

PROPOSED METEOROLOGICAL MAST AND REMOTE SENSING CAMPAIGN IN THE TSAU//KHAEB NATIONAL PARK

Final EIA Scoping Report (including Impact Assessment) and Environmental Management Plan

Springbok and Dolphin Concession Areas, Tsau //Khaeb National
Park (TKNP), near Lüderitz, southern Namibia

Prepared for: HYPHEN Hydrogen Energy (Pty) Ltd



SLR Project No: 733.08032.00003
Revision No: 3
October 2022



DOCUMENT INFORMATION

Title	Proposed Meteorological Mast and Remote Sensing Campaign in the Tsau//Khaeb National Park
Sub-title	Final EIA Scoping Report (including Impact Assessment) and Environmental Management Plan
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Reviewer	Stuart Heather-Clark & Jessica Hughes
Keywords	Hyphen, Met Mast, Remote sensing, Green Hydrogen, Namibia, Tsau/Khaeb National Park
Status	Final EIA Scoping Report issued for submission to competent authority
Revision No	3
Authority Reference No.	APP-003748
SLR Project No	733.08032.00003

DOCUMENT REVISION RECORD

Rev No.	Issue Date	Description	Issued By
0	August 2022	Draft EIA Report issued for client review	Jeremy Blood
1	September 2022	Draft EIA Report issued for I&AP review and comment	Jeremy Blood
2	October 2022	Final EIA Report issued for client review	Jeremy Blood
3	October 2022	Final EIA Report issued to MME and MEFT	Robyn Christians

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EXECUTIVE SUMMARY

1 INTRODUCTION

This Executive Summary summarises the Final Environmental Impact Assessment (EIA) Scoping Report and Environmental Management Plan (EMP) prepared as part of the EIA process that is being undertaken for a proposed meteorological (met) mast and remote sensing campaign in the Tsau//Khaeb National Park (TKNP), near Lüderitz, southern Namibia.

1.1 PROJECT BACKGROUND

In November 2021, the Namibian government issued a notice of award stating its intention to appoint HYPHEN Hydrogen Energy (Pty) Ltd (Hyphen) as the preferred bidder to develop the country's first large-scale green hydrogen (H₂) project in two concession areas (namely Springbok and Dolphin) in the TKNP (see Figure 1).

The proposed green H₂ project will consist of 5-6 gigawatts (GW) of wind and solar renewable energy facilities, as well as support infrastructure comprising a desalination plant, an electrolyser, pipelines, powerlines, battery storage, access roads, single buoy mooring, etc. The project is forecast to produce 300 000 to 350 000 tons per annum (tpa) of green H₂, which will then be combined with nitrogen from the air to produce 1.7 million - 2 million tpa of green ammonia (NH₃) for the export market.

The bulk of the renewable electricity generation will be in the form of wind energy, which will be generated from wind turbines located within the two concession areas. To better understand the suitability of the wind resource in the identified development area, Hyphen is proposing to install 10 meteorological (met) masts and Light Detection and Ranging (LIDAR) remote sensors (LIDAR) in two locations as a means of secondary data collection. The proposed met masts and remote sensing campaign (the 'Project') will allow Hyphen to:

- Collect site specific wind resource data and refine its understanding of the wind resource characteristics, seasonality, and patterns; and
- Optimise the design (wind turbine type), number of turbines needed, and layout of the wind energy facility to ensure it operates as efficiently as possible, thereby maximising the project's generation capacity.

The proposed Project triggers Listed Activity 10.1(j) of the Environmental Impact Assessment (EIA) Regulations 2012 promulgated under the Environmental Management Act, 2007 (No. 7 of 2007), and as such requires an Environmental Clearance Certificate (ECC) from the Ministry of Environment, Forestry and Tourism (MEFT). An EIA process must be undertaken for MEFT to consider an ECC application.

SLR Environmental Consulting (Namibia) (Pty) Ltd (SLR), an independent firm of environmental consultants, has been appointed by Hyphen to manage the ECC Application and undertake an EIA process (scoping with assessment) for the proposed met mast and remote sensing campaign. Please be advised that the larger green H₂ project will be subject to a separate EIA process. The current EIA process only deals with the proposed met mast and remote sensing campaign.

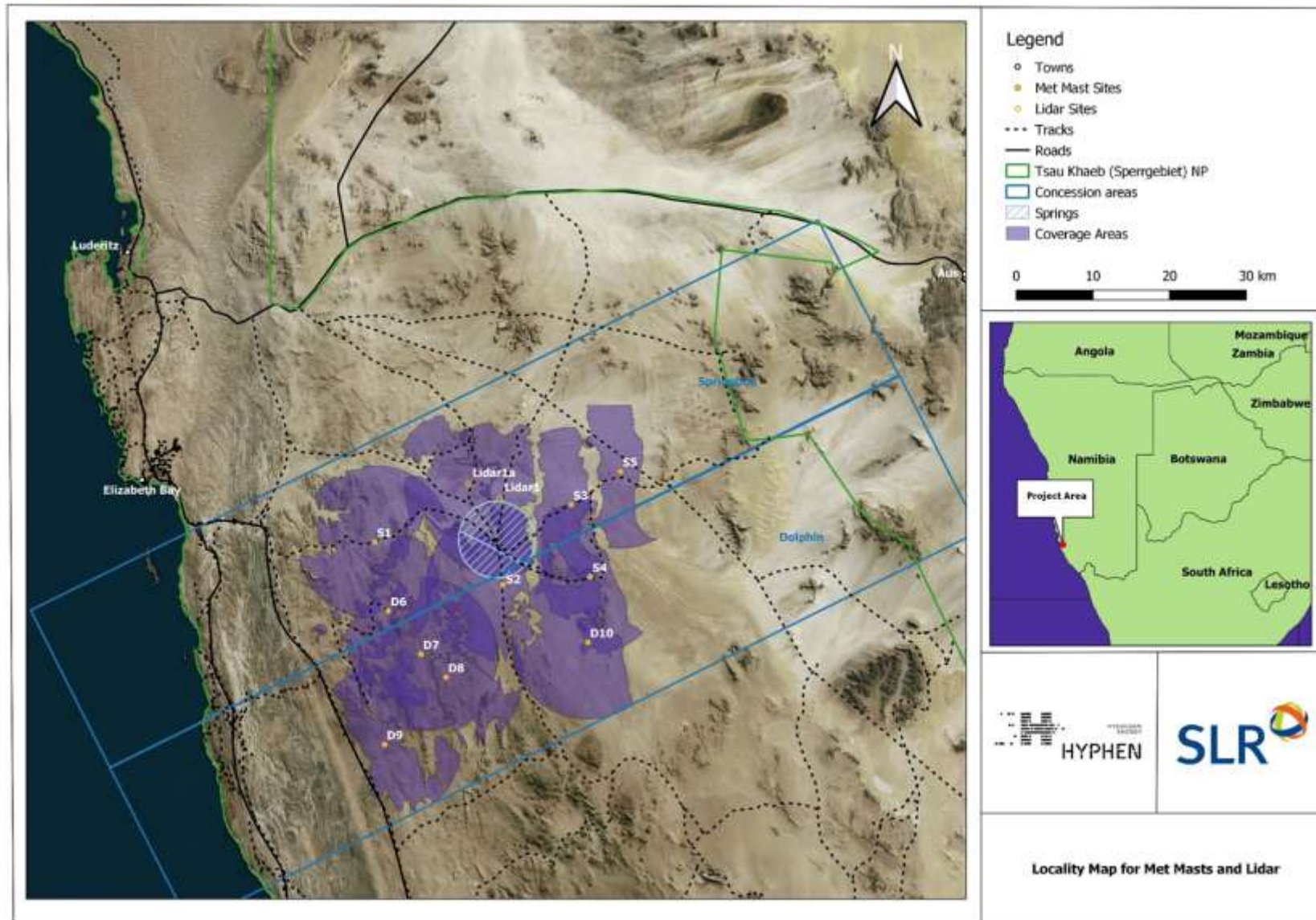


Figure 1: Locality map showing hyphen concession areas and proposed site locations in the Tsau//Khaeb National Park

1.2 PURPOSE OF THIS REPORT

This Final EIA Scoping Report and EMP has been prepared in compliance with Section 8 and 15(2) of the EIA Regulations 2012 as part of the EIA that is being undertaken for the proposed Meteorological Mast and Remote Sensing Campaign in the TKNP.

The compilation of this report has been informed by comments received from Interested and Affected Parties (I&APs) during the draft EIA Scoping Report review and comment period (5 September to 5 October 2022) and those raised during two public meetings. Comments received by SLR have been recorded and responded to in a Comments and Responses Report (see Appendix 2.8 of the main report). **It should be noted that all significant changes to the draft report are underlined and in a different font (Times New Roman) to the rest of the text.**

This report is submitted to the competent authority, the Ministry of Mines and Energy (MME): Energy Directorate, for consideration and review. In terms of Section 32 of the Environmental Management Act, 2007 (No. 7 of 2007), MME will then make a recommendation on the acceptance or rejection of the report to the MEFT: Directorate of Environmental Affairs, who will make the final decision on the ECC application.

2 EIA PROCESS

The purpose of the EIA is to identify, assess and report on potential impacts the proposed project may have on the receiving environment. The EIA describes and analysis what the consequences of the project choices will be in terms of impacts on the natural and socio-economic environment and applying the Mitigation Hierarchy, identifies how such impacts can, as far as possible, be avoided, be enhanced, or mitigated and controlled.

The EIA Regulations 2012 set out the procedures and documentation that need to be complied when undertaking an EIA process. The anticipated tasks and timing for the current EIA process (scoping with assessment) are presented in Figure 2.

2.1 INITIAL CONSULTATION AND DISCLOSURE

An initial round of public consultation and disclosure was undertaken to identify I&APs and develop the I&AP database, as well as obtain confirmation of the key issues and impacts for assessment. This involved the following:

- **Pre-Application Authority Meetings:** SLR and Hyphen held two online meetings with MME / MEFT and other key stakeholders. The purpose of these meetings was to introduce the project and EIA teams, provide notification of the commencement of the EIA process for the proposed project and to confirm the process to be followed.
- **Availability of Background Information Document (BID):** A notification letter and BID were released for a 21-day review and comment period from 20 April to 11 May 2022. The purpose of the BID was to convey information on the proposed project and EIA process, as well as to invite I&APs to register on the project database and provide initial comment on the proposed project and scope of the assessment.
- **Advertising and Site Notices:** Two sets of advertisements announcing the proposed project, the availability of the BID and the I&AP registration / comment period were placed in the following newspapers on 20 and 27 April 2022: (1) Republikein, the Sun and the Allgemeine Zeitung (in English and Afrikaans); and (2) The Namibian (in English). Site notices were placed at four locations in Lüderitz in English and

Afrikaans, including the Lüderitz Public Library, Lüderitz Regional Council, Lüderitz Town Council and the Safari and Tours offices.

