Lichen diversity and abundance decreases from the sandy/gravel plains just south of the Swakop River to the sandy/gypsum plains north of the Kuiseb River east of the dune belt. The closest lichen hotspots include a Crustose lichen zone east of the dune belt area while extensive patches of fruticose and foliose lichens occur in the Mile 8 and Wlotzkasbaken areas between Swakopmund and Henties Bay – i.e. far to the north and east of the proposed development areas.

Lichens are: important pioneer plants that colonise bare desert habitats; slow growing; depend on moisture from coastal fog; prevent wind and water erosion by stabilising the soil; provide ecological niches for other flora and fauna; are an important food source for beetles and an array of larger animals from gerbils to springbok; and are highly vulnerable to the impacts of off-road driving and mining (Swart *et al.*, 2012).

At least six species of lichen were observed during the fieldwork in the general area.

7.6.4 IMPORTANT AREAS

Gravel & Gypsum plains

Gravel and gypsum plains, such as those between Conception Bay and Meob Bay, are fragile habitats that are easily damaged by vehicle tracks and other disturbances (Swart *et al.*, 2012, Walmsley n.d.) (Figure 10).

Salt pans

According to Swart *et al.* (2012) and Walmsley (n.d.), the extensive salt pans in the Meob-Conception Bay area provide a valuable summer stopover for migrating Palearctic birds (Figure 10).

Damara tern breeding sites

Gravel, and gypsum plains and salt pans are favoured breeding sites for Damara terns along the Namibian coast. These pan areas around Meob Bay are known breeding sites for a bird which could be viewed as a coastal Namibian flagship species with nests of between 1-18 (18-100 pairs), 14 (14-50 pairs) and 6-18 (0-10 pairs) confirmed from the Meob Bay, Conception Bay and Sandwich Harbour areas, respectively (Braby, 2011). Furthermore, Damara terns prefer undisturbed areas as breeding

sites (Braby *et al.*, 2009) with off road driving viewed as one of the main causes of disturbance affecting their successful breeding throughout its range (Braby *et al.*, 2009; Braby 2011) (Figure 10).



Figure 10: Gravel/gypsum/salt pans

Note: These plains or salt pans could serve as potential Damara tern breeding sites and are indicated by the blue dotted line. The approximate location of Fischersbrunn (black star), proposed lodge (red star) and camp sites 1 and 2 (white and yellow stars) are also indicated.

Bird flyways

Although very little is known regarding bird flight paths in Namibia, especially species moving/migrating at night, most birds seem to follow the shortest routes between selected habitats – e.g. dams, estuaries, bays, etc. However, unpredictable rainfall events may lure species into areas not normally frequented – e.g. kori and Ludwig's bustards into the coastal areas – and storms (e.g. berg winds) may also force birds into areas not regularly visited. Planning for all eventualities is therefore not always possible. Walmsley (n.d.) indicates that the salt flats in the Meob-Conception Bay area are used as stopover by Palaearctic migrant birds.

Water sources

As water is extremely sparse along the coastal Namib Desert, all such areas are viewed as extremely important. Known water sources in the general area include Fischersbrunn and two artificial wells, one at the proposed lodge site and another at the existing camp site.

Vegetated dune hummocks

The dune hummocks, dominated by *Cladoraphis cyperoides* and *Salsola nollothensis*, are important as they stabilise the soil and serve as a source of food and habitat for a variety of vertebrate (and

invertebrate) species. Another important plant with similar functions is the endemic and protected *Acanthosicyos horridus* (INara) as it is important as a commodity for the Topnaars (living along the Kuiseb River) and serves as refuge and a source of food for various desert dwelling fauna.

7.7 SOCIO-ECONOMICS

Meob Bay is part of the Hardap Region which covers an area of 109,713 square kilometres (km²). In terms of population distribution by region, Hardap is one of the least populated. According to the Namibia Statistics Agency (2017), the Hardap Region had a population of 87,186 (with the ratio of males per 100 females at 105), growing at an annual rate of 1.8 %. The majority of the population resides in urban areas (72 %), and a minority in the rural areas (28 %). The average household size is 2.9 people, among which:

- 98 % had safe water;
- 56 % had electricity for lighting;
- 58 % used wood/charcoal for cooking; and
- 44 % did not have toilet facilities.

The most commonly spoken languages at home were Nama/Damara (49 %) and Afrikaans (29 %). For those 15 years and older, the literacy rate was 85 %, and in terms of education: 8 % never attended school, 7 % were attending school at the time of the census (2016), and 82 % had left school. The main sources of household income were wages and salaries (61 %), old age pension (9 %), business (non-farming) (4 %), cash remittance (4 %) and farming (3 %).

7.7.1 /KHOWESEN / WITBOOI COMMUNITY

The indigenous /Khowesen / Witbooi community resides in the Hardap constituency (Gibeon District). This community is included as a shareholder in the NAMAB concession agreement, and therefore will have preferential rights to socio-economic development such as job opportunities and skills transfer.

7.8 ARCHAEOLOGY

An Archaeological study specifically for the proposed Meob Bay lodge was undertaken by Meyer (2019), indicating that shell middens were observed at Meob Bay. The full report is attached as Annexure I-1. Following comments received on the draft EIA, an additional cultural heritage study was undertaken subsequently by Dr John Kinahan (2022), whereby all shell middens were recorded for both potential lodge sites, with the report attached as Annexure I-2.

7.8.1 NAMIB SAND SEA

The Meob area is proposed within the proclaimed World Heritage Site (Namib Sand Sea) and has a rich and diverse history. Seely (2012) state that human presence in the Namib Sand Sea dates back several hundred thousand years to the early ancestors of modern people. Early Palaeolithic (or Early Stone Age) tools are found at a number of locations within the sand sea.

The archaeological history of the area then resumes around 12,000 years Before Present (BP), represented by only a few sites near Gobabeb and Sossvlei, respectively.

Three human burials were found under cairns at coastal Sylvia Hill, and a number of other stone circle occupation sites within and just outside the Namib Sand Sea area. Stone circles were dated from around 1,000 BP to recent times (20th century), but it is unknown which people may have occupied

them. Similarly, middens with pottery and marine mollusc are found along the coast, dating from around 2,000 years BP to 19th century times.

In terms of geopolitical history, Seely 2012 writes that the Portuguese explorers were likely to be the first non-African visitors to the Namib Sand Sea. Portuguese navigator, Diogo Cão was the first to erect a stone pillar on the Namibian coastline in 1486. He was followed a year later by Bartolomeu Dias who undertook the first detailed mapping of the coastline and erected a stone pillar in Pequena (today Lüderitz). Ten years later (1497), Vasco da Gama repeated this journey, and successfully continued to India.

In 1596, Dutch seafarers broke the grip held by the Portuguese. Porcelain and Dutch coins have been recovered at sites in the Namib Sand Sea that attest to early contact.

More than a century later, in the 1770's American whalers started visiting the Namibian coast. And, the offshore islands were harvested for guano. The established Walvis Bay community traded beef and mutton to visiting ships. Because of the potential economic importance of the offshore islands and Walvis Bay, these were both annexed by the Cape Colony in 1878.

In terms of local history, the Nama-speaking Topnaar or \ne Aonin Nama-speaking people maintain small farms along the lower Kuiseb River Valley. The Topnaars were most likely the people who first made contact and traded with European visitors.

The Namib Sand Sea also has a history of diamond prospecting dating back to 1908. Because of the chaotic pegging of claims, the German government proclaimed the area between 26° south and the Orange River, and from the coast to 100 km inland off-limits (the so-called Sperrgebiet). Prospectors focussed on the area north of Lüderitz, and by 1910, 5,000 claims had been registered. Prospectors eliminated most game, and permanently exterminated the springbok from the area. The prospectors also burned the wood from shipwrecks and claim beacons for fuel. This demand virtually cleared the beaches north of Lüderitz of shipwreck remains which may have been useful to reconstruct maritime trade history. The wreck of the *Eduard Bohlen* lies hundreds of metres inland from the beach and is a major tourist attraction.

The diamond deposit was eventually mined out in 1963 after more than 300,000 carats were produced between 1931 and 1963.

7.8.2 MEOB BAY LODGE AREA

An Archaeological study specifically for the proposed Meob Bay lodge was undertaken by Meyer (2019), indicating that shell middens were observed at Meob Bay. A shell midden is a heap of clam, oyster, whelk or mussel shells. The observed middens are former dumping sites which can be used to better understand ancient environments. The observed middens were white mussel shells and potsherds, amongst other archaeological remains. The extensive middens (heaps of shells and bones) which were found along the coast suggests that there was seasonal occupation and that coastal resources were used by people in the last several thousand years. These middens add to the diverse and extensive archaeological and palaeontological history of the Namib Sand Sea which is important for the history of this area and Namibia as a country. Following comments received on the draft EIA, an additional cultural heritage study was undertaken subsequently by Dr John Kinahan (2022), whereby shell middens were recorded. The study found that the Northern Site pose too high a risk on the heritage resources, and proposed that the Southern Site be used as the preferred lodge location.

The results of the initial and subsequent surveys are described in more detail below.

In total 146 middens were recorded across the two surveys. Of these, 126 were primary accumulations with a diameter of less than 2m probably representing single mussel collecting trips; there were also 15 middens of up to 5m in diameter and four with a diameter of 10m or more represented central middens. These agglomerations of midden heaps showed clearly discernible ashy patches representing cooking hearths, and six of these middens were associated with coarse fabric pottery typical of the kind that was widespread in the Namib during the last 1000 years. The main distribution of shell middens at Meob Bay extends over a distance of 2.7 km along the western or seaward margins of a line of vegetated hummock dunes which narrows towards the south-east.