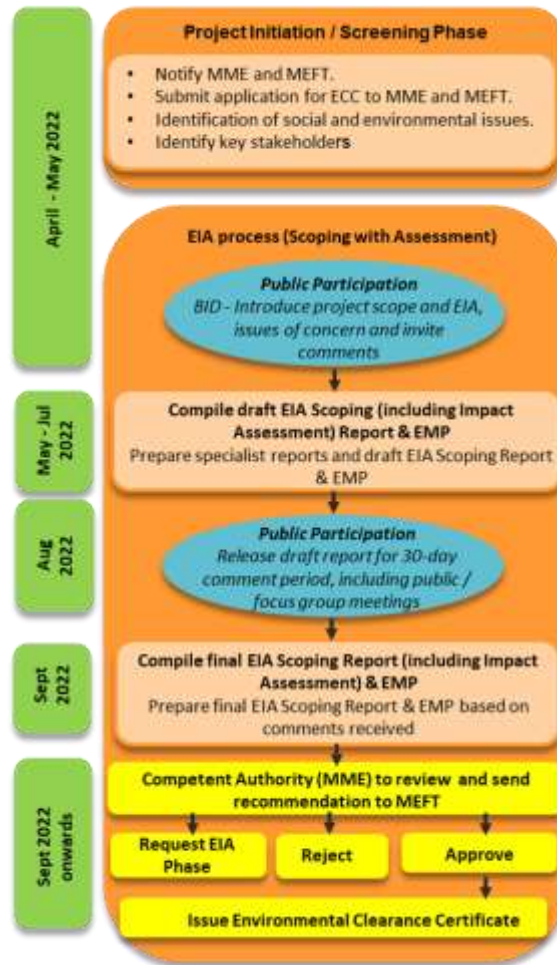


Figure 2: Outline of detailed steps in the EIA Process

2.2 SPECIALIST STUDIES AND SITE VISIT

Three specialist studies were commissioned to address the key issues associated with the proposed project. These included: (1) Terrestrial Ecology Assessment; (2) Avifaunal Assessment; and (3) Archaeological Assessment.

As part of these studies, a site visit was undertaken between 1 and 10 May 2022. Data collected were used by specialists to describe their respective baseline receiving environments, identify and assess environmental impacts that may occur as a result of the proposed project, and recommend appropriate mitigation enhancement measures (including proposing alternative routes to access the sites).

2.3 COMPILATION AND REVIEW OF DRAFT EIA SCOPING REPORT AND EMP

A Draft EIA Scoping Report and EMP was prepared in compliance with Section 8 and 15(2) of the EIA Regulations 2012 and released for a 30-day review and comment period from 5 September to 5 October 2022. The specialist findings on the impact assessment, recommended mitigation, as well as other relevant information, were integrated into this draft report. Steps that were undertaken as part of this review process are summarised below.

- **Availability of the Draft EIA Scoping Report & EMP:** Copies of the draft report were made available on the SLR website for download, as well as public locations in Lüderitz, Aus, Rosh Pinah, Oranjemund and Windhoek.
- **Notification letter:** All I&APs registered on the Project database were notified of the comment and review period by means of a notification letter (in English and Afrikaans). A copy of the Executive Summary (in English and Afrikaans) was attached to the letter.
- **Public meetings:** Two public meetings were held during the draft Scoping EIA Report review and comment period - one meeting was held in Lüderitz and one online on 20 and 26 September 2022, respectively. The purpose of these meetings was to provide an overview of the Project proposal, EIA process and findings of the impact assessment, as well as provide stakeholders with the opportunity to raise any issues, concerns, or comments. A focus group meeting was also held with the Namibian Civil Aviation Authority.

2.4 COMPILATION OF FINAL EIA SCOPING REPORT AND COMPLETION OF THE EIA

This final Scoping EIA Report has been informed by comments received on the draft Scoping EIA Report and those issues raised during public meetings. All written submissions have been collated, and responded to, in a Comments and Responses Report (see Appendix 2.8).

As noted previously, this report is submitted to the MME: Energy Directorate, as the competent authority, for review and recommendation to MEFT: Directorate of Environmental Affairs who will make the final decision on the ECC application. The decision taken by MEFT will be distributed to all I&APs registered on the project database for information purposes.

3 PROJECT OVERVIEW

3.1 MET MASTS

The met masts will be located within Hyphen's two concession areas (namely Springbok and Dolphin) in the TKNP. Due to the extent of and changing elevation within the identified development area, 10 met masts are proposed each representing a specific wind resource coverage area (Figure 1).

Met masts are typically tall lattice structures with measuring instrumentation installed at various heights (Figure 3a). The type of mast proposed is a triangular steel lattice mast with a maximum structure height of up to 120 m and held in place by guy wires (cable stays) to anchor the mast. Each met mast foundation occupies an area of approximately 1.5 m² but maybe larger depending on the site geotechnical conditions (Figure 3b).

To stabilise the met masts, each mast will have 12 ground anchors. The guy wires attach the met mast tower to the ground at different heights. Guys wires are attached to the mast from three directions and the anchors are spaced at 40 m, 60 m, 70 m, and 80 m from the centre of the mast.

Instruments will be installed at various heights on the met mast. Typical instruments that are installed on each mast include: anemometers, wind vanes, pressure sensors, temperature sensors, and humidity sensors.

3.2 LIDAR REMOTE SENSING

The LIDAR will be located at two sites within the identified development area each representing a specific coverage area (Figure 1).

The LIDAR remote sensing method is used to measure vertical wind profiles at higher elevations (up to 200 m). This method works by transmitting short pulses of infrared laser light into the atmosphere. These beams hit

particles and aerosols in the air, which scatter a small fraction of that light energy back to the sensor. Data will be used to supplement the met mast data in mapping the wind speed and direction, turbulence, and wind shear. Unlike the met masts, the LIDAR sensor is mobile (Figure 4) and will be moved from one site to another to further reduce wind resource uncertainty.

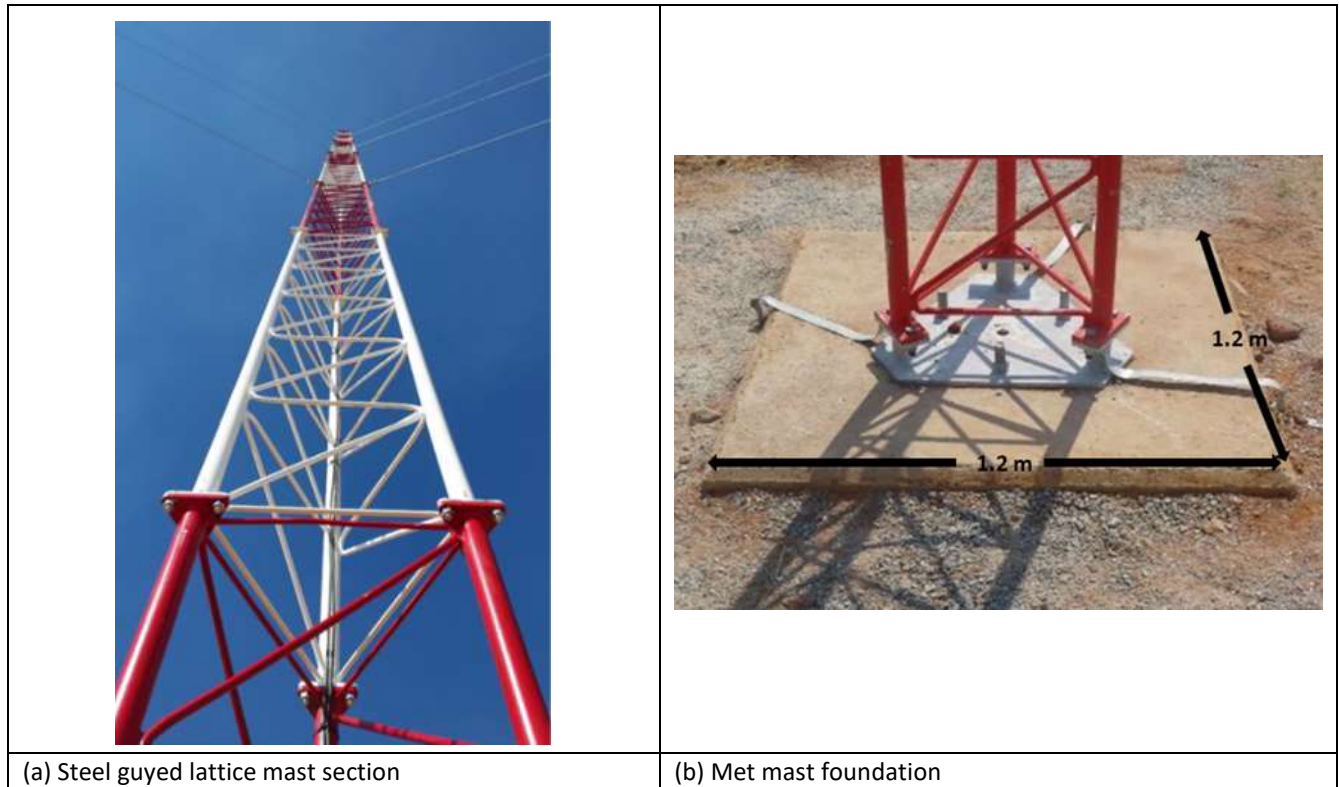


Figure 3: Met Mast



Figure 4: Examples of mobile LIDAR

3.3 SITE ACCESS

Initial access routes were identified using existing tracks, where possible. However, new tracks were required to access the more remote sites, which were identified in the field by the specialists in consultation with MEFT during the May 2022 site visit. After the site visit, the initial route network was amended by the specialists, in consultation with MEFT, in order to avoid various sensitive areas, including the Kaukausib spring area, although many of these were existing tracks. The final proposed access route network is presented in Figure 5.

Access into the TKNP will be via the Rotkopf gate (20 km east of Lüderitz), which is controlled by Namdeb and the Sperrgebiet Diamond Mining companies. It should, however, be noted that that Hyphen is in the process of requesting access to the park from MEFT, via a separate entrance, to enable ease of access to the project site.