The absence of European debris such as porcelain, glass and coins from the Meob Bay midden sites was noted, and suggests that the sites were not occupied during the period of most intensive outside contact on the Namib coast covering the last 300 years.

Several of the larger middens at Meob Bay were associated with fragments of whale and seal bone, as well as fist-sized cobbles that were probably employed to break open mussel shells and marrow bones. The overwhelming majority of shellfish on the middens was *Donax serra*, the common white mussel. Human remains comprising the post-cranial skeleton of an unsexed adult in an extended position were found in a highly weathered and fragile state adjacent to one of the middens. No indications were seen of structures such as shelters or windbreaks although these probably did exist on the sites here as has been recorded on other Namib coast sites.

Kinahan (2022) further suggested that the Northern Site form part of an archaeological exclusion zone measuring approximately 170ha, with a boundary length of 6.8km. Figure 11 shows the lodge site significantly removed from the shell middens.

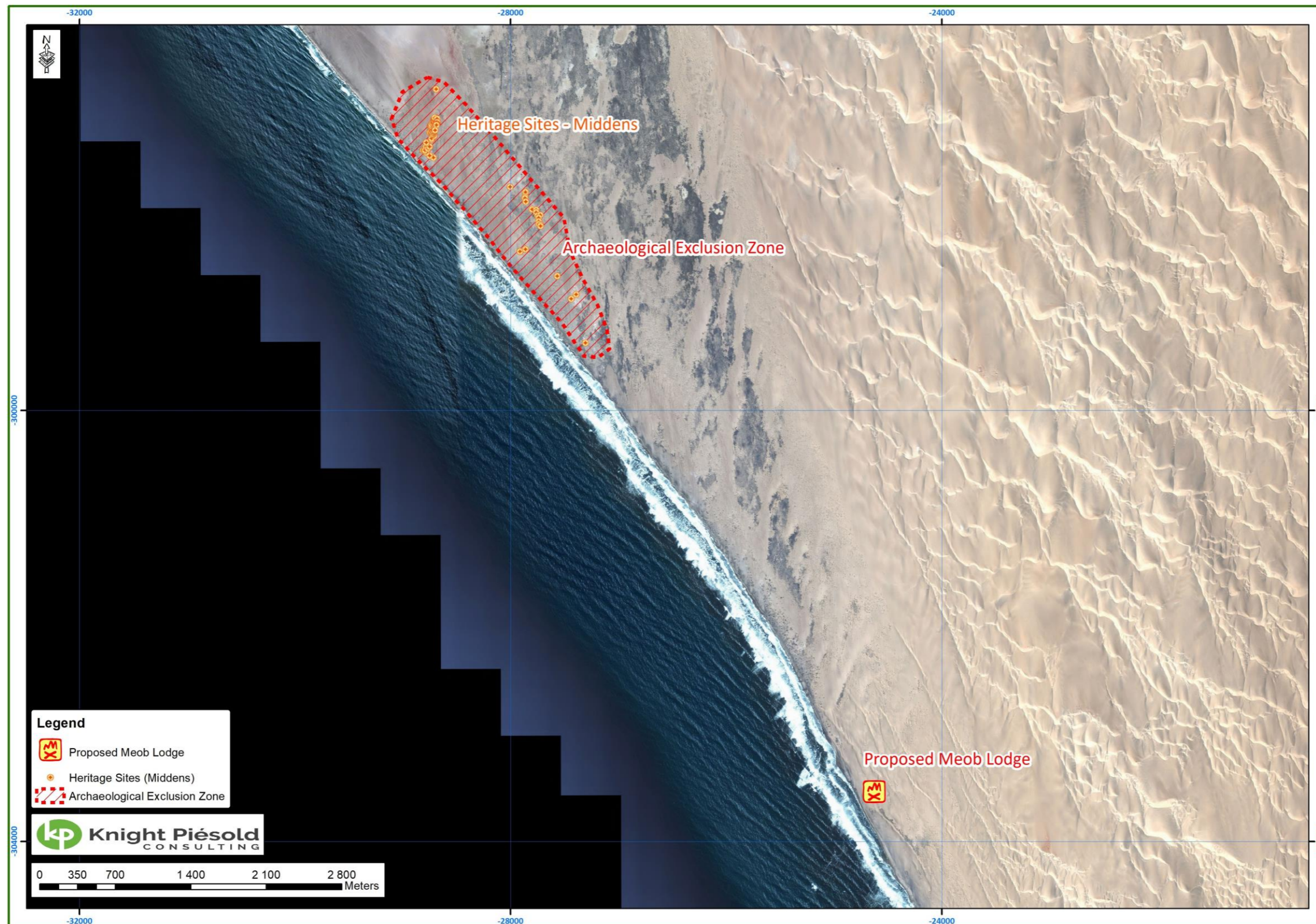


Figure 11: Middens in relation to the lodge

The middens described below was part of the 2019 archaeological assessment for the northern site. **These sites are no longer at risk as the preferred site has now been changed to the southern site.** However, the descriptions of the northern site middens have been retained in the EIA for completeness.

7.8.2.1 MIDDEN 15

Midden 15, as described by Meyer (2019) is clearly visible given its size (width of approximately 36 x 24 m with a southwest – northeast orientation). It is uniformly shaped and appears to consist of formerly smaller middens that grew together.

In the western part were some unformed smaller middens, but no separation was possible. The boundaries against the sand were all around very unclear. It contains mostly broken and fragmented white shells, which are weathered. Some of them were still intact.



Plate 9: Midden 15 seen from north to south

Note: A whale rib is visible in the foreground amongst some stones

The western part of the midden contains many bones, widely spread. One stone tool fragment was found at the surface. In the northern part of the midden other stones were found with no markings to indicate that they have been used. Here, unburnt bones were discovered. Furthermore, weathered whale ribs and two round stones were observed. Ostrich eggshells (max 4 cm) were discovered in the eastern part of the midden (Plate 10). Ostrich eggs were often used as freshwater containers, while the eggshells may have been used for jewellery.



Plate 10: Ostrich eggshells in Midden 15

7.8.2.2 MIDDENS WITH FINDS

- Potsherds

In six middens some different potsherds were discovered (Midden 1, 2, 3, 9, 18, 23). All the fragments are body sherds in a dark grey colour and all of them did not show any kind of decoration. They were max. 6 cm big and 4 mm thick. The paste consists of sand and quartz grit, so the fragments have a coarse appearance.

Unfortunately, the fragments are too small so that it is impossible to draw conclusions about the original shape of the receptacle.

- Stones

Sixteen middens showed different numbers of stones (Midden 9, 10, 12, 15, 16, 18, 46, 47, 49, 51, 52, 54, 55, 56, 59, 67). Only some of them had been worked to stone tools. Along the coastline it is fairly easy to find a certain stones of different rock types. Most of them are rounded due to the action of the water and their surface was sanded smoothly.

In the past stones were used as tools to grind grain, to sharpen cutting tools or as a hammer for example. In this case people might have used the stones to crack shells.

- Bones

In 16 middens (Midden 1, 9, 10, 12, 13, 14, 15, 18, 48, 49, 51, 52, 53, 54, 56, 67) various bone fragments were discovered at the surfaces. The bones were mostly long bones from birds, in this case maybe seabirds like seagulls. Some bones of mammals like scapulae from seals were documented too. At four locations the weathered leftovers of whale bones, mostly ribs, were found.

The evidence of whale ribs might give an answer to a kind of shelter with ribs used as a sub construction and covered with seal fur. Such shelters could have been used as a tent to protect against wind. But the whalebones might also indicate that the meat and fat of whales was used as food.

In general, the bones indicate that the people that lived and hunted along the coast added different animals to their diet.

- Iron

In one midden (Midden 1) a very small piece of rusted iron was found. It was approximately 5 cm long and 3 mm thick, of a long and round shape. No function was distinguishable.

- Ostrich Egg Shells

In two middens (Midden 15, 56) some small pieces of Ostrich Egg Shells were visible (see Plate 10). The eggshells were likely used as water containers while the egg itself was consumed. Also beads and jewellery could be made from the eggshells.

- Middens in their conditions

The middens were distinguished by their mussel shell conditions and three groups were documented: the ones that consist of intact shells, of partly intact shells and those that were mostly broken ones. The aim was to find out if there is any pattern to conclude the relative age of them.

- Middens mussel shells

Seven middens consist of intact mussel shells. They are located in the northern part of the surveyed area at about 280 m away from the shoreline. It is assumed that these might be younger middens where destruction due to weathering and animal tracks did not cause extensive damage.

Thirty-four middens with partly intact mussel shells were identified. This type of midden was found all over the surveyed area. It is assumed that they are older than the ones with intact shells as the weathering of them already started.

Twenty-nine middens contained shells that were broken into small pieces. Most of these middens are located in the animal paths and get trampled by animals. Gemsbok and jackal were present in the area at the time of the archaeology survey.

7.8.3 HERITAGE COUNCIL

The Heritage Report was submitted to the NHC for comment. Their letter (objection) and our response is captured in Section 6 and annexed in Annexure D-7.