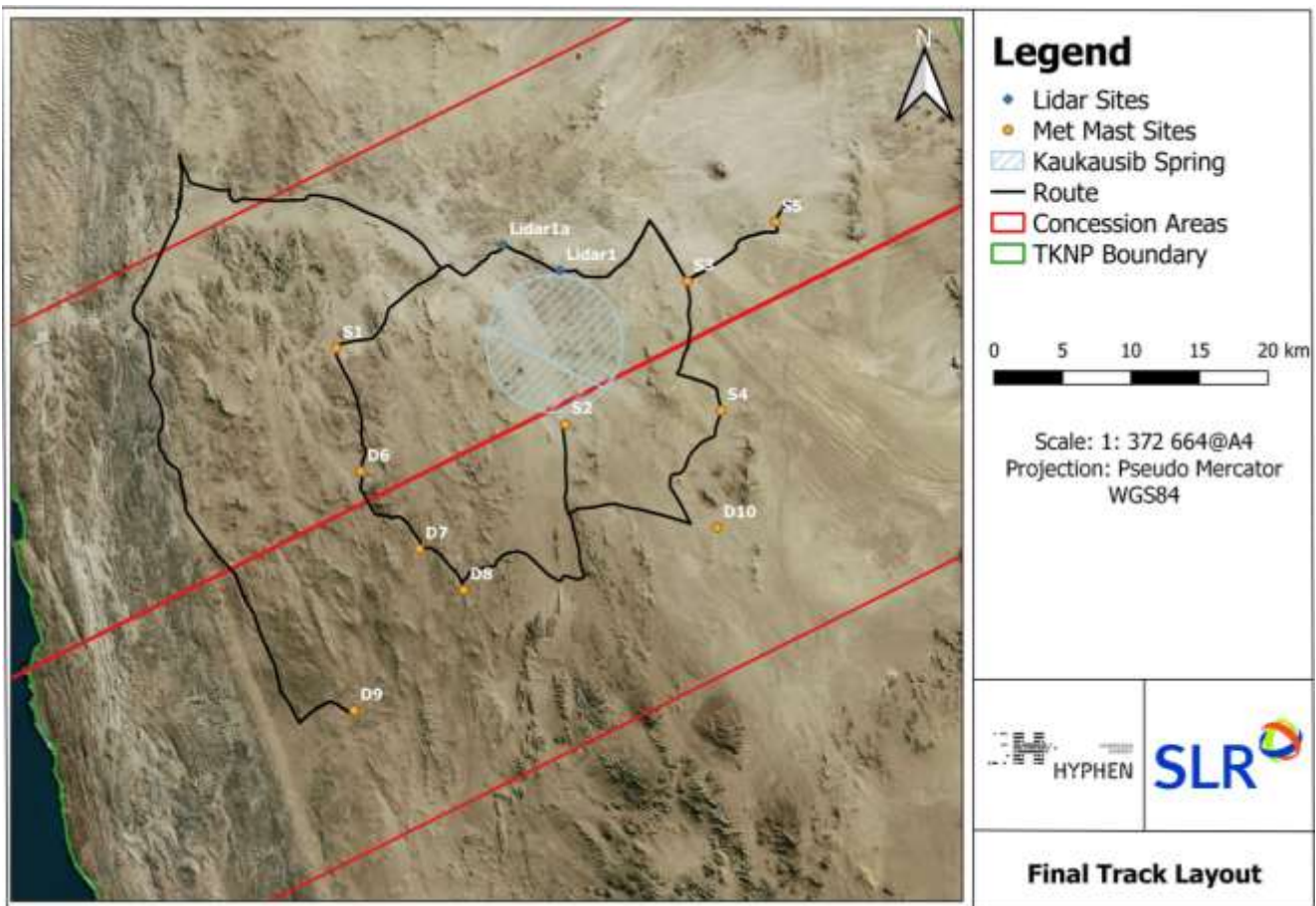


Figure 5: Final Access Route Layout

3.4 EQUIPMENT MAINTENANCE

Four maintenance visits will be undertaken for each met mast over a 12-month period. Masts could remain on site for the duration of the larger green H₂ project wind farm, decommissioned or repositioned / reused to serve as the wind farms operational met masts. Decommissioning will involve dismantling and removal, and the materials reused or recycled where possible. LIDARs are typically located at a position for a minimum of 6 months before being moved to another location or being removed from site.

4 SUMMARY OF BASELINE INFORMATION

This section provides a brief description of the attributes of the receiving environment in the project area.

Receptor/ Variable	Description Summary
1. Bio-Physical Considerations	
Climate	<ul style="list-style-type: none"> Namibia is one of the largest and driest countries in sub-Saharan Africa. In general, the country is hot and dry with sparse and erratic rainfall. Most of the country is defined as very arid, arid, or semi-arid, with two deserts, namely the Kalahari and Namib, covering large portions of the west and east of the country, respectively. Given Namibia's world-class renewable resources (wind and solar), abundant land availability, and proximity to the ocean, the project area lends itself to the potential development of renewable energy projects.
Vegetation	<ul style="list-style-type: none"> The vegetation of the TKNP forms the northernmost portion of the Succulent Karoo Biome, which is a biodiversity hotspot and of international conservation importance. The vegetation in the project areas is dominated by dwarf shrubs of various species and the shrub <i>Euphorbia gummifera</i>. In the broader context the proposed met mast and LIDAR sites are placed in Kaukausib-drainage dwarf shrubland, northern gravel and sand plain grassland, <i>Euphorbia</i> shrubland and Western Klinghardt-plain shrubland (Figure 6). Approximately 90 plant species were recorded during the field work, of which 23 are of conservation importance (25%) either by being legally protected, red-listed or CITES-listed. Seven species are endemic to the Sperrgebiet.
Terrestrial Fauna	<ul style="list-style-type: none"> Distribution and abundance of terrestrial fauna across the project area is poorly known. Mammals such as springbok, oryx, brown hyena, black-backed jackal, bat-eared fox, and cape fox occur in low abundance, but are known to move through the area, and are more likely to be found near water sources such as the Kaukausib Spring. A few amphibians and reptiles are endemic or near-endemic to the desert regions of Namibia including Desert rain frog, Nama dwarf tortoise, and Namaqua dwarf adder, which may occur in the project area. A total of 14 reptile and six mammal species were confirmed during fieldwork, none of which are globally threatened and only hyena which is near-threatened.
Avifauna	<ul style="list-style-type: none"> Due to the harsh climatic conditions, avian abundance and diversity are expected to be extremely poor in the broader project area. The occurrence, abundance, richness, and diversity of birdlife in the broader project area are largely dictated by regional rainfall patterns. Years of poor local rainfall may yield extremely few birds, while good local rainfall events may draw birds that are not necessarily desert-adapted from inland areas further west. Out of the 49 listed bird species known (or suspected) to occur in the broader project area, five species were identified as priority species, namely Ludwig's Bustard, Barlow's Lark, Gray's Lark, Greater Flamingo and Lesser Flamingo. During the field survey in May 2022 (dry conditions), a total of 30 bird species were identified, including the Barlow's Lark and Gray's Lark.
Biodiversity Sensitivity	<ul style="list-style-type: none"> Eleven of the measurement sites are located in areas with "medium biodiversity" sensitivity and one site within an area of "high biodiversity" sensitivity, as defined by the TKNP Management Plan (Figure 7).
2. Socio-Economic Considerations	
Mining	<ul style="list-style-type: none"> Diamonds (and zinc more recently) have been mined in the TKNP for more than a century particularly in the //Kharas Region. Five of the measurement sites are located within existing Exclusive Prospecting Licence (EPL) and Mining Licence (ML) areas (Figure 8).

Receptor/ Variable	Description Summary
Tourism	<ul style="list-style-type: none"> A number of tourism concessions have been issued for parts of the TKNP; the only one relevant to the current project is the Aus-Lüderitz Link Tourism Development Area (TDA). Four measurement sites overlap with the Aus-Lüderitz Link TDA (Figure 9).
Archaeology	<ul style="list-style-type: none"> A total of 29 archaeological sites were located during the May 2022 site survey. These included ten with historic material, two with ESA artefacts, 13 with MSA artefacts, 12 with LSA artefacts, eight with ostrich eggshell fragments, one with decorated ostrich eggshell fragments, one with ostrich eggshell beads, two with land snail, four with grindstones, nine with rock shelters, one with pottery and one with charcoal artefacts. None of the twelve measure sites nor the access routes leading to these sites impacted on any of these archaeological or historical sites.

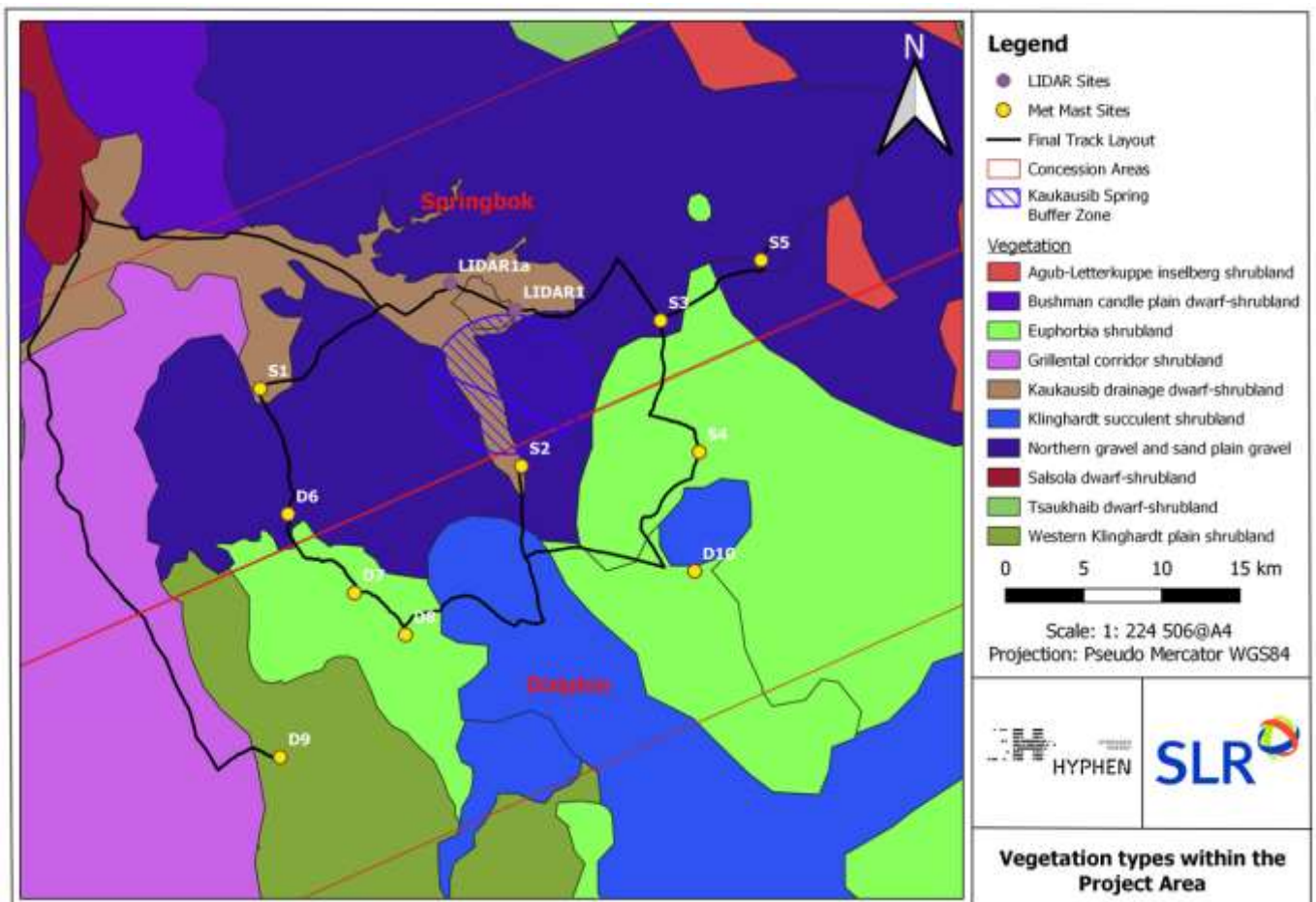


Figure 6: Vegetation Types. Source: Burke 2006; MEFT 2019; MEFT 2020a

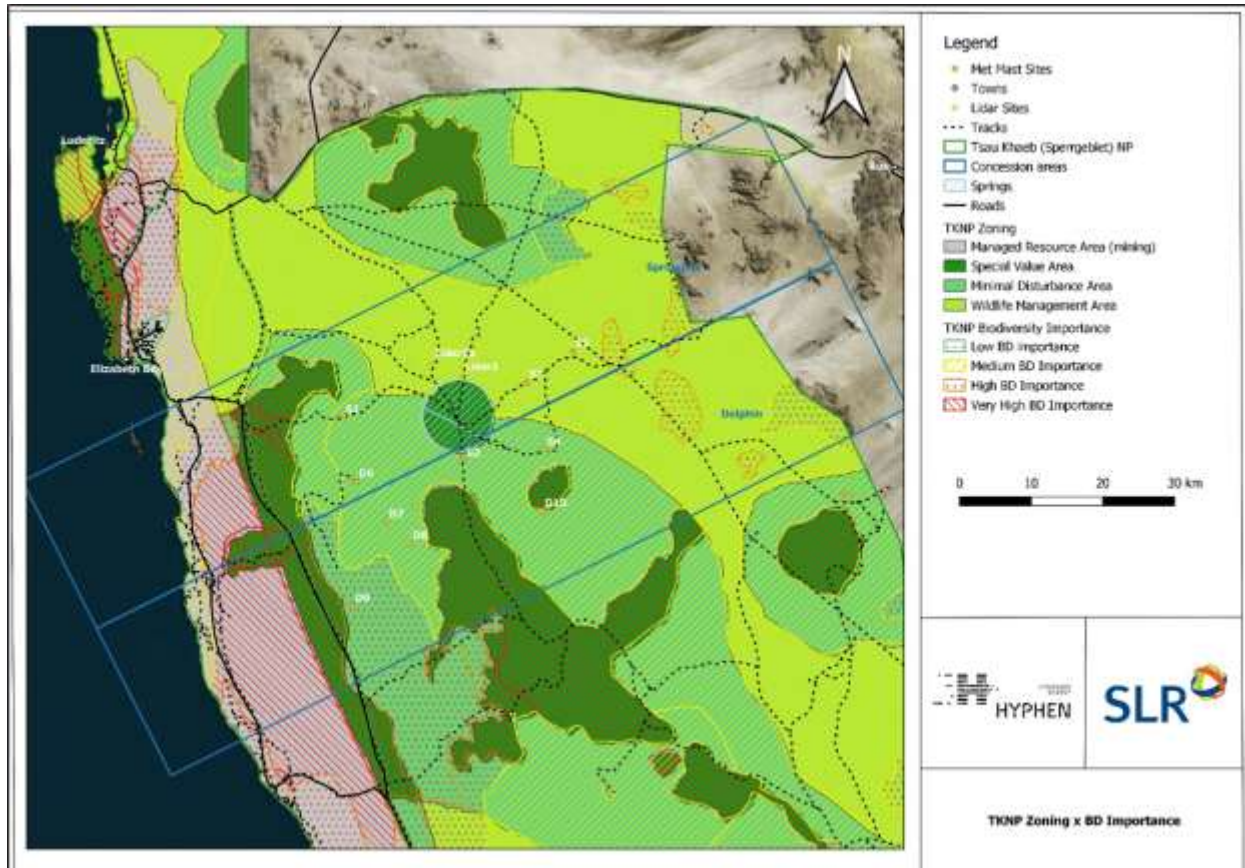


Figure 7: TKNP Zoning Map and Biodiversity Importance. Source: Burke 2006, MEFT 2019, 2020a

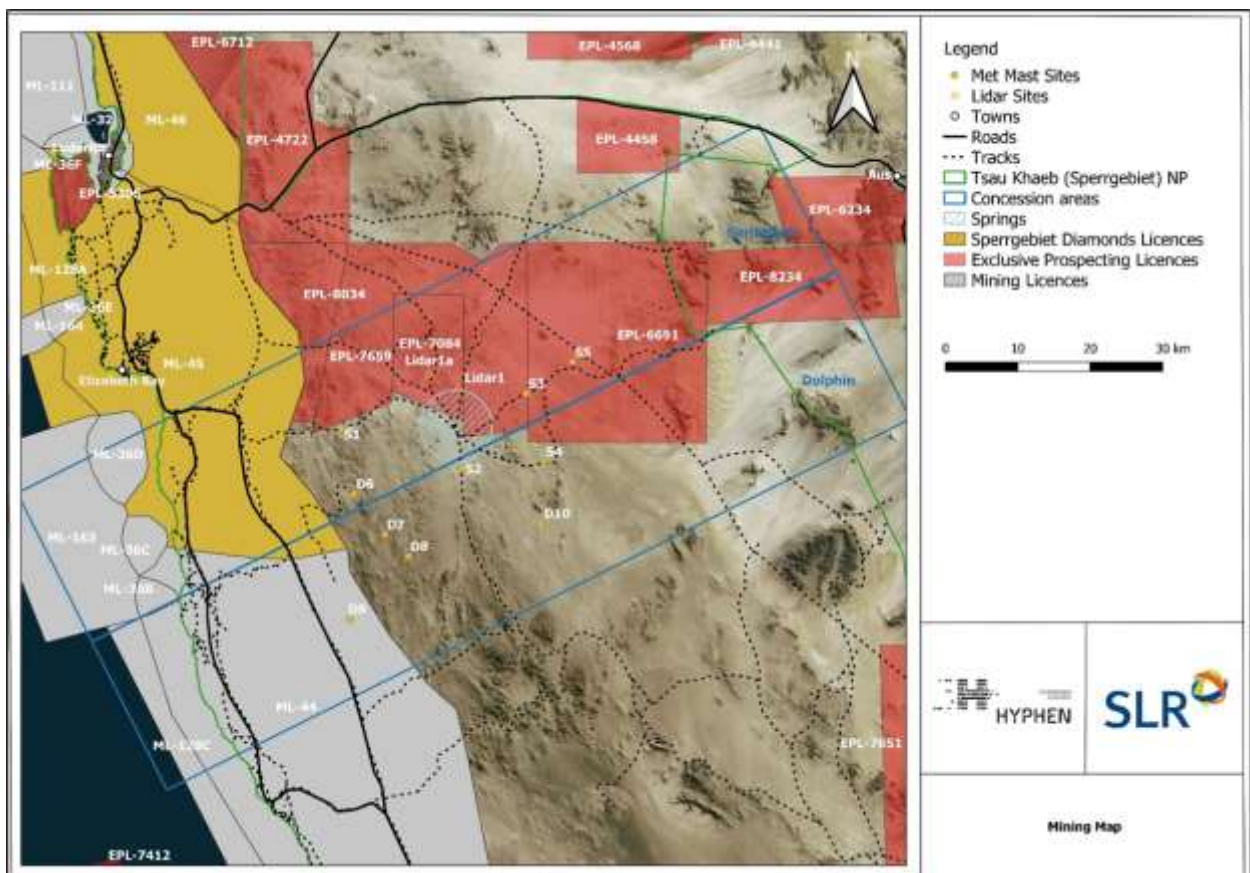


Figure 6: Mining Licenses and EPL Areas Map. Source: Namibia Mining Cadastre Map Portal 2022

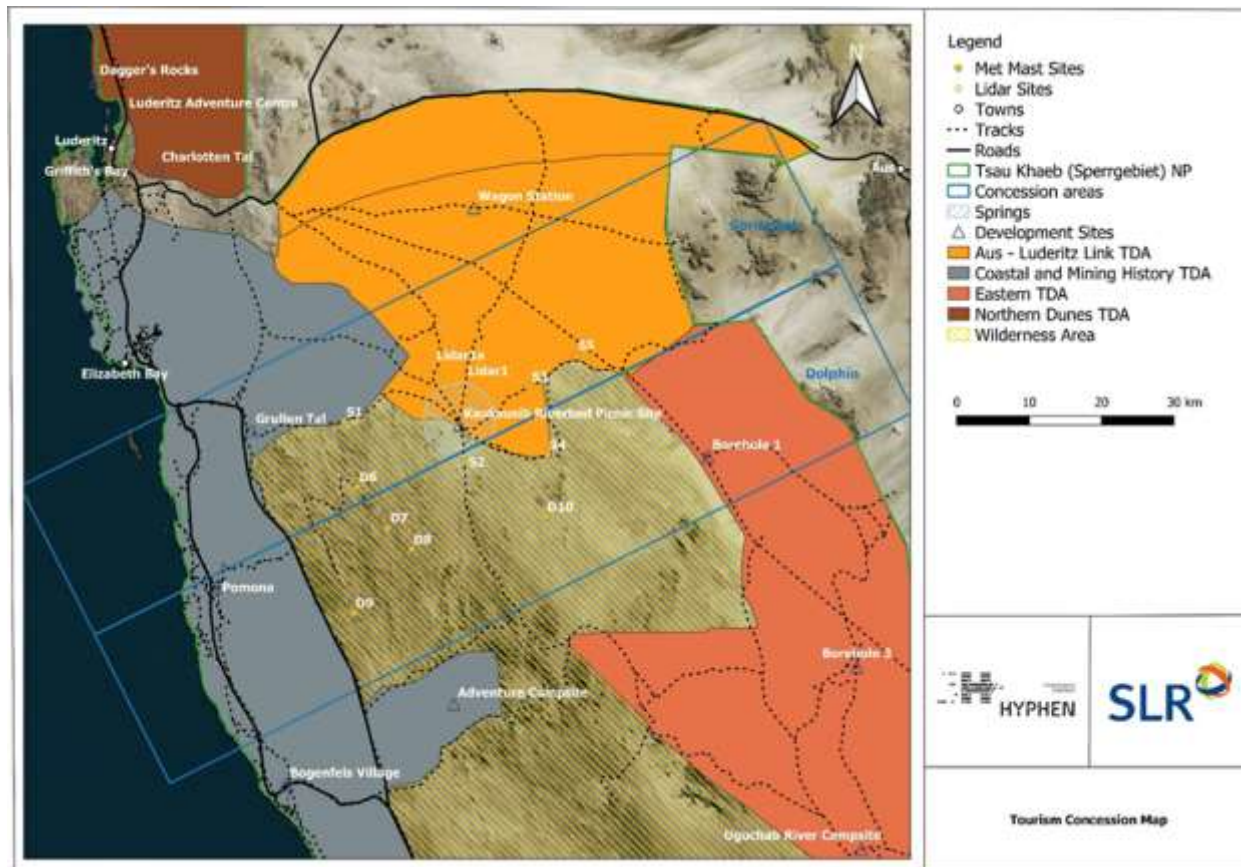


Figure 9: Tourism Concession Map. Source: MEFT 2020b

5 IMPACT ASSESSMENT AND MITIGATION SUMMARY

A summary of the assessment of potential impacts and proposed mitigation associated with the three specialist studies provided in Table 1 overleaf. The most significant impacts are related to the:

- Physical removal and disturbance of vegetation and soil, which would result in the direct loss of vegetation and faunal habitat, as well as the disturbance to terrestrial fauna (including avifauna):** The vegetation of the TKNP forms the northernmost portion of the Succulent Karoo Biome, which is a biodiversity hotspot and of international conservation importance. The project area is currently in a largely undisturbed and pristine state, which provides a sanctuary for a host of life forms, including those that are adapted to the harsh arid and windy conditions that prevail. Some of these life forms are restricted to these desert habitats and, therefore, have a narrow distribution range, and are thus sensitive to disturbance.

The potential impact terrestrial ecology and avifauna as a result of vegetation removal and disturbance have, however, been largely mitigated by the careful siting of met mast sites and access routes to avoid sensitive areas. All met mast sites were selected so as to avoid areas of very high biodiversity (as defined by the TKNP Management Plan), as well as avoiding highly sensitive habitats such as on ridges, inselbergs and springs. The access tracks were also amended, in consultation with the specialists and MEFT, to avoid various sensitive areas, including the Kaukausib spring area. The impact as a result of vegetation removal and disturbance is considered to be of **LOW significance** after mitigation. Thus, it is important to ensure

that the demarcated construction footprint (at each met mast site) and final agreed access routes are adhered to all times.

- **Bird collision mortality and injury due to the presence of the met masts and guy wires:** Met masts and supporting guy wires present an unnatural obstacle that may be poorly visible to birds, especially at night or during adverse weather conditions, such as dense fog or sandstorms. This potential impact is considered to be of medium significance prior to mitigation. With the implementation of the proposed mitigation (which includes the installation of bird diverters), the impact is considered to be of **LOW significance**.

None of the twelve measurement sites nor the access routes leading to these sites impacted on any archaeological or historical sites. The proposed project layout is thus unlikely to have an impact on the archaeology of the area. This said, it is recommended that a Chance Finds Procedure be compiled and implemented on site.

The management and mitigation measures are included in more detail in the EMP (refer to Appendix 4 of the report). To ensure compliance with the EMP it is recommended that an Environmental Control Officer (ECO) is appointed during construction.