7.9 CLIMATE

7.9.1 GENERAL REGIONAL CLIMATE

The Namib Sand Sea has the arid climate of the Namib Desert. The aridity is typified by little rainfall (which is enhanced by coastal fog) and strong winds. There is little evaporation over the South Atlantic Ocean close to Namibia because the cold waters of the Benguela Current cool the air. The minimum evaporation that occurs does not rise up to develop into rain-bearing clouds, instead it remains trapped in a layer from the sea to 600 m above sea level. Therefore, the moisture from the sea is seen as low clouds and fog. In addition, the moist tropical air from the Indian Ocean to the east usually loses moisture before it reaches the Namib coastal areas. The moist tropical air that does reach the desert descends over the escarpment, warms up and dries out as it descends. These are amongst the factors that result in the general lack of rainfall in this area (Seely, 2012).

7.9.2 TEMPERATURE

The climate of the Namib Desert is mainly influenced by the cold Benguela Current and the South Atlantic Anticyclone. The average minimum and maximum temperatures (in the coldest and hottest months) have a range of between 7 and 32 degrees Celsius (°C) (Seely, 2012).

7.9.3 CLOUD COVER AND PRECIPITATION

Summer rain over the Namib Sand Sea is rare, but when it does fall, it occurs when warm and moist air is blown in from the east. Precipitation ranges from < 20 mm in the west (on the coast) to >300 mm in the east. Winter rainfall (which does not always occur) is usually < 30 mm in total. It occurs when the low-pressure cells from the South Atlantic anticyclone brings rain to the southern 'winter rainfall' part of the Namib Sand Sea, as it passes over the southern tip of the continent. Therefore, rain over the Namib Sand Sea is exceptional and highly seasonal and mostly occurs in summer (Seely, 2012).

Fog acts as a source of moisture and it supports a wide range of the biodiversity of the Namib Sand Sea. Sometimes it materialises as minute droplets, other times as a wet drizzle almost like rain. It produces five times the moisture that is produced by rain in the western sand sea. Fog-water precipitation is recorded from high fogs, and up to 15 litres of water per day can be collected (60 to 120 days per year). The annual amount of fog precipitation varies widely, and this variety affects the population dynamics of different flora and fauna in the Namib Sand Sea area (Seely, 2012).

7.9.4 WIND

Throughout the year, Meob Bay has strong southerly and south-westerly winds. During winter months there are very strong (5-20 metres per second (m/s)) north-easterly Berg winds which occur occasionally and sometimes result in sandstorms. The south-westerlies build up from morning (reaching a peak by late morning) and dissipate by nightfall. The conditions are hardly ever calm, especially near the coast (Walmsley, n.d.).

7.10 AIR QUALITY AND NOISE

With the area being mostly devoid of human activity, the air quality is considered to be excellent, with the only noise being natural (the ocean, waves, bird and animal sounds, etc.).

7.11 GROUNDWATER

A Hydrogeological Study was undertaken by Geo Pollution Technologies (2019). This section summarises information from the study. The full report is available in Annexure E.

The project is located at the coast in an area where the rainfall is low (< 50 millimetres per annum (mm/a)) and very erratic. It can therefore be assumed that the local springs and wells are fed by water that infiltrated closer to the escarpment further to the east. It can be expected that groundwater flow will occur through a mixture of primary porosity in the surface soil cover and paleochannels in the area and through secondary porosity in fractures and faults in the underlying consolidated sandstone formations as well as in the underlying hard rock formations.

Figure 12 depicts the groundwater basins for the area. The site is located within the Namib groundwater basin, receiving locally its water mainly from the Tsondab and Tsauchab groundwater basin. The site is located outside a water control area; however, groundwater is still the property of the Government of Namibia.

A hand auger hole drilled adjacent to the tented camp well intersected beach sediments containing mussel shells up to a depth of 2 m below surface. Water was intersected from 1 m below surface. It therefore seems as if the freshwater will have a direct interface with the seawater.

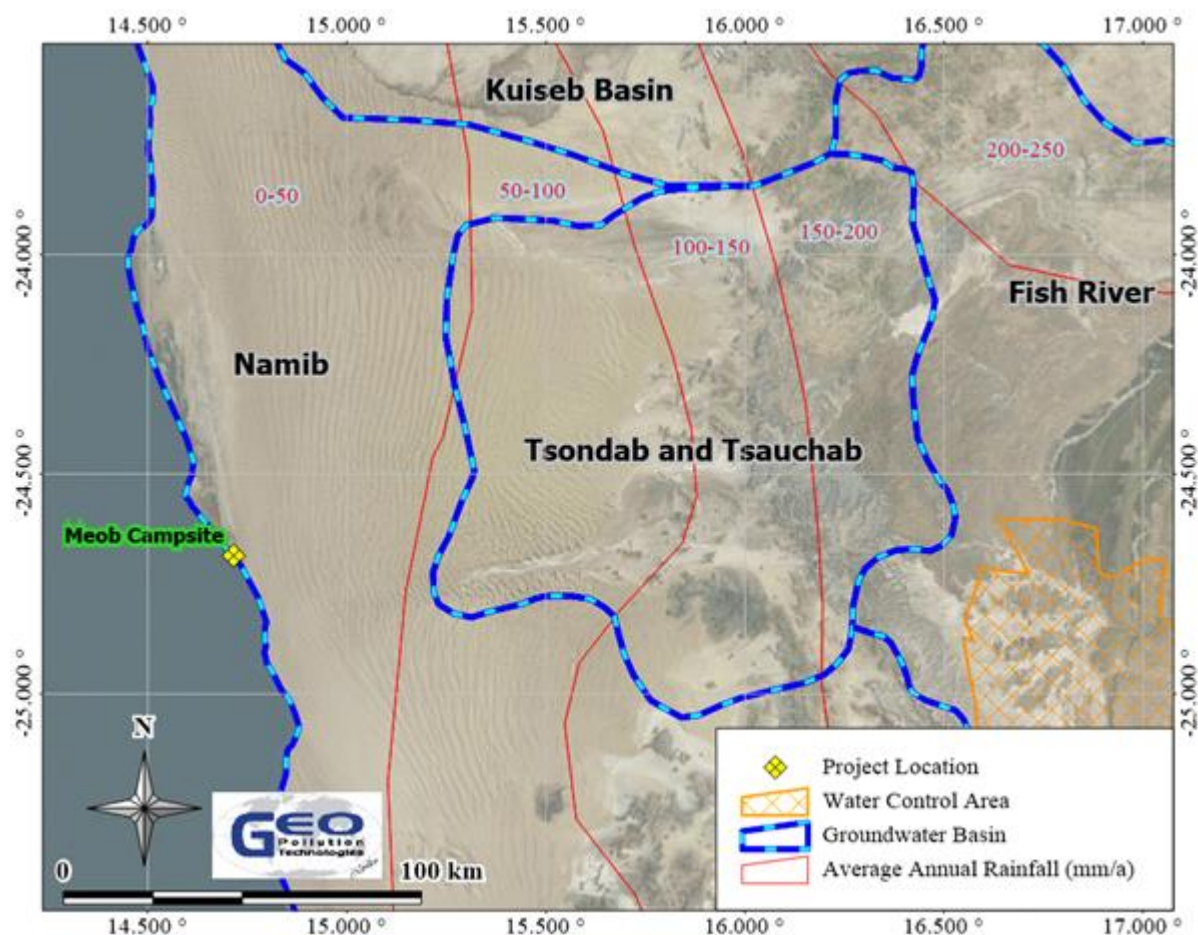


Figure 12: Water control areas with groundwater basins and average annual rainfall (Geo Pollution Technologies, 2019)

7.11.1 AQUIFER TESTING

A constant rate test was conducted on the existing well at the tented campsite. A monitoring hole was drilled 4.9 m from the existing well, on the inland side of the well. The existing well has a diameter of 1.4 m and is located approximately 150 m from the high-water mark of the Atlantic Ocean. The existing well was subjected to a constant rate test at a pump rate of 1,000 litre per hour (ℓ/h) for a discharge period of 300 minutes. Water was discharged near the high-water mark.

The Stallman method was utilised to analyse the data measured in the observation well. A transmissivity (T) value of 53.1 m²/d and a storativity (S) value of 0.15 were used.

7.11.2 WATER QUALITY

A water sample collected in February 2019 from the tented campsite well indicated that the water is of a Na-Cl water type, similar to marine or very old water. The water is classified as unsuitable for human consumption, mainly due to the salinity caused by elevated sodium (Na) and chloride (Cl) concentrations. The sulphate and hardness concentration is also of concern and scaling can be expected.

The campsite is equipped with an undercounted reverse osmosis system that can treat small volumes of water. A water sample was also collected of the tented campsite well water after it was treated by the treatment system, and the results indicated that the system effectively treated the water to a suitable quality.

8 IMPACT ASSESSMENT

8.1 DEFINING THE NATURE OF THE IMPACT

An impact is essentially any change to a resource or receptor brought about by the presence of the proposed project component or by the execution of a proposed project related activity. The terminology used to define the nature of an impact is detailed in Table 6 below.

Table 6: Impact Nature

Term	Definition
Positive (+)	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative (-)	An impact that is considered to represent an adverse change from the baseline or introduces a new undesirable factor.
Direct impact (D)	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).
Indirect impact (I)	Impacts that result from other activities that are encouraged to happen as a consequence of the project (e.g. in-migration for employment placing a demand on resources).
Cumulative impact (C)	Impacts that act together with other impacts (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as the Project.
Residual impact	Those impacts that remain following the implementation of the mitigation measures proposed.