6 CONCLUDING STATEMENT

The work undertaken in support of this ECC Application has been completed in line with the applicable regulatory framework. The assessment process followed included the undertaking of three specialist assessments deemed necessary to adequately identify and assess these potential impacts.

Following the impact assessment process, the identified residual impacts are assessed to be of **LOW** significance with the implementation of the recommended mitigation measures. The potential impacts can be adequately mitigated with the implementation of the proposed mitigation measures (as included in the EMP), which follows the principle of the mitigation hierarchy by firstly avoiding identified sensitive areas, and then reducing / minimising the impact, and lastly rehabilitating disturbed sites.

Based on the findings of the EIA and associated specialist studies, SLR is of the opinion that this EIA Scoping Report and EMP is sufficiently robust and provides sufficient information for MME and MEFT to make an informed decision on the proposed project taking into consideration the significance of potential impacts. SLR recommends that the commitments presented in the EMP should be conditional to the ECC, should MEFT approve the application.

Table 1: Summary of the significance of the impacts associated with the proposed met mast and remote sensing project in the TKNP

Note: (1) Neg = Negligible; VL = Very Low; L = Low; M = Medium; H = High; VH = Very High; +ve = Positive.
(2) * indicates that no mitigation is possible and/or considered necessary, thus significance rating remains.
(3) ** indicates that although the significance rating of the impact remains the same, the intensity of the impact decreases due to the proposed mitigation.

No.	Activities	Aspects	Impacts on Main Receptors	Pre-Mitigation Significance	Key Mitigation / Project Controls	Residual Significance
1	CONSTRUCTION PHASE					
1.1	Establishment of new tracks and erection of met masts and LIDAR	Removal and disturbance of vegetation and soil	Loss of vegetation and associated biota	MEDIUM	<ul style="list-style-type: none"> Avoid the creation of additional new tracks by ensuring the final agreed access routes are adhered to at all times. Appoint an ECO to oversee construction activities in accordance with the EMP. Minimise and demarcate construction footprint (with wooden stakes). Position the mast and anchors and lay-down areas to avoid plant species of concern such as <i>Zygophyllum applanatum</i> near site S5 and <i>Polemanniopsis namibensis</i> in the vicinity of sites S1, S2, S3, and LIDAR1 and LIDAR1a. Restore disturbed areas by, at minimum, 'brooming' disturbed surfaces to natural profile. 	LOW
1.2			Loss of or disturbance to avifauna habitat	MEDIUM		LOW
1.3			Disturbance, damage or loss of archaeological or historical sites	NO IMPACT		NO IMPACT
1.4			Introduction of invasive alien plants associated with construction activities	LOW		LOW **

No.	Activities	Aspects	Impacts on Main Receptors	Pre-Mitigation Significance	Key Mitigation / Project Controls	Residual Significance
					<ul style="list-style-type: none"> Remove any alien invasive plants found in areas disturbed by the Project and incinerate at a designated area outside the TKNP. 	
1.5		Increased traffic volume and construction activities	Loss and disturbance of vegetation and terrestrial fauna	MEDIUM	<ul style="list-style-type: none"> Adhere to final agreed access routes. Minimise the upgrading and maintenance of access, as far as possible. Minimise and demarcate construction footprint. Appoint ECO to oversee construction activities in accordance with the EMP. Adhere to TKNP regulations especially with respect to natural resource use; waste management; traffic; water use; traffic speeds; etc. Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas. Accommodate workforce off site. Develop and implement an Environmental Code of Conduct for all construction staff and ensure staff are well informed of environmental controls through induction and regular toolbox talks. Store construction equipment and waste that is susceptible to hyena damage appropriately (e.g., on vehicles or storage container) or implement some form of protection (e.g., ready fence panels). 	LOW
1.6			Disturbance of avifauna	LOW		LOW **
1.7						
1.8		Generation of waste and hydrocarbon spills	Soil, water and general environmental contamination	LOW		<ul style="list-style-type: none"> Adhere to waste management protocols. Ensure there is a supply of absorbent material readily available at each site to absorb / breakdown spills.

No.	Activities	Aspects	Impacts on Main Receptors	Pre-Mitigation Significance	Key Mitigation / Project Controls	Residual Significance
2	OPERATION PHASE					
2.1	Presence and operation of met masts and LIDAR	Alteration of site characteristics	Bird collision mortality, injury and changes in behaviour	MEDIUM	<ul style="list-style-type: none"> If necessary, discuss any amendments to the final met mast locations with a terrestrial ecologist. Equip all upper guy wires with bird flight diverters. If acceptable to NCAA, lighting should consist, as far as possible, of red or green (rather than white), flashing (rather than steady burning) lights. 	LOW
2.2			Injuries to traversing birds due to laser light pulses from LIDAR sensor	LOW	None.	LOW *
2.3		Increased traffic volume and presence of staff	Disturbance of vegetation and terrestrial fauna	LOW	<ul style="list-style-type: none"> Adhere to final agreed access routes. Adhere to TKNP regulations especially with respect to natural resource use; waste management; traffic; water use; traffic speeds; etc. 	LOW **
2.4			Disturbance of avifauna	LOW	<ul style="list-style-type: none"> Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas. Accommodate workforce off site. Conduct routine checks and remove alien invasive plants, and incinerate at a designated area outside the TKNP. 	LOW **
2.5		Generation of waste and hydrocarbon spills	Soil, water and general environmental contamination	LOW	<ul style="list-style-type: none"> Adhere to waste management protocols. Ensure there is a supply of absorbent material readily available at each site to absorb / breakdown spills. 	LOW **

No.	Activities	Aspects	Impacts on Main Receptors	Pre-Mitigation Significance	Key Mitigation / Project Controls	Residual Significance
3	DECOMMISSIONING PHASE					
3.1	Removal of infrastructure	Increased traffic volume and presence of staff	Disturbance of vegetation and terrestrial fauna	LOW	<ul style="list-style-type: none"> Adhere to final agreed access routes. Adhere to TKNP regulations especially with respect to natural resource use; waste management; traffic; water use; traffic speeds; etc. Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas. Accommodate workforce off site. Removal of alien invasive plants. 	LOW **
3.2			Disturbance of avifauna	LOW		LOW **
3.3		Generation of waste and hydrocarbon spills	Faunal injury / mortality due to construction waste and soil contamination	LOW		<ul style="list-style-type: none"> Adhere to waste management protocols. Ensure there is a supply of absorbent material readily available at each site to absorb / breakdown spills.

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
AFOLU	Agriculture, Forestry and Other Land Use
BID	Background Information Document
CBD	Convention on Biological Diversity
CITES	Convention on International Trade of Wild Fauna and Flora Endangered Species
CMS	Convention on Migratory Species
CO ₂	Carbon dioxide
COP21	21 st Conference of the Parties
DEA	Directorate of Environmental Affairs
DTG	Directorate of Tourism and Gaming
DSR	Draft Scoping Report
DWNP	Directorate of Wildlife and National Parks
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EN	Endangered
ESA	Early Stone Age
ESMP	Environmental Social Management Plan
FDI	Foreign Direct Investment
GHC	Green Hydrogen Council
GHG	Greenhouse Gases
GN	Guidance Note
H ₂	Hydrogen
HPPII	Harambee Prosperity Plan II
Hyphen	Hyphen Hydrogen Energy (Pty) Ltd
I&APs	Interested and Affected Parties
ITCZ	Inter-Tropical Convergence Zone
LC	Least Concern
LCOH	levelized cost of hydrogen
LIDAR	Light Detection and Ranging
LSA	Late Stone Age
MAWLR	Ministry of Agriculture, Water and Land Reform

Acronym / Abbreviation	Definition
met	meteorological
MEFT	Ministry of Environment, Forestry and Tourism
MIT	Ministry of Industrialisation and Trade
MME	Ministry of Mines and Energy
MSA	Middle Stone Age
MSME	Micro, Small and Medium Enterprises
MWT	Ministry of Works and Transport
NBSAP	National Biodiversity Strategy and Action Plan
NCCC	National Climate Change Committee
NCCSAP	National Climate Change Strategy and Action Plan
NDP5	Namibia's Fifth National Development Plan
NGO	Non-Governmental Organisation
NH3	Ammonia
NIC	Namibian Investment Centre
NIPDB	Namibian Investment Promotion and Development Board
NT	Near Threatened
PV	Photovoltaic
QA	Quality control
QC	Quality assurance
RFP	Request for Proposals
SAPP	Southern African Power Pool
SCDI	Southern Corridor Development Initiative
SEA	Strategic Environmental Assessment
SLR	SLR Environmental Consulting (Namibia) (Pty) Ltd
SME	Small and Medium Enterprise
TDA	Tourism Development Area
TKNP	Tsau //Khaeb National Park
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNCBD	United Nations Convention on Biological Diversity
VU	Vulnerable

ACRONYMS AND ABBREVIATIONS

Unit	Definition
>	Greater than
<	Less than
≥	Greater than or equals to
°C	Degrees Celsius
%	Percentage
\$	US Dollars
cm	Centimetres
eq	Equivalent Units
Gg	Gigagram
GW	Gigawatts
kg	Kilograms
km	Kilometres
km ²	Squared Kilometres
kWh	Kilowatt per hour
m	Metres
m ²	Squared metres
mm	Millimetres
Mt	Megatonne
Mt/yr	Megatonne per year
MW	Megawatt
tpa	Tons per annum
W	Watt

GENERAL TERMINOLOGY

Terms	Definition
Activity	An “activity” is defined as a distinct process or risk undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation.
Area of Influence	<p>The area of influence is a spatially defined area within which potential impacts associated with a project are expected to occur. It is defined taking into account:</p> <ul style="list-style-type: none"> the physical extent of the proposed project activities, defined by the limits of landscape or seascape to be acquired or used temporarily or permanently for the Project; and the nature of the baseline environment, the sources of predicted impacts and the extent to which the impact is likely to occur beyond the Project boundary. (e.g., air or water contamination). <p>The area of influence is separated into the direct area of influence within which direct impacts of the project would occur (e.g., project footprint). The indirect area of influence typically covers a wider area to include potential indirect social impacts (e.g., employment or economic benefits at a district or regional scale), and biophysical impacts (e.g., unplanned events such as oil spills).</p>
Aspect	An environmental or social ‘aspect’ is an element of an organisation’s activities, products and services which can interact with the natural and social environment. The interaction of an aspect with the natural and social environment may result in an impact.
Baseline	A description of the physical, biological, and social environment based on data and information from the pre-project conditions that provides a reference against which any future changes associated with a project can be assessed, and which provides information for subsequent monitoring of biodiversity performance. The baseline should identify and describe the attributes of the physical, biological, socio-economic, and cultural receiving environment both in the immediate and wider area around a project site.
Cumulative Impact	<p>Impacts that in combination with other impacts from the same project or other existing or planned (but reasonably foreseeable) projects affect the same environmental or social resources and/or receptors as the Project. They may be of two types:</p> <ul style="list-style-type: none"> Additive - impacts that may result from the combined or incremental effects of future planned activities (i.e., those developments currently in planning and not included as part of the existing baseline conditions), or In-combination - impacts where individual project-related impacts are likely to affect the same environmental or socioeconomic feature (e.g., a combined effect of noise and drill cutting on a receptor acting together in space and time could result in increased effects greater than the individual effects in isolation).
Effect	Effect is a change in a variable or parameter caused or influenced by a project activity, but where no judgement or evaluation is made about the consequence of this change on a receptor. Effects are typically related to abiotic or physico-chemical changes (e.g., change in water quality, air quality or noise) (see ‘Impact’ below)
Embedded or Project Controls	The physical or procedural measures that are built into the design or operation of a project and required by law or standard for good international industry practice and which serves to mitigate potential consequences on the environment (e.g., amendment of access roads to avoid sensitive areas). These measures are typically incorporated into the project description and should not be considered additional mitigation measures in the evaluation of post-mitigation impact significance.
Footprint	The area directly affected by a project usually through physical disturbance such as placement of infrastructure, and which falls within the direct area of influence of the project.

Terms	Definition
Impact	Impact is a change resulting from an aspect acting on a natural or environmental receptor (e.g., impact of air quality change on nearby settlement or impact of water quality change on instream biota etc.). Impacts are evaluated in an EIA process using an agreed impact assessment methodology taking into account aspects such as receptor sensitivity, intensity, extent and duration. Impacts can be direct, indirect, induced, or cumulative, as well as negative, positive, and neutral.
Magnitude	A rating assigned to an impact to reflect the 'size' of the impact on the specific resource, based on intensity, extent, and duration.
Mitigation Hierarchy	A process of sequentially prioritising the application of measures to avoid, mitigate, restore, and offset impacts to minimise impacts to as low as reasonably possible (ALARP).
Planned Impact	An impact that is expected as a result of a Project's planned activity (e.g., vegetation clearance in project footprint).
Pre-Mitigation	The assessment of impact significance before mitigation has been applied but which includes the implementation of embedded control measures.
Project	The Project includes all the infrastructure components and activities which form part of the development, including all related and ancillary facilities or infrastructure (e.g., power and water supply, waste services etc.) without which the Project cannot proceed. It also includes any other developments or activities which follow as a necessary consequence of the project.
Residual impact	The assessment of impact significance after additional technically feasible and agreed mitigation has been applied in accordance with the mitigation hierarchy (including the implementation of embedded control measures).
Receptor	Receptors are environmental components, people and cultural heritage assets that may be affected (adversely or beneficially) by the proposed project. They can be categorised into three types: <ul style="list-style-type: none"> • Physical marine environment (i.e., abiotic environmental components, e.g., water and air quality, marine sediments, geology, noise, etc.); • Biological environment (i.e., terrestrial, coastal, and marine habitats, flora, and fauna, protected areas, etc.). • Socio-economic (i.e., local economy, people, settlements, livelihoods (e.g., resource users), and cultural heritage, etc.).
Scoping	Scoping is the process of defining the range of issues and alternatives to be considered and the approach to be followed in an environmental and social impact assessment (ESIA) process. It is typically designed to focus the Environmental Impact Assessment on significant issues including those perceived as important by stakeholders.
Sensitivity	A term used to denote the importance or value or vulnerability of a receptor to an impact. Sensitivity ratings are defined specific to different receptor types.
Screening	Screening is a process to determine whether a proposed activity requires an environmental assessment, as well as the type and level of assessment required and is typically undertaken prior to commissioning an EIA process. The term may also be used as a high-level assessment of potential impacts that may arise, for example, through the use of an activity-impact interaction matrix.
Unplanned Impact	Impacts that result from an unplanned or non-routine event and which are not reasonably foreseeable or expected during the Project. The probability or likelihood of occurrence is described when assessing unplanned impacts, but is not used to influence the significance rating. Unplanned events include, for example, a fuel/oil spill during operations, but does not include routine discharges during normal operations (e.g., sewage discharges).

1 INTRODUCTION

This chapter provides a brief description of the project background, describes the purpose of this report and defines the structure of the report.

1.1 PROJECT BACKGROUND AND LOCATION

In November 2021, the Namibian government issued a notice of award stating its intention to appoint HYPHEN Hydrogen Energy (Pty) Ltd (Hyphen) as the preferred bidder to develop the country's first large-scale green hydrogen (H₂) project in two concession areas (namely Springbok and Dolphin) in the Tsau //Khaeb National Park (TKNP), near Lüderitz, southern Namibia (Figure 1-1).

The proposed green H₂ project, worth an estimated US\$ 9.4 billion, will consist of 5-6 gigawatts (GW) of wind and solar renewable energy facilities, as well as support infrastructure comprising a desalination plant, an electrolyser, pipelines, powerlines, battery storage, access roads, single buoy mooring, etc. The project is forecast to produce 300 000 to 350 000 tons per annum (tpa) of green H₂, which will then be combined with nitrogen from the air to produce 1.7 million - 2 million tpa of green ammonia (NH₃) for the export market.

The bulk of the renewable electricity generation will be in the form of wind energy, which will be generated from wind turbines located within the two concession areas. To better understand the suitability of the wind resource in the identified development area, Hyphen is proposing to install 10 meteorological (met) masts and a Light Detection and Ranging (LIDAR) remote sensors (LIDAR) in two locations as a means of secondary data collection. The proposed met masts and remote sensing campaign (the 'Project') will allow Hyphen to:

- Collect site specific wind resource data and refine its understanding of the wind resource characteristics, seasonality, and patterns; and
- Optimise the design (wind turbine type), number of turbines needed, and layout of the wind energy facility to ensure it operates as efficiently as possible, thereby maximising the project's generation capacity.

The proposed Project triggers Listed Activity 10.1(j) of the Environmental Impact Assessment (EIA) Regulations 2012 promulgated under the Environmental Management Act, 2007 (No. 7 of 2007), and as such requires an Environmental Clearance Certificate (ECC) from the Ministry of Environment, Forestry and Tourism (MEFT). An EIA process must be undertaken for MEFT to consider an ECC application.

SLR Environmental Consulting (Namibia) (Pty) Ltd (SLR), an independent firm of environmental consultants, has been appointed by Hyphen to manage the ECC Application and undertake an EIA process (scoping with assessment) for the proposed met mast and remote sensing campaign. Please be advised that the larger green H₂ project will be subject to a separate EIA process. The current EIA process only deals with the proposed met mast and remote sensing campaign.

1.2 PURPOSE OF THIS REPORT

This Final EIA Scoping Report and Environmental Management Plan (EMP) has been prepared in compliance with Section 8 and 15(2) of the EIA Regulations 2012 as part of the EIA that is being undertaken for the proposed Meteorological Mast and Remote Sensing Campaign in the Tsau//Khaeb National Park.

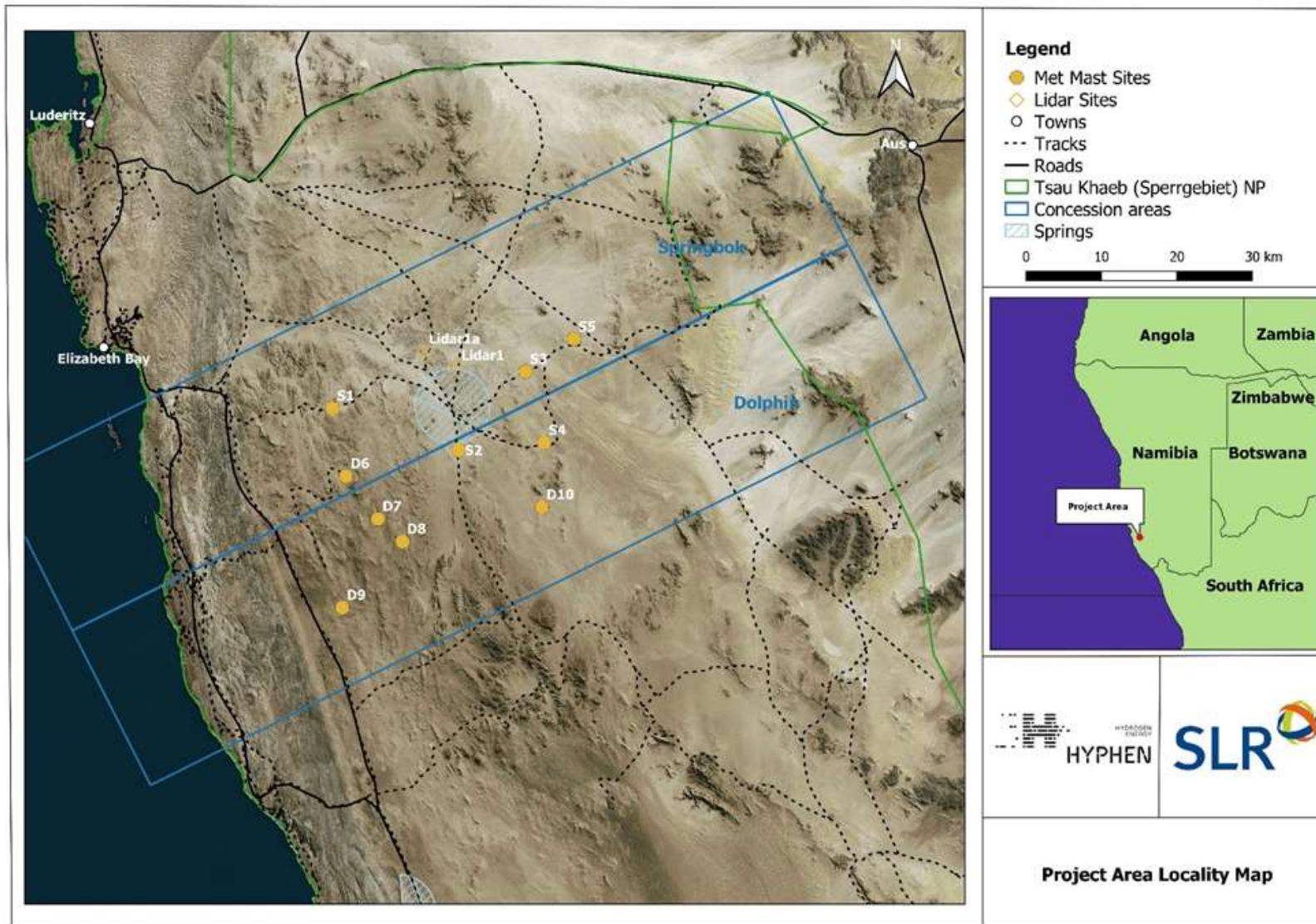


FIGURE 1-1: LOCALITY MAP SHOWING HYPHEN CONCESSION AREAS AND PROPOSED SITE LOCATIONS IN THE TSAU//KHAEB NATIONAL PARK

This report provides:

- An introduction to the proposed Project;
- The legal and policy framework;
- The EIA approach and methodology;
- Details of the public consultation process;
- The need for the proposed Project;
- A description of the proposed Project activities and alternatives being considered;
- A description of the key characteristics of the receiving (baseline) environment;
- An assessment of potential impacts of the proposed Project (normal operations and upset conditions);
- Mitigation and management measures necessary to avoid or reduce potentially significant impacts, which are included into an EMP; and
- Recommendation and conclusion regarding the issuing of an ECC for the proposed Project.

The compilation of this report has been informed by comments received from Interested and Affected Parties (I&APs) during the draft EIA Scoping Report review and comment period (5 September to 5 October 2022) and those raised during two public meetings. Comments received by SLR on or before 5 October 2022 have been recorded and responded to in a Comments and Responses Report (see Appendix 2.8). **It should be noted that all significant changes to the draft report are underlined and in a different font (Times New Roman) to the rest of the text.**

This report is submitted to the delegated authority, the Ministry of Mines and Energy (MME): Energy Directorate, for consideration and review. In terms of Section 32 of the Environmental Management Act, 2007 (No. 7 of 2007), MME is then required to make a recommendation on the acceptance or rejection of the report to the Ministry of Environment, Forestry and Tourism (MEFT): Directorate of Environmental Affairs, who will make the final decision on the ECC application.

1.3 STRUCTURE OF THIS REPORT

This report has been structured in compliance with Section 8 and 15(2) of the EIA Regulations 2012 and the content is given in Table 1-1 below.