Assessing Significance

The Knight Piésold impact significance rating system is based on the following equation:

$$\text{Significance of Environmental / Social Impact} = \text{Consequence} \times \text{Probability}$$

The consequence of an impact can be derived from the following factors:

- Severity / Magnitude – the degree of change brought about in the environment;
- Reversibility - the ability of the receptor to recover after an impact has occurred;
- Duration - how long the impact may be prevalent; and
- Spatial Extent - the physical area which could be affected by an impact.

The severity, reversibility, duration, and spatial extent are ranked using the criteria indicated in Table 7 and then the overall consequence is determined by adding up the individual scores and multiplying it by the overall probability (the likelihood of such an impact occurring). Once a score has been determined, this is checked against the significance descriptions indicated in Table 8.

Table 7: Ranking Criteria

Severity / magnitude (M)	Reversibility (R)	Duration (D)	Spatial extent (S)	Probability (P)
5 – Very high – The impact causes the characteristics of the receiving environment/ social receptor to be altered by a factor of 80 – 100%	5 – Irreversible – <u>Environmental</u> - where natural functions or ecological processes are altered to the extent that it will permanently cease. <u>Social</u> - Those affected will not be able to adapt to changes and continue to maintain pre-impact livelihoods.	5 – Permanent - Impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.	5 – International - Impacts that affect internationally important resources such as areas protected by international conventions, international waters etc.	5 – Definite - The impact will occur
4 – High – The impact alters the characteristics of the receiving environment/ social receptor by a factor of 60 – 80%		4 – Long term - impacts that will continue for the life of the Project but ceases when the Project stops operating.	4 – National - Impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences.	4 – High probability – 80% likelihood that the impact will occur
3 – Moderate – The impact alters the characteristics of the receiving environment/ social receptor by a factor of 40 – 60%	3 – Recoverable <u>Environmental</u> - where the affected environment is altered but natural functions and ecological processes may continue or recover with human input. <u>Social</u> - Able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support or intervention.	3 – Medium term - Impacts are predicted to be of medium duration (5 – 15 years)	3 – Regional - Impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystem.	3 – Medium probability – 60% likelihood that the impact will occur
2 – Low – The impact alters the characteristics of the receiving environment/ social receptor by a factor of 20 – 40%		2 – Short term - Impacts are predicted to be of short duration (0 – 5 years)	2 – Local - Impacts that affect an area in a radius of 2 km around the site.	2 – Low probability - 40% likelihood that the impact will occur
1 – Minor – The impact causes very little change to the characteristics of the receiving environment/ social receptor and the alteration is less than 20%	1 – Reversible <u>Environmental</u> - The impact affects the environment in such a way that natural functions and ecological processes are able to regenerate naturally. <u>Social</u> - People/ communities are able to adapt with relative ease and maintain pre-impact livelihoods.	1 – Temporary - Impacts are predicted to be intermittent/ occasional over a short period.	1 – Site only - Impacts that are limited to the site boundaries.	1 – Improbable - 20% likelihood that the impact will occur

Table 8: Significance Definitions

Score According to Impact Assessment Matrix	Significance Definitions	Colour Scale Ratings	
		Negative Ratings	Positive Ratings
Between 0 and 29 significance points indicate Low Significance	An impact of low significance is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value.	Low	Low
Between 30 and 59 significance points indicate Moderate Significance	An impact of moderate significance is one within accepted limits and standards. The impact on the receptor will be noticeable and the normal functioning is altered, but the baseline condition prevail, albeit in a modified state. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is As Low as Reasonably Practicable (ALARP). This does not necessarily mean that “moderate” impacts have to be reduced to “low” impacts, but that moderate impacts are being managed effectively and efficiently to not exceed accepted standards.	Moderate	Moderate
60 to 100 significance points indicate High Significance	An impact of high significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An impact with high significance will completely modify the baseline conditions. A goal of the EIA process is to get to a position where the project does not have any high negative residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be high residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors, such as employment, in coming to a decision on the project.	High	High

A detailed impact significance table for the Meob project is found in Table 9. The descriptions of each impact in this section should be read in conjunction with this table.

8.2 IMPACT ASSESSMENT PER ENVIRONMENTAL ASPECT

8.2.1 LAND USE & AESTHETICS

Because the project is located within a pristine, world heritage site, the change in land use from wilderness to tourism can be rated as high. That being said, the proposed project is fully aligned with the land use plan for Meob Bay. In the Land Use Plan for Meob Bay (Walmsley, n.d.) it is stated that:

“The most suitable, sustainable land use options for the Meob Concession Area (MCA) are tourism, and conservation and research. It is recommended in this land use plan that a small lodge could be constructed at Meob, with day tours into the surrounding areas, capitalising on the biotic and abiotic resources in the area, such as mining history, shipwrecks, whale bones, bird life in the salt pans, stark desert landscapes, desert-adapted wildlife, marine mammals, surf angling etc. Access to the area will be predominantly by air and land-based access will be limited to specially arranged tours (guided 4 x 4 convoys). The lodge could also be used as a base for researchers and conservation officials working in the area.”

8.2.2 TOPOGRAPHY AND DRAINAGE

No impacts on topography and drainage are expected.

8.2.3 GEOLOGY

No impacts on geology are expected.

8.2.4 SOIL

Contamination by means of a hazardous spill is a potential impact on soil. However, the amount and usage of hazardous substances on site is miniscule and, therefore, the impact is rated as having a very low significance before and after mitigation.

8.2.5 FAUNA

The direct impacts on fauna from the lodge (through habitat loss or disturbance) is considered to be localised and short term, but definite. The impacts on fauna are rated as moderate and low before mitigation, and low after mitigation. It should be noted that if further developments were to occur – e.g. more lodges, tented camps, tracks/roads increase, the extent or cumulative effect of the impact(s) will increase.

The impact during construction of lodge infrastructures is expected to be detrimental to reptiles associated with the affected area/habitat. This would affect a relatively small area (~2ha) over a short/limited period of time. The impact of lodge infrastructures is not expected to be detrimental to reptiles – i.e. would not impede their movement, etc.

Most fauna species (especially species associated with the well-vegetated dune hummocks – e.g. various reptiles and small mammals) are expected to re-colonise the areas not altered by the construction of the lodge.

Larger mammals (e.g. oryx, brown hyena, etc.), not viewed as sedentary and/or permanently associated with the area, would not be affected as severely as these species are not permanently associated with the area.

The effect that aircraft may have on the fauna is difficult to determine beforehand, although increased disturbance associated with increased activities are expected. As the Fischersbrunn airstrip is an existing runway with infrequent use, the impact is viewed as minimal as larger species would be accustomed to the disturbance. This would, however, be limited to the actual areas affected.

Indirect impacts on fauna caused by potential impacts on groundwater (i.e. hazardous spills, seawater intrusion, or over abstraction) include animal deaths or out-migration due to contaminated or insufficient water. These indirect impacts have been rated as moderate before mitigation and low after mitigation.

Impacts on the abundance, breeding productivity and biodiversity on coastal sea- and shorebirds in response to off-road vehicle traffic associated with the proposed development would largely consist of an indirect impact (disturbance) and a small likelihood of a direct impact (bird mortalities), potentially of moderate magnitude (depending on traffic density, frequency and routes used).

Impacts on the biodiversity of beach macrobenthic invertebrates in response to off-road vehicle traffic associated with the proposed development would be considered an indirect impact potentially of low to moderate magnitude (depending on traffic density and height on the beach). Impacts would therefore be fully reversible, and the overall significance of the project is rated as low. Similarly, the impacts on the abundance of white mussel and pillbugs in response to off-road vehicle traffic associated with the proposed development would be considered an indirect impact potentially of low (*Donax*) to moderate (*Tylos*) significance (depending on time of day and height on the beach).

8.2.6 FLORA

The impacts on flora is considered to be localised and short term, but definite. The impacts on fauna are rated as moderate and low before mitigation, and low after mitigation. It should be noted that if further developments were to occur – e.g. more lodges, tented camps, tracks/roads increase, the extent or cumulative effect of the impact(s) will increase.

Indirect impacts on flora caused by potential impacts on groundwater (i.e. hazardous spills, seawater intrusion, or over abstraction) include plant dieback due to contaminated or insufficient water. These indirect impacts have been rated as moderate before mitigation and low after mitigation.

8.2.7 ARCHAEOLOGY

The potential impact on the shell middens would be permanent, and therefore the proposed lodge location has been shifted from the Northern site to the Southern Site in order to protect these heritage resources and prevent any impact. This shift to the Southern Site is expected to have no impact on heritage resources, however, the development of the heritage exclusion zone is expected to have a positive impact on the heritage resources at the Northern Site.

8.2.8 CLIMATE

No impacts on climate are expected.

8.2.9 AIR QUALITY

Carbon emissions may increase because of the use of 4x4 vehicles, the generator, airplanes and incineration of biodegradable waste. There will also be dust during construction and because of vehicle entrainment from gravel roads. The impact is rated as having a low significance before and after mitigation.

8.2.10 NOISE

During the construction phase, noise from construction activities may be generated. However, this activity will be very short term and localised. When the backup generator is required, this will also create noise. Therefore, the impact is rated as having a low significance before and after mitigation.

8.2.11 SOCIO-ECONOMIC

During both the construction and operational phases, jobs will be created. The significance of this impact is rated as moderate (positive) during the construction phase, and high (positive) during the operational phase. During the operational phase, the job opportunities created will be longer term.

Furthermore, during the operational phase, tourism in the Hardap Region will be increased. This positive impact is rated as having a high (positive) significance.

The potential of health and safety impacts on workers and visitors is rated as having a low (negative) significance, that will be reduced to even lower significance when health and safety management measures are implemented.

Impacts of off-road driving associated with the proposed development on other beach users along the coastline of the Namib-Naukluft Park would be considered an indirect impact potentially of minor magnitude due to the low visitor numbers in the area. The overall significance of the impact is therefore rated low.

8.2.12 GROUNDWATER

Two potential groundwater impacts may occur, i.e. groundwater contamination because of a hazardous spillage or seawater intrusion or over abstraction of groundwater leading to insufficient water supply. These impacts are rated as moderate before mitigation, but low after mitigation.

Table 9: Impact Significance

Project activity or issue	Potential impact	Nature of impact		Significance before mitigation							Significance after mitigation as per EMP						
		+ / -	D/I/C	M	R	D	S	P	TOTAL	SP	M	R	D	S	P	TOTAL	SP
Land use																	
Construction of Lodge	Change of land use	-	D	2	3	4	5	5	70	H	2	1	4	5	5	60	H
Topography & Drainage																	
	No impacts expected																
Geology																	
	No impacts expected																
Soil																	
Hazardous chemical spills (e.g. fuel)	Contamination of Soil	-	D	1	1	1	1	1	4	L	1	1	1	1	1	22	L
Fauna																	
Construction of Lodge	Loss/ Disturbance of fauna	-	D	2	1	1	2	5	30	M	1	1	1	2	5	25	L
Operation of Lodge	Loss/ Disturbance of fauna	-	D	2	3	2	2	5	45	M	1	1	1	2	5	25	L
Decommissioning	Loss/ Disturbance of fauna	-	D	1	1	1	1	5	20	L	1	1	1	1	1	4	L
Hazardous chemical spills (e.g. fuel) or seawater intrusion	Animals dying or moving away due to contaminated water	-	I	3	3	4	2	3	36	M	3	3	4	1	2	22	L
Water abstraction	Animals dying or moving away due to insufficient water	-	I	3	3	4	2	4	48	M	3	3	4	1	2	22	L
Coastal and Marine Ecology																	
Construction and Operation: Off-road driving	Beach Geomorphology	-	I	3	3	3	3	2	24	L	2	3	1	3	1	9	L
Construction and Operation: Off-road driving	Beach macrofaunal biodiversity	-	I	3	1	2	3	3	27	L	2	1	2	2	2	14	L
Construction and Operation: Off-road driving	Coastal Birds	-	I	3	3	2	3	3	33	M	2	1	2	3	2	16	L
Construction and Operation: Off-road driving	Tylos sp.	-	C	3	1	4	3	4	44	M	1	1	2	2	1	6	L

Project activity or issue	Potential impact	Nature of impact		Significance before mitigation						SP	Significance after mitigation as per EMP						SP
		+ / -	D//IC	M	R	D	S	P	TOTAL		M	R	D	S	P	TOTAL	
Construction and Operation: Off-road driving	White Mussels	-	I	2	1	2	3	3	24	L	1	1	2	2	1	6	L
Construction and Operation: Off-road driving	Other species	-	I	2	1	2	3	2	16	L	1	1	2	2	1	6	L
Flora																	
Construction of Lodge	Loss/ Disturbance of flora	-	D	2	1	3	2	5	40	M	1	1	1	2	5	25	L
Operation of Lodge	Loss/ Disturbance of flora	-	D	2	3	1	2	5	40	M	1	1	1	2	5	25	L
Decommissioning	Loss/ Disturbance of flora	-	D	1	1	1	1	5	20	L	1	1	1	1	5	20	L
Hazardous chemical spills (e.g. fuel) or seawater intrusion	Plant dieback due to contaminated water	-	I	3	3	4	2	3	36	M	3	3	4	1	2	22	L
Water abstraction	Plant dieback due to insufficient water	-	I	3	3	4	2	4	48	M	3	3	4	1	2	22	L
Socio-Economics																	
Construction of Lodge	Construction job opportunities	+	D	2	5	1	3	5	55	M	2	5	1	3	5	55	M
Operation of Lodge	Longer term job opportunities	+	D	2	5	3	3	5	65	H	2	5	3	3	5	65	H
Operation of Lodge	Increased tourism Hardap	+	D	2	5	3	3	5	65	H	2	5	3	3	5	65	H
Workers and Visitors to the area	Health and Safety Impacts	+	D	2	3	1	1	3	21	L	2	3	1	1	1	7	L
Construction and Operation: Off-road driving	Traffic Incidents	-	I	1	1	1	2	1	5	L	1	1	1	2	1	5	L
Archaeology																	
Construction of Lodge	Impact on shell middens		D	0	0	0	0	0	0	L	0	0	0	0	0	0	L
Development of exclusion zone	Impact on shell middens	+	D	2	5	5	1	1	13	L	2	5	5	1	2	26	L
Climate																	
	No impacts expected																
Air quality																	

Project activity or issue	Potential impact	Nature of impact		Significance before mitigation						SP	Significance after mitigation as per EMP						SP
		+ / -	D//C	M	R	D	S	P	TOTAL		M	R	D	S	P	TOTAL	
Construction and Operation of Lodge	Increase in carbon emissions from 4x4 vehicles, flights and incineration of biodegradable waste	-	D	3	3	3	2	4	44	M	3	3	3	2	4	44	M
Construction and Operation of Lodge	Increase in dust from vehicle entrainment on gravel roads and construction activities	-	D	1	1	3	1	3	18	L	1	1	3	1	3	18	L
Noise																	
Construction of Lodge	Generation of noise (e.g vehicle and equipment noise & noise from building activities)	-	D	3	1	1	1	5	30	M	2	1	1	1	4	20	L
Groundwater																	
Hazardous chemical spills (e.g. fuel) or seawater intrusion	Groundwater Contamination	-	D	5	3	4	2	3	42	M	3	3	4	1	2	22	L
Water abstraction	Over abstraction and reduced / no potable water supply	-	D	5	3	4	2	4	56	M	3	3	4	1	2	22	L

9 ENVIRONMENTAL MANAGEMENT PLAN

This section provides an Environmental Management Plan (EMP) to summarise the mitigation and management actions outlined in the previous sections. This is done in order to streamline the implementation and monitoring thereof.

The applicant is to ensure full compliance not only with this EMP but also with all Namibian Legislation, and as far as possible all best practice guidelines.

The EMP is split into a Construction, Operation and Decommissioning Phase, in Table 10, Table 11 and Table 12 respectively.

Table 10: Environmental Management Plan - Construction Phase

Project activity or issue	Potential impact	Mitigating action
<i>Land use & Aesthetics</i>		
Construction activities	Change of land use	<ul style="list-style-type: none"> • Ensure that sense of place is kept as natural as possible by minimising the footprint and designing and operating facilities that blend in with the natural surrounds. • Keep construction phase as short as possible.
Construction activities	Visual / aesthetic impact	<ul style="list-style-type: none"> • Ensure that the outer shell of any structure blends with the surrounding environment. • Ensure that visitor accommodation enhances the "sense of place" attraction of the Concession Area. • Site staff quarters, storage facilities, maintenance area and other support facilities away from and out of sight of visitor facilities bearing in mind prevailing weather conditions. • Avoid light pollution, direct lights downwards and avoid floodlighting where feasible.
Installation linear infrastructure (pipelines / power lines)		<ul style="list-style-type: none"> • Align linear infrastructure together (where feasible) and bury them underground.
Installation of communication networks / masts		<ul style="list-style-type: none"> • Avoid installation of infrastructure at high points to hide them from view where feasible.
<i>Soil</i>		
Construction activities	Hazardous spillage	<ul style="list-style-type: none"> • Store hazardous substances in appropriately bunded areas. • Use a drip-tray when refuelling vehicles or machinery. • If a spillage occurs, clean it up immediately and dispose soil at an appropriate site (Walvis Bay) as hazardous waste.
<i>Fauna</i>		
Construction activities	Loss / Disturbance of fauna	<p>Lodge area & camp site:</p> <ul style="list-style-type: none"> • Construct the chalets between the <i>Salsola nollothensis</i> and <i>Cladoraphis cyperoides</i> hummocks for least impact on vertebrate species favouring these areas (e.g. reptiles and small mammals) – i.e. do not destroy this habitat. Incorporating these hummocks into the Lodge layout would furthermore contribute to the overall desert ambiance of the facility. • Prevent and discourage indiscriminate killing of perceived dangerous species (e.g. snakes, etc.)