TABLE 1-1: STRUCTURE AND CONTENT OF THE EIA SCOPING REPORT AND EMP

Section	Contents
Executive Summary	Provides a synopsis of the Final EIA Scoping Report and EMP.
Chapter 1	Introduction Provides a brief description of the Project background, describes the purpose of this report and defines the structure of the report.
Chapter 2	Legislative and Policy Requirements Summarises the Namibian administrative framework, describes the Namibian legislation and international conventions / treaties.
Chapter 3	EIA Approach and Methodology Lists the EIA Project Team members, outlines the EIA assumptions, limitations, EIA approach and methodology.
Chapter 4	Public Consultation Process Presents and describes the public consultation process undertaken during the EIA process.

Section	Contents
Chapter 5	Need and Desirability Describes the need and desirability for the proposed Project.
Chapter 6	Project Description Describes the technical aspects of the Project and feasible alternatives for activities, location, scheduling, site, scale, and design.
Chapter 7	Description of the Receiving Environment Describes the baseline physical, biological, socio-economic, and cultural environment.
Chapter 8	Identification and Description of Potential Environmental and Social Impacts Provides a high-level screening of the interaction between the Project activities and the receiving environment, as well as a Project-specific Aspects and Impacts Register. It also presents the key impacts identified by the EIA project team and the associated specialist studies identified to assess these impacts and their associated terms of reference.
Chapter 9	Impact Assessment Describes and assesses the potential impacts significance of the proposed Project. Mitigation/management measures are also presented.
Chapter 10	Conclusions and Recommendations Provides conclusions to the EIA and makes a recommendation regarding the issuing of an Environmental Clearance Certificate for the proposed Project.
Chapter 11	References Provides a list of the references used in compiling this report.
Appendices	<p>Appendix 1: Curricula Vitae of the EIA Project Team</p> <p>Appendix 2: Public Participation Process</p> <p>Appendix 2.1: I&AP Database</p> <p>Appendix 2.2: Background Information Document</p> <p>Appendix 2.3: Advertisements</p> <p>Appendix 2.4: Site Notices</p> <p>Appendix 2.5: I&AP Notification Letters</p> <p>Appendix 2.6: I&AP Correspondence</p> <p><u>Appendix 2.7: Minutes of public meetings</u></p> <p>Appendix 2.8: Comments and Responses Report</p> <p>Appendix 3: Specialist Studies:</p> <p>Appendix 3.1: Method for Assessing Impact Significance</p> <p>Appendix 3.2: Terrestrial Ecology</p> <p>Appendix 3.3: Avifauna</p> <p>Appendix 3.4: Archaeology</p> <p>Appendix 4: Environmental Management Plan</p>

2 LEGAL AND POLICY FRAMEWORK

This chapter provides an overview of relevant Namibian legislation and policy, summarises the Namibian administrative framework and describes the international treaties, industry standards and guidelines applicable to the EIA process for this Project.

2.1 NAMIBIAN INSTITUTIONAL AND ADMINISTRATIVE STRUCTURE

2.1.1 Ministry of Mines and Energy

The Ministry of Mines and Energy (MME) comprises six directorates; one of which is the **Directorate of Energy**. The mandate of the Directorate of Energy is to ensure the adequate and affordable energy supply in a sustainable manner taking advantage of Namibia's natural resources in support of the nation's socio-economic development. The Directorate is responsible for the implementation of the Energy Policies and enforces the compliance of legal requirements of energy legislation (Electricity Act, 2007) and regulations, and research new and renewable sources of energy. The Directorate of Energy consists of three divisions:

- **Electricity Division:** Electricity Division is engaged in coordinating, planning, managing project financing and implementing national electricity programmes with emphasis on Rural Electrification Programme and Power generation Projects. It also monitors the Electricity Supply Industry restructuring through policy formulation and implementation.
- **Renewable Energy Division:** This Division is tasked with the implementation of Renewable Energy and Energy Efficiency programmes. The key functions of the division are:
 - Provide energy access to off-grid public institutions;
 - Implement and monitor policies;
 - Provide information for investment purposes;
 - Create awareness on energy related issues; and
 - Facilitate research and capacity building in the energy industry.
- **Energy Planning and Research Division:** Energy Planning and Research Division is engaged in conducting research and compile statistics regarding power generation, transmission, import/export, and distribution of electricity, as well as primary energy resource development including renewable sources of energy as basis for policy advice.

MME is the Competent Authority for ECC applications relating to power generation. As part of the EIA, the Energy Directorate is required to make a recommendation to MEFT on the application for Environmental Clearance, who will make the final decision.

2.1.2 Ministry of Environment, Forestry and Tourism

The Ministry of Environment, Forestry and Tourism (MEFT) is the custodian of Namibia's natural environment, and its mission is to "*promote biodiversity conservation in the Namibian environment through the sustainable utilisation of natural resources and tourism development for the maximum social and economic benefit of its citizens*". MEFT develops, administers, and enforces environmental legislation and policy.

The Ministry comprises seven directorates; three of directorates are relevant to the Project:

- **Directorate of Environmental Affairs (DEA):** DEA is mandated to give effect to Article 95L of the Constitution by promoting environmental sustainability. The Environmental Commissioner serves as head of the DEA. The DEA is responsible for, inter alia, the administration of the EIA process undertaken in terms of the Environmental Management Act, 2007 and the EIA Regulations 2012.
- **Directorate of Wildlife and National Parks (DWNP):** The key objectives for the DWNP are to sustainably manage Namibia's Protected Areas manage and regulate the utilisation of renewable natural resources on a sustainable basis and to strive for biodiversity conservation.
- **Directorate of Tourism and Gaming (DTG):** The mission of the DTG is to develop a sustainable and responsible tourism industry that contributes significantly to the economic development of Namibia and the quality of life of all her people.

The DEA will be responsible for issuing a decision on the application for an ECC for the proposed Project, based on the recommendations from MME: Energy Directorate. If approved, the DEA will issue an ECC.

2.1.3 Ministry of Agriculture, Water and Land Reform

The Ministry of Agriculture, Water and Land Reform's (MAWLR) mission is to realise the potential of the Agricultural, Water and Forestry sectors towards the promotion of an efficient and sustainable socio-economic development for a prosperous Namibia. The MAWLR is mandated to promote, develop, manage, and utilise Agricultural and Water resources.

The MAWLR has been identified a key stakeholder for the proposed Project and EIA process.

2.1.4 Ministry of Education, Arts and Culture and the National Heritage Council of Namibia

The Ministry of Education and Culture is the national administrative body responsible for the protection of Namibia's natural and cultural heritage. Its objectives are to reconcile culture and share the benefits of Namibia's heritage and growth in our diverse cultural identities; to identify, protect and manage the natural and cultural heritage of Namibia.

The National Heritage Council of Namibia is a statutory organisation of the government of Namibia established under the National Heritage Act, No 27 of 2004. It is the national administrative body responsible for the protection of Namibia's natural and cultural heritage.

Both the Ministry of Education and Culture and the National Heritage Council of Namibia have been identified as key stakeholders for the proposed Project and EIA process.

2.1.5 Ministry of Works and Transport

The Ministry of Works and Transport (MWT) is responsible for infrastructure development and setting transport policy and regulation. MWT comprises the four departments, one of which is the **Department of Transport**.

The **Directorate of Transportation Infrastructure** falls under the Department of Transport. This Directorate is responsible for the development of modern transport infrastructure for roads, aerodromes, harbours, and waterways; ensure optimal utilisation and management of transport infrastructure projects assigned to the Directorate.

The MWT has been identified a key stakeholder for the proposed Project and EIA process.

2.1.6 Namibian Civil Aviation Authority

The Namibia Civil Aviation Authority (NCAA) conducts the safety and security regulation of civil air operations in Namibia's airspace, as well as provides air navigational services to all airspace users.

The NCAA has been identified a key stakeholder for the proposed Project and EIA process, and has confirmed that apart from the Lüderitz aerodrome, there are no private airstrips or other aerodromes within the vicinity of the proposed met masts. SLR has submitted an application form to NCAA for the erection of the met mast structures (FSS-AGA-FORM-32). Hyphen will comply with any recommendations made by the NCAA. A copy of the NCAA decision will be provided to MEFT.

2.1.7 Green Hydrogen Council (GHC)

The Green Hydrogen Council (GHC) is an inter-ministerial committee that was established in July 2021. The GHC is responsible for championing the development of the Southern Corridor Development Initiative (SCDI) vision, one of the key actions outlined in the Harambee Prosperity Plan II, which was endorsed by the Inter-Ministerial Green Hydrogen Committee. The SCDI includes plans to develop a portfolio of complementary projects and infrastructure that unlocks the potential of the green hydrogen and green ammonia as a transformative, strategic industry for Namibia (NIPDB, 2021). As noted in Section 1.1, the proposed met mast and remote sensing project is a precursor of the larger proposed green H₂ project and will result in a better understanding of the suitability of the wind resource in the identified development area.

2.1.8 Namibia Investment Promotion and Development Board (NIPDB)

The Namibia Investment Promotion and Development Board (NIPDB) is a Non-Profit Organisation incorporated under Section 21 of the Companies Act, 2004 (No. 28 of 2004). It commenced operations on 1 January 2020 as an autonomous entity in the Presidency and was pronounced as a Public Enterprise in accordance with Section 2 of the Public Enterprises Governance Act, 2019 (No. 1 of 2019). The NIPDB is mandated with the following functions, amongst other things:

- Promote and facilitate investment by foreign and Namibian investors and New Ventures that contributes to economic development and job creation;
- Implement Namibia Investment Policy and attendant Strategy;
- Review and propose policy reforms and measures to support trade and investment promotion, conducive labour market policies, improve the country's Competitiveness and the Ease of Doing Business;
- Develop and implement branding interventions that promote Namibia as an attractive investment destination;
- Develop institutional mechanism and assume lead coordinating role across all levers for SME Development nationally;
- Implement the National MSME Policy of 2016;
- Promote regional Special Economic Zones that leverage the geographic comparative advantages of each region; and

- In collaboration with relevant stakeholders, facilitate collaborative roles between the Government and private sector to stimulate the growth, expansion, and development of the Namibian economy.

The NIPDB is in the process of taking over the activities of the Namibian Investment Centre (NIC) and SME Development programmes from the Ministry of Industrialisation and Trade (MIT) in an effort to accelerate and propel sustainable and impactful investment opportunities for Namibia. The NIPDB is a key stakeholder in this Project.

2.2 LAWS AND POLICIES APPLICABLE TO RENEWABLE ENERGY

2.2.1 Introduction

The Republic of Namibia has five tiers of law, which includes:

- The Constitution;
- Statutory law;
- Common law;
- Customary law; and
- International law.

The Constitution of the Republic of Namibia (1990) sets of founding principles to which Namibia is governed. Article 95(L) of the Constitution commits the state to promote sustainable development by “*maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians both present and future...*”.

The key policy and legislative requirements and guiding principles underpinning the EIA process are outlined here.

2.2.2 Policy and Legal Framework for EIA

2.2.2.1 Environmental Assessment Policy for Sustainable Development and Environmental Conservation, 1995

Namibia’s Environmental Assessment Policy was published in 1995 and promotes sustainable development and economic growth while protecting the environment in the long-term. The government recognises that EIA (termed Environmental Assessment in Policy) is a key tool to further the implementation of a sound Environmental Policy that strives to achieve Integrated Environmental Management. EIAs ensure the consequences of development projects are considered and incorporated into the planning process. Although the proposed met masts and remote sensing campaign are not specifically listed in the Policy as activities requiring an EIA, this EIA aims to fulfil the requirements of this Policy.