Project activity or issue	Potential impact	Mitigating action
		<p>as this would diminish and negatively affect the local fauna. No form of poaching, illegal collecting of veld foods (e.g. bird eggs, etc.), etc. should be tolerated, especially during the construction phase.</p> <ul style="list-style-type: none"> • Remove and relocate perceived dangerous species (e.g. snakes) to similar undisturbed habitats in the general area. • Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and result in typical problem animal scenarios – e.g. crows, black-backed jackal, brown hyena, various gulls, etc. • When observing Damara Terns or shorebirds displaying behaviour that indicates the presence of a nest nearby (e.g. mobbing or alarm call behaviour by parent birds, birds acting injured to distract attention from their nest), avoid the nest and a 100 m radius until nesting has clearly been concluded. • Use only existing tracks/roads when travelling in the area. • Implement and maintain track discipline limited to pre-determined tracks with maximum speed limits (e.g. 40 km/h) as this would result in fewer faunal road mortalities and overall destruction of vegetated areas which serve as habitat to a variety of fauna. • Avoid off road driving in areas prone to scarring (e.g. gravel/gypsum/salt plains/flats/pans). Avoid nocturnal driving, as this result in the destruction of slow-moving fauna – e.g. various reptiles and other nocturnal species. • Rehabilitate all new tracks, construction site(s), temporary accommodation site(s), etc. • Avoid and/or limit the use of lights during nocturnal activities as this influence and/or affects various nocturnal species – e.g. especially migrating Palaearctic birds, bats, owls, etc. and contribute to “light pollution”. Use focused lighting for least effect. • Install a suitable contained sewerage system for the least impact on the environment and ensure that a risk strategy is in place to contain potential operational problems. • Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and resulting typical problem animal scenarios – e.g. crows, black-backed jackal, brown hyena, etc. • Prevent using driftwood and other firewood sourced throughout the area, but rather source firewood from outside the Park, especially invasive alien species such as <i>Prosopis</i> spp.. • Prohibit domestic pets – e.g. cats and dogs – accompanying, workers/staff/tourists as they cause considerable damage to the local fauna. Cats also interbreed and transmit diseases to the

Project activity or issue	Potential impact	Mitigating action
		<p>indigenous African wildcat found in the area while dogs could transmit canine diseases to brown hyena. The indiscriminate and wanton killing of the local fauna by such pets should be avoided at all cost.</p> <ul style="list-style-type: none"> • No animal (marine or terrestrial) may be injured, fed, trapped, hunted or harmed in any way. • Limit water abstraction so as not to impact negatively on the groundwater recharge and consequently the associated vegetation which would affect vertebrate species dependent thereon. • Educate/inform contractors and staff on dangerous (e.g. snakes) and protected species (e.g. brown hyena) to avoid and the consequences of killing and/or illegal collection of such species. Liaise with the Ministry of Environment and Tourism (MET) to provide this service as the area is within the NNP and United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site.
<i>Flora</i>		
Construction activities	Loss / Disturbance of flora	<p>Important areas:</p> <ul style="list-style-type: none"> • Avoid off road driving on gravel and gypsum plains. • Avoid off road driving on salt pans. • Avoid overexploiting and/or contaminating any and all water sources throughout the area as this will ultimately affect the vegetation, especially the extensive stands of <i>Cladoraphis cyperoides</i> and <i>Odyssea paucinervis</i> which in turn provide habitat and serve as a source of food for a variety of vertebrates. • Although there are no !Nara in the proposed development area, the northern access route from Walvis Bay passes patches of these plants in the Sandwich Harbour area and these should be avoided. <p>Lodge area and camp site:</p> <ul style="list-style-type: none"> • Construct the chalets between the <i>Salsola nollothensis</i> and <i>Cladoraphis cyperoides</i> hummocks for least impact on flora – i.e. do not destroy this habitat. Incorporating these hummocks into the Lodge layout would furthermore contribute to the overall desert ambiance of the facility. • Prevent and discourage illegal collection of flora (e.g. unique bulbs potentially occur in the area and only visible of periodic rain showers) as this would diminish and negatively affect the local flora.

Project activity or issue	Potential impact	Mitigating action
		<ul style="list-style-type: none"> • Use only existing tracks/roads when travelling in the area. • Implement and maintain track discipline limited to pre-determined tracks with maximum speed limits (e.g. 40 km/h) as this would result in less dust pollution and overall destruction of vegetated areas which serve as habitat to a variety of fauna. • Avoid off road driving in areas prone to scarring (e.g. gravel/gypsum/salt plains/flats/pans) or dominated by lichens. • Prevent the planting of potentially alien invasive plant species (e.g. <i>Tecoma stans</i>, <i>Pennisetum setaceum</i>, etc.) for ornamental purposes as part of the landscaping (e.g. around Lodge, staff accommodation, etc.) should this be thought necessary. Alien species often “escape” and become invasive causing further ecological damage. • Implement a policy of “no tolerance” towards any invasive alien plant species encountered in future in the area. This should include the removal and destruction of these species throughout the proposed development areas. • If any landscaping is to be undertaken, incorporate only indigenous vegetation. • Limit water abstraction so as not to impact negatively on the groundwater recharge and consequently the associated vegetation which would affect vertebrate species dependent thereon. • Monitor water levels. • Educate/inform contractors and staff on protected species to avoid and the consequences of illegal collection of such species. Liaise with MET to provide this service as the area is within the NNP and UNESCO World Heritage Site. • Prohibit the use of any pesticides or herbicides.
<i>Marine Resources</i>		
Construction team on site	Exploitation of marine resources	<ul style="list-style-type: none"> • Any fishing by construction workers will be strictly prohibited.
<i>Socio-economic</i>		
Construction activities	Job opportunities	<ul style="list-style-type: none"> • Appoint local contractor(s) and workers from the Hardap Region for the construction activities
Construction activities	Health and Safety of Construction workers	<ul style="list-style-type: none"> • Implement the requirements of the Labour Act 11 of 2007 (as amended) to ensure the health and safety of workers and visitors.

Project activity or issue	Potential impact	Mitigating action
		<ul style="list-style-type: none"> • Develop and implement a Health and Safety Plan before construction and continue implementation during operation • Provide training to all workers prior to starting work. • Ensure that the contractor has a Human Immunodeficiency Virus (HIV) /Acquired Immune Deficiency Syndrome (AIDS) Policy and Programme and Health and Safety Plan is in place for their workers.
<i>Archaeology</i>		
Construction Activities	Damage or destruction of shell middens	<ul style="list-style-type: none"> • Engage with the NHC regarding the proposed project. • The lodge location should be at least 500 m from any or the middens, to prevent physical disturbance and to exclude the lodge from the immediate landscape setting of the sites. • Also proposed is an archaeological exclusion zone measuring approximately 170 ha, with a boundary length of 6.8km. It is proposed that this area should be completely closed, most especially to vehicle traffic.
Construction Activities	Destruction of other	<ul style="list-style-type: none"> • Educate all staff on the provisions of the National Heritage Act 27 of 2004 with regard to the protection of all archaeological sites and the need to report any new finds. • Should a possible or suspected site be discovered (e.g. a grave), immediately stop work, cordon the area off and photograph the area/site; immediately inform the project manager/supervisor, and contact an Archaeologist and the NHC of Namibia. • Under no circumstances are archaeological and/or cultural heritage sites to be disturbed or any relics to be removed from such a site. • Appoint an archaeologist to supervise and monitor development activities to ensure that no unnecessary destruction takes place.
<i>Air Quality</i>		
Construction of Lodge	Increase in carbon emissions from construction vehicles and incinerator	<ul style="list-style-type: none"> • Undertake necessary maintenance on vehicles and equipment and keep a maintenance record. • Incinerators “donkeys” used to burn waste and heat water should only burn biodegradable (paper-based) waste.
Construction of Lodge	Increase in dust	<ul style="list-style-type: none"> • Implement speed limits of 40 km/h • Provide personal protective equipment (PPE) to construction workers to prevent or minimise dust inhalation from construction activities.

Project activity or issue	Potential impact	Mitigating action
<i>Noise</i>		
Construction of Lodge	Generation of noise (e.g. vehicle and building noise)	<ul style="list-style-type: none"> • Limit travelling speed of all vehicles and machinery to 40 km/h. • Undertake necessary maintenance on vehicles and equipment and keep a maintenance record.
<i>Surface and Groundwater</i>		
Construction activities	Impact on surface and groundwater	<ul style="list-style-type: none"> • Limit water abstraction so as not to negatively affect any spring, fountain, wetland, seep or any other natural water source in the concession area. • Restrict water usage to a maximum of 100 litres per occupied visitor bed per day and a maximum of 100 litres per staff member per day. • Prohibit sourcing of water into the Park via a pipeline from east of the Park border. • Install adequate meters for monitoring compliance to the above limits. • Undertake all laundry well outside the Park. • Implement proper pollution control measures. • Immediately clean up all accidental pollution (oil spills, diesel spills etc.)
<i>Waste Management</i>		
Construction activities	Various environmental impacts	<ul style="list-style-type: none"> • Minimise the creation of waste at source. • Prioritise solid waste recycling, separation at source and safe disposal of unavoidable waste. • Remove all solid waste from the Park to the Walvis Bay Landfill Site. • Provide suitable waste storage and separation facilities that are fully enclosed and inaccessible by any wildlife. • Ensure that waste storage containers have lids to prevent wind dispersal of waste. • Burn biodegradable waste and paper waste products in a suitable incinerator. • Prohibit the burning of plastic or rubber or any of their derivatives, styrofoam products, or any waste fuel or lubricants. • Remove all ash and other waste to the Walvis Bay Landfill Site in appropriate sealed containers or bags on a monthly basis. • Minimise the impact of liquid waste on the natural environment in general, and on both surface and groundwater resources in particular.

Project activity or issue	Potential impact	Mitigating action
		<ul style="list-style-type: none"> • Install a plastic septic tank system at the temporary construction camp. • Prohibit the disposal of sewerage into the sea or water resources • Remove toxic and hazardous effluent to Walvis Bay Landfill Site.
<i>Tracks vehicles and driving</i>		
Driving to and from site as part of construction process	Various environmental impacts	<ul style="list-style-type: none"> • Only use existing roads and tracks in the concession area, and no new track, road or airstrips may be laid out without the prior written permission of the MET. • Maintain and repair the track network if necessary. • Adhere to the speed limit of 40 km/h in the Concession Area.

Table 11: Environmental Management Plan – Operational Phase

Project activity or issue	Potential impact	Mitigating action
<i>Land use & Aesthetics</i>		
Operation of Lodge and tented camp	Change of land use	<ul style="list-style-type: none"> Keep the sense of place as natural as possible.
Use of lights	Visual impact	<ul style="list-style-type: none"> Avoid light pollution, direct lights downwards and avoid floodlighting where feasible.
<i>Soil</i>		
Operation of Lodge and camp	Hazardous spillage	<ul style="list-style-type: none"> Store hazardous substances in appropriately bunded areas. Use a drip-tray when refuelling vehicles or machinery. If a spillage occurs, clean it up immediately and dispose soil at an appropriate site as hazardous waste.
<i>Fauna</i>		
Operation of Lodge	Loss / Disturbance of fauna	<p>Lodge area & camp site:</p> <ul style="list-style-type: none"> Prevent and discourage indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) as this would diminish and negatively affect the local fauna. Prevent and discourage all forms of poaching, illegal collecting of veld foods (e.g. bird eggs). Remove and relocate perceived dangerous species (e.g. snakes) to similar undisturbed habitats in the general area. Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and result in typical problem animal scenarios – e.g. crows, black-backed jackal, brown hyena, various gulls, etc. When observing Damara Terns or shorebirds displaying behaviour that indicates the presence of a nest nearby (e.g. mobbing or alarm call behaviour by parent birds, birds acting injured to distract attention from their nest), avoid the nest and a 100 m radius until nesting has clearly been concluded. Schedule the beach driving trips to coincide with the receding tide, i.e. driving should

Project activity or issue	Potential impact	Mitigating action
		<p>occur only 2-3 hours either side of the low tide.</p> <ul style="list-style-type: none"> • Maintain a buffer of at least 25 m and a vehicle speed slower than 30 km/h around roosting or feeding shorebirds. • If necessary, stop to allow large groups of roosting or foraging birds to move away from approaching vehicles and to take flight without causing a mass stampede. • Maintain a buffer of at least 100 m and a vehicle speed of slower than 30 km/h around seal colonies or haul-out sites, allowing seals to move away from approaching vehicles towards the ocean without causing a mass stampede. • Consider imposing a seasonal closure during periods critical to the life cycle of vulnerable coastal bird species. This would concurrently provide opportunity to allow impacted macroinvertebrates to recover. • Lodge guests may not undertake any recreational fishing or bait collection whilst in the area. • Make use of existing tracks/roads as much as possible throughout the area. • Implement and maintain track discipline limited to pre-determined tracks with maximum speed limits (e.g. 40 km/h) as this would result in fewer faunal road mortalities and overall destruction of vegetated areas which serve as habitat to a variety of fauna. • Avoid off road driving in areas prone to scarring (e.g. gravel/gypsum/salt plains/flats/pans). • Avoid night-time driving as this may result in the accidental deaths of slow-moving fauna – e.g. various reptiles and other nocturnal species. • Avoid and/or limit the use of lights during nocturnal activities as this influence and/or affects various nocturnal species – e.g. especially migrating Palaearctic birds, bats, owls, etc. and contribute to “light pollution”. Use focused lighting for least effect. • Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and resulting typical problem animal scenarios – e.g. crows, black-backed jackal, brown hyena, etc. • Prevent using driftwood and other firewood sourced throughout the area, but rather source firewood from outside the park, especially invasive alien species such as <i>Prosopis spp.</i> • Prohibit domestic pets – e.g. cats and dogs – accompanying, workers/staff/tourists as

Project activity or issue	Potential impact	Mitigating action
		<p>they cause considerable damage to the local fauna. Cats also interbreed and transmit diseases to the indigenous African wildcat found in the area while dogs could transmit canine diseases to brown hyena. The indiscriminate and wanton killing of the local fauna by such pets should be avoided at all cost.</p> <ul style="list-style-type: none"> • Prohibit the injury, feeding, trapping, hunting or harming of marine and terrestrial animals in any way. • Be conservative with the abstraction of water so as not to impact negatively on the groundwater recharge and consequently the associated vegetation which would affect vertebrate species dependent thereon.
<i>Flora</i>		
Operation of Lodge	Loss / Disturbance of flora	<p>Important areas:</p> <ul style="list-style-type: none"> • Avoid off road driving on gravel and gypsum plains. • Avoid off road driving on salt pans. • Avoid overexploiting and/or contaminating any and all water sources throughout the area as this will ultimately affect the vegetation, especially the extensive stands of <i>Cladoraphis cyperoides</i> and <i>Odyssea paucinervis</i> which in turn provide habitat and serve as a source of food for a variety of vertebrates. • Avoid the patches of !Nara in the northern access route from Walvis Bay in the Sandwich Harbour area. <p>Lodge area and camp site:</p> <ul style="list-style-type: none"> • Prevent and discourage illegal collection of flora (e.g. unique bulbs potentially occur in the area and only visible of periodic rain showers) as this would diminish and negatively affect the local flora. • Make use of existing tracks/roads as much as possible throughout the area. • Implement and maintain track discipline limited to pre-determined tracks with maximum speed limits (e.g. 40 km/h) as this would result in less dust pollution and overall destruction of vegetated areas which serve as habitat to a variety of fauna. • Avoid off road driving in areas prone to scarring (e.g. gravel/gypsum/salt plains/flats/pans) or dominated by lichens. • Prevent the planting of potentially alien invasive plant species (e.g. <i>Tecoma stans</i>,

Project activity or issue	Potential impact	Mitigating action
		<p><i>Pennisetum setaceum</i>, etc.) for ornamental purposes as part of the landscaping (e.g. around Lodge, staff accommodation, etc.) should this be thought necessary. Alien species often “escape” and become invasive causing further ecological damage.</p> <ul style="list-style-type: none"> • Implement a policy of “no tolerance” towards any invasive alien plant species encountered in future in the area. This should include the removal and destruction of these species throughout the proposed development areas. Such activity would be beneficial to the overall ecology of the areas. • Incorporate indigenous vegetation into the overall landscaping of the area (e.g. around Lodge, staff accommodation, etc.). This would create a natural ambiance while indigenous species require less water and overall maintenance. • Limit water abstraction so as not to impact negatively on the groundwater recharge and consequently the associated vegetation which would affect vertebrate species dependent thereon. • Monitor water levels and potential impacts on vegetation. • Prohibit the use of any pesticides.
<i>Marine Resources</i>		
Catch-and release fishing	Exploitation of marine resources	<ul style="list-style-type: none"> • Prohibit a fishing on site.
<i>Socio-economic</i>		
Operation of Lodge and camp	Inability to maintain “five desert flower” rating	<ul style="list-style-type: none"> • Maintain the operations at a level of a 'five desert flower' rating in the Namibian Eco- wards System, or equivalent thereof, during the entire term of this Concession.
Operation of Lodge and camp	Job opportunities	<ul style="list-style-type: none"> • Source employees of the lodge from the Hardap Region.
Operation of Lodge and camp	Staff health and wellbeing	<ul style="list-style-type: none"> • Execute the project to be in full compliance with the Labour Act 11 of 2007 (as amended) to ensure the health and safety of workers and visitors. • Ensure that an HIV/AIDS Policy and Programme and Health and Safety Plan is in place. • Appoint a SHE (Safety, Health, Environment) Representative once the staff complement reaches 10. • Prevent communicable disease (e.g. Sexually Transmitted Infections (STIs) such as HIV transmission) by providing active screening and treatment of employees; prevent illness among employees (through health awareness and education initiatives); ensure ready access

Project activity or issue	Potential impact	Mitigating action
		to medical treatment, confidentiality and appropriate care.
<i>Archaeology</i>		
Operation of Lodge and camp	Damage or destruction of shell middens	<ul style="list-style-type: none"> • Further engagement is required with the NHC regarding the proposed project. • The lodge location should be at least 500 m from any or the middens, to prevent physical disturbance and to exclude the lodge from the immediate landscape setting of the sites. • Also proposed is an archaeological exclusion zone measuring approximately 170 ha, with a boundary length of 6.8km. It is proposed that this area should be completely closed, most especially to vehicle traffic. • Provide training to guides to explain cultural significance of the middens to visitors
Operation of Lodge and camp	Destruction of other potential heritage features	<ul style="list-style-type: none"> • Make all staff aware of the provisions of the National Heritage Act 27 of 2004 with regard to the protection of all archaeological sites and the need to report any new finds. • Stop work immediately if a possible or suspected site is discovered (e.g. a grave), , cordon the area off and photograph the area/site; immediately inform the project manager/supervisor, and contact an Archaeologist and the NHC of Namibia. • Prohibit the removal of disturbance of archaeological and/or cultural heritage sites or relics.
<i>Air Quality</i>		
Operation of Lodge and camp	Increase in carbon emissions from construction vehicles and incinerator	<ul style="list-style-type: none"> • Undertake necessary maintenance on vehicles and equipment and keep a maintenance record. • Burn only biodegradable (paper-based) waste in incinerators “donkeys”.
<i>Noise</i>		
Operation of Lodge and camp	Generation of noise impacting wildlife	<ul style="list-style-type: none"> • Limit travelling speed of operational vehicles to 40 km/h. Undertake necessary maintenance on vehicles and equipment and keep a maintenance record.
<i>Surface and Groundwater</i>		
Operation of Lodge and camp	Impact on surface and groundwater	<ul style="list-style-type: none"> • Limit water abstraction so as not to negatively affect any spring, fountain, wetland, seep or any other natural water source in the concession area. • Restrict water usage to a maximum of 100 litres per occupied visitor bed per day and a maximum of 100 litres per staff member per day.

Project activity or issue	Potential impact	Mitigating action
		<ul style="list-style-type: none"> • Prohibit sourcing of water into the Park via a pipeline from east of the Park border. • Install adequate meters for monitoring compliance to the above limits. • Undertake all laundry well outside the Park. • Implement proper pollution control measures. • Immediately clean up all accidental pollution (oil spills, diesel spills etc.)
<i>Waste Management</i>		
Operation of Lodge and camp	Various environmental impacts	<ul style="list-style-type: none"> • Minimise the creation of waste at source. • Achieve waste minimisation by: <ul style="list-style-type: none"> – buying in bulk quantities – using refillable, bulk dispensers (e.g. toiletries) instead of individually packaged products – avoiding the use of polystyrene foam altogether – using glass/durable plastic rather than disposable plastic items such as straws and cups – providing in-room recycling procedures and appropriate receptacles. • Use environmentally sensitive cleaning products, i.e. free of phosphates and Volatile Organic Compounds (VOCs) • Prioritise solid waste recycling, separation at source and safe disposal of unavoidable waste. • Remove all solid waste from the Park to the Walvis Bay Landfill Site • Ensure that there are suitable waste storage and separation facilities that are fully enclosed and inaccessible by any wildlife available. • Ensure that waste storage containers have lids to prevent wind dispersal of waste. • Burn biodegradable waste and paper products in a suitable incinerator. • Prohibit the burning of plastic or rubber or any of their derivatives, styrofoam products, or any waste fuel or lubricants. • Remove all ash and other waste to the Walvis Bay Landfill Site in appropriate sealed containers or bags on a monthly basis. • Minimise the impact of liquid waste on the natural environment in general, and on both surface and groundwater resources in particular. • Install and maintain a proper sewerage treatment system.

Project activity or issue	Potential impact	Mitigating action
		<ul style="list-style-type: none"> • Prohibit the disposal of sewerage within the sea or watercourses. • Comply with the Concessor's directives and/or regulations as regards waste and wastewater. • Remove toxic and hazardous effluent to the Walvis Bay Landfill Site.
<i>Tracks vehicles and driving</i>		
Driving by visitors and guides	Various environmental impacts	<ul style="list-style-type: none"> • Only use existing roads and tracks in the concession area, and no new track, road or airstrips may be laid out without the prior written permission of the MET. • Maintain and repair the track network if necessary. • Do not exceed the speed limit of 40 km/h anywhere in the Concession Area. • Undertake beach driving visitor activities below the high-water mark. • Develop a track maintenance plan for approval by the MET. • Ensure that all safari drivers or other drivers employed by the Concessionaire are: <ul style="list-style-type: none"> – skilled in desert driving conditions; – obtain the relevant national qualification when it becomes available. • Ensure that all safari drivers or other drivers employed by the Concessionaire have a thorough knowledge of the track network and access routes authorised in terms of the Concession Contract.
Forbidden Activities		
Activities by tourists	Various environmental impacts	<ul style="list-style-type: none"> • Prohibit the undertaking of the following activities by the Concessionaire, including its staff, invitees or clients in the Concession Area: <ul style="list-style-type: none"> – The use of quadbikes, three wheelers, or any other sort of motor bike; – The use of sand yachts, or other wind-propelled vehicles; – Ballooning, paragliding, parasailing, hang-gliding, skydiving or any other air sport; and – The use of microlights or helicopters or any other small plane for recreational purposes or visitor activities. – The launching or use of boats of any description (rigid or inflatable) for recreational purposes or visitor activities. – The planting or keeping of alien, exotic or any other vegetation not occurring locally or any vegetable or fruit variety in the Concession Area.

Project activity or issue	Potential impact	Mitigating action
		<ul style="list-style-type: none">- The introduction or keeping of pets, livestock or pack animals.- The keeping of wild animals of any description.

Table 12: Environmental Management Plan – Decommissioning Phase

Project activity or issue	Potential impact	Mitigating action
<i>Land use</i>		
Decommissioning activities	Change of land use	<ul style="list-style-type: none"> Decommissioning activities to take no more than 40 days (in line with concession agreement).
<i>Aesthetics</i>		
Decommissioning activities	Visual / aesthetic impact	<ul style="list-style-type: none"> Return the project-area to its natural / wilderness state once the project has been decommissioned.
<i>Soil</i>		
Decommissioning activities	Hazardous spillage	<ul style="list-style-type: none"> Store hazardous substances in appropriately banded areas. Use a drip-tray when refuelling vehicles or machinery. If a spillage occurs, clean it up immediately and dispose soil at an appropriate site (Walvis Bay) as hazardous waste.
<i>Fauna</i>		
Decommissioning activities	Loss / Disturbance of fauna	<ul style="list-style-type: none"> Refer to the mitigation measures of the construction and operational phases relating to fauna.
<i>Flora</i>		
Decommissioning activities	Loss / Disturbance of flora	<ul style="list-style-type: none"> Refer to the mitigation measures of the construction and operational phases relating to flora.
<i>Socio-economic</i>		
Decommissioning activities	Job opportunities	<ul style="list-style-type: none"> Use local contractor(s) and workers from the Hardap Region for the decommissioning activities
<i>Archaeology</i>		
Decommissioning activities	Damage or destruction of shell middens	<ul style="list-style-type: none"> Take care to avoid midden sites during decommissioning activities. Cordon off the middens (as shown in Figure 11) to protect them from human interference during decommissioning and the barricades removed before leaving the site.
<i>Air Quality</i>		

Project activity or issue	Potential impact	Mitigating action
Decommissioning activities	Increase in carbon emissions from decommissioning vehicles and incinerator	<ul style="list-style-type: none"> • Undertake necessary maintenance on vehicles and equipment and keep a maintenance record. • Incinerators “donkeys” used to burn waste and heat water should only burn biodegradable (paper-based) waste.
Decommissioning activities	Increase in dust	<ul style="list-style-type: none"> • Implement speed limits of 40 km/h • Provide personal protective equipment (PPE) to decommissioning workers to prevent or minimise dust inhalation from construction activities.
<i>Noise</i>		
Decommissioning activities	Generation of noise (e.g. vehicle and building noise)	<ul style="list-style-type: none"> • Limit travelling speed of all vehicles and machinery to 40 km/h. • Undertake necessary maintenance on vehicles and equipment and keep a maintenance record.
<i>Surface and Groundwater</i>		
Decommissioning activities	Impact on surface and groundwater	<ul style="list-style-type: none"> • Ensure that water abstraction does not negatively affect any spring, fountain, wetland, seep or any other natural water source in the concession area. • Restrict water usage to a maximum of 100 litres per staff member per day. • Prohibit sourcing of water into the Park via a pipeline from east of the Park border. • Install adequate meters for monitoring compliance to the above limits. • Undertake all laundry well outside the Park. • Implement proper pollution control measures. • Clean up all accidental pollution (oil spills, diesel spills etc.) immediately/
<i>Waste Management</i>		
Decommissioning activities	Various environmental impacts	<ul style="list-style-type: none"> • Demolish and remove from site materials for re-use and/or safe disposal.

10 CONCLUSION

Meob Bay, within the NNP is proposed through a concession agreement was signed between NAMAB and the MET to develop the tourism opportunities in the Park. This proposal aligns with the Land Use Plan for Meob Bay (Walmsley, n.d.), in which it is stated that:

“The most suitable, sustainable land use options for the Meob Concession Area (MCA) are tourism, and conservation and research. It is recommended in this land use plan that a small lodge could be constructed at Meob, with day tours into the surrounding areas, capitalising on the biotic and abiotic resources in the area, such as mining history, shipwrecks, whale bones, bird life in the salt pans, stark desert landscapes, desert-adapted wildlife, marine mammals, surf angling etc. Access to the area will be predominantly by air and land-based access will be limited to specially arranged tours (guided 4 x 4 convoys). The lodge could also be used as a base for researchers and conservation officials working in the area.”

The Namib Sand Sea was inscribed on the United Nations Educational, Scientific and Cultural Organisation (UNESCO's) World Heritage List on Friday 21st June 2013.

The environmental impacts have been assessed and took into consideration that the project is proposed within a proclaimed world heritage site, and that certain aspects are of international importance. In that context, the change in land use is considered to be of a high significance. In parallel the positive socio-economic impacts of jobs and increased tourism can also be considered as high.

It should be noted that based on comments received, an additional heritage study was undertaken which recommended that the lodge be moved to the southern site alternative, to avoid impacts on heritage resources (middens).

Other potential environmental impacts may include contamination of soil or water through accidental spills, over-abstraction of water leading to impacts on fauna and flora. Apart from the change in land use, all negative environmental impact can be reduced to a low significance with appropriate mitigation measures.

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12 CERTIFICATION

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