2.2.2.2 Environmental Management Act, 2007

The Environmental Management Act, 2007 (No. 7 of 2007) was promulgated in December 2007 and came into effect on 6 February 2012. The main objectives of this Act are to ensure that:

- Significant effects of activities on the environment are considered carefully and timeously;
- There are opportunities for timeous participation by I&APs throughout the assessment process; and
- Findings are considered before any decision is made in respect of activities.

Section 3(2) of the Act provides a set of principles which give effect to the provisions of the Constitution for integrated environmental management. Decision-makers must take these principles into account when deciding on a proposed Project. This Act stipulates that no party, whether private or governmental, can conduct a listed activity without an ECC obtained from the Environmental Commissioner.

2.2.2.3 EIA Regulations 2012

The EIA Regulations 2012, promulgated on 6 February 2012 in terms of Section 56 of the Environmental Management Act, 2007 (GN No. 30) provides for the control of certain listed activities. These listed activities are provided in GN No. 29 and are prohibited until an ECC has been obtained from MEFT. Such ECCs, which may be granted subject to conditions, will only be considered once there has been compliance with the EIA Regulations 2012. GN No. 30 sets out the procedures and documentation that need to be complied with in undertaking an EIA process. Listed activities applicable to the proposed Project are presented in Table 2-1.

TABLE 2-1: LIST OF APPLICABLE ACTIVITIES THAT REQUIRE EIA IN TERMS OF THE EIA REGULATIONS 2012

Activity	Description of activity in relation to the proposed Project
10. Infrastructure	
10.1 (j) <i>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.</i>	To better understand the suitability of the wind resource in the proposed development area within the two concession areas, Hyphen is proposing to install 10 met masts in selected locations. To further reduce the wind resource uncertainty in both the horizontal and vertical planes, Hyphen is also proposing to use LIDAR remote sensing in two locations as means of secondary data collection.

2.2.3 Other Laws and Policies Relevant to the meteorological masts and remote sensing Project

Other legislation relevant to the proposed Project are summarised in Table 2-2 below.

TABLE 2-2: SECTORAL LAWS AND REGULATIONS

Sector	Law	Key Provisions
Power	<i>Electricity Act (No.4 of 2007)</i>	This Act provides a facilitation and regulation role for the generation, transmission, transformation, distribution, supply, and use of electric energy. It endeavours to provide electricity and the planning and regulation of electrification and related matters. The Act furthermore speaks to access to land for installations and electrification plans and strategies.
Transport	<i>Civil Aviation Act (No. 6 of 2016) and associated regulations</i>	The Act sets out to provide for a civil aviation regulatory and control framework for maintaining, enhancing, and promoting the safety and security of civil aviation for ensuring the implementation of international aviation agreements, and for incidental matters thereto.
	<i>Road Traffic and Transport Act (No. 22 of 1999) and regulations GN53 of 2001</i>	This Act provides for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, and the control and regulation of road transport across Namibia's borders; and for matters incidental thereto.

Sector	Law	Key Provisions
Pollution	<i>Atmospheric Pollution Prevention Ordinance (Ordinance 11 of 1976)</i>	This Act provides for the prevention of the pollution of the atmosphere. The Act lists the prohibited activities within controlled areas and serves to control air pollution as it affects occupational health and safety issues. Although it addresses air pollution from point sources, it does not consider ambient air quality.
Environmental/ Conservation	<i>Forestry Act (No. 12 of 2001)</i>	This Act provides for the management and use of forests and forest products. It offers protection to any living tree, bush, or shrub growing within 100 m of a river, stream, or watercourse on land that is not a surveyed erf of a local authority area. A licence would be required to cut and remove any such vegetation. Compensation for trees bigger 30 cm in diameter is to be paid to the Ministry of Water, Agriculture and Forestry. Several tree species are listed as being “plants or species of any plant declared to be protected plants” in terms of the 2015 Forest Regulations of the Forest Act (No. 12 of 2001).
	<i>Nature Conservation Ordinance (No. 4 of 1975)</i>	This Ordinance consolidates and amends the laws relating to the conservation of wildlife and protected areas; the establishment of game parks and nature reserves; and the control of problem animals. The Act also governs the operation of tourism activities of which a number has been identified for the Tsau //Khaeb (Sperrgebiet) National Park (TKNP), as stated in the park’s Management Plan (MEFT, 2021). Activities that are prohibited in Namibia’s nature reserves, e.g., hunting and unauthorised picking of indigenous plants, is governed by MEFT. The Ordinance remains effective until the Wildlife and Protected Areas Management Act, 2020 is enacted.
	<i>Nature Conservation Amendment Act (No. 3 of 2017)</i>	This Act amends the Nature Conservation Ordinance and relates, in part, to a revised penalty structure.
	<i>Draft Wildlife and Protected Areas Management Bill, 2021</i>	This Act has not yet been adopted or enacted but is scheduled to be adopted in the second half of 2022. It provides for the protection of indigenous fauna and flora and acknowledges the need to maintain biodiversity and essential ecological processes. Associated regulations, including a list of threatened and / or (near)endemic species, are in draft stage.
	<i>National Heritage Act (No. 27 of 2004)</i>	The Act provides for the protection and conservation of places and objects of heritage significance and their registration. Section 46 requires that a permit is obtained to remove, disturb, damage, or excavate a protected place or object. Section 55 requires that any person who discovers an archaeological site should notify the National Heritage Council.
	<i>Water Resources Management Act (No. 11 of 2013)</i>	This Act provides a framework for managing water resources based on the principles of integrated water resources management. It provides for the management, protection, development, use and conservation of water resources and the regulation and monitoring of water services and to provide for incidental matters.
	<i>Soil Conservation Act (No.76 of 1969)</i>	The Act provides for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.
	<i>Regulations of the Marine Resources Act No 27 of 2000; Government Notice No. 241 of 2001</i>	These Regulations list a number of protected sea- and coastal bird species, including flamingos.

Sector	Law	Key Provisions
Hazardous Substances	<i>Hazardous Substances Ordinance (Ordinance 14 of 1974)</i>	The manufacturing, storage, handling, or processing of all hazardous substances are defined in the Hazardous Substances Ordinance, 1974. This Ordinance provides for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances and for the control of the use, storage and dumping of such substances.
Labour	<i>Labour Act (No. 11 of 2007) and Regulations relating to the health and safety of employees at work (GN 156 of 1997)</i>	This Act sets out the fundamental rights of workers and basic conditions for work. The Act provide instructions relating to the health and safety of employees.
	<i>Regulations relating to the health and safety of employees at work (GN 156 of 1997)</i>	These Regulations establish health and safety regulations for the workplace.
Health	<i>Public and Environmental Health Act (No.1 of 2015)</i>	The Act serves to protect the public from nuisance and states that no person shall cause a nuisance or shall allow any nuisance or other condition which is injurious or dangerous to health on land or premises owned or occupied by them.

A summary of other policies, plans and guidelines applicable to the proposed Project is provided in Table 2-3.

TABLE 2-3: POLICIES AND PLANS

Policy	Key Provisions
<i>Namibia Vision 2030</i>	This outlines the country's development programmes and strategies to achieve its national objectives. One of the major objectives of Vision 2030 is to “ensure the development of Namibia’s ‘natural capital’ and its sustainable utilisation, for the benefit of the country’s social, economic, and ecological well-being”.
<i>Fifth National Development Plan 2017/18 – 2021/22 (NDP5)</i>	Namibia’s Fifth National Development Plan (2017/18 – 2021/22) provides the context for all development in Namibia, with the overarching aim of economic and social development.
<i>Harambee Prosperity Plan II (HPPII)</i>	The Harambee Prosperity Plan II (covering the period 2021-2025) is a plan which details the tangible commitment of Namibian Government to deliver improved results and to build an enhanced, resilient economy for the benefit of all citizens. Building on the inaugural HPP (2016-2020), the Harambee Prosperity Plan II (HPPII) is a targeted Impact Plan, consisting of short to medium terms goals in the interest of economic recovery, enhancing service delivery, engendering inclusive growth and strategically accelerating national development towards Vision 2030 and Prosperity for All.
<i>Strategic Plan, 2017/2018 – 2021/2022</i>	In order to achieve the objectives in Namibia Vision 2030, Harambee Prosperity Plan and NDP5, MME developed the Strategic Plan (2017/2018 – 2021/2022). This Plan provides the strategic direction of MME aimed at achieving its Mandate, Vision, Mission, and Strategic Objectives. It aims to ensure the development of Namibia’s natural capital and its sustainable utilisation for the benefit of the country’s social, economic, and ecological well-being. The Harambee Prosperity Plan also includes elements from the Ministry of Trade and Industry’s (MTI) industrialisation strategy, “ <i>Growth at Home</i> ”, which promotes local value addition of raw materials before they are exported, building, and promoting regional value chains and bilateral cooperation, nurturing infant industries, and the continuous reform of the business environment to become more competitive (MTI, 2015).

Policy	Key Provisions
<i>National Policy on Climate Change</i>	The National Policy on Climate Change aims to provide the legal framework and overarching national strategy for the development, implementation, monitoring and evaluation of climate change mitigation and adaptation activities. The policy promotes the enhancement of synergies amongst sectors and stakeholders for effective and efficient mitigation and adaptation responses to climate change in Namibia. In addition, the policy facilitates identification of sector and cross-cutting climate change strategies and actions to lower the overall risks and the risks to the most vulnerable people. The policy also provides a legal basis for resource mobilisation to address climate change adaptation and mitigation.
<i>National Energy Policy 2017</i>	The National Energy Policy (2017) describes the government's intent, direction and undertakings regarding the development and future of the Namibian energy sector. It aims to see the energy sector develop, in alignment with Vision 2030, for the benefit of all Namibians in a sustainable manner. The primary goals of the National Energy Policy (2017) are to: <ul style="list-style-type: none"> • Ensure the security of all relevant energy supplies to the country; • Create cost-effective, affordable, reliable and equitable access to energy for all Namibians; • Promote the efficient use of all forms of energy; and • Incentivise the discovery, development, and productive use of the country's diverse energy resources.
<i>Policy for the Conservation of Biotic Diversity and Habitat Protection, 1994</i>	This Policy was drafted by MEFT to ensure adequate protection of all species and subspecies, of ecosystems and of natural life support processes.
<i>Namibia's Second National Biodiversity Strategy and Action Plan (2013 – 2022)</i>	Namibia signed the Convention on Biological Diversity (CBD) in 1992 and ratified it in 1997. Namibia has developed the second National Biodiversity Strategy and Action Plan (NBSAP2) to build upon the first National Biodiversity Strategy and Action Plan (NBSAP1) and to better align to the latest national and global trends (e.g., the CBD Strategic Plan Aichi Biodiversity Targets). The NBSAP2 demonstrates the Namibian Government's commitment to the sustainable management of its biodiversity and ecosystems and assist with the realisation of Vision 2030.
<i>Management Plan Tsau//Khaeb National Park (2020/2021 – 2029/2030)</i>	This Plan guides the zoning of the park and the activities that may take place in each zone. An updated plan was completed in 2020 but is not yet available publicly.
<i>Tourism Development Plan for Tsau//Khaeb (Sperrgebiet) National Park 2019 to 2028</i>	MEFT has adopted a strategic approach to tourism and recreation development for the Tsau //Khaeb (Sperrgebiet) National Park. This strategic approach takes cognisance of and is influenced by best practice in tourism development in protected areas; trends for future tourism and recreation within protected areas; tourism resources and attractions within national parks; tourism markets and tourism flows; positioning for national parks in the tourism market and relative to other competitive and complementary protected areas in Namibia and neighbouring countries; park management plans and environmental considerations. Furthermore, such tourism development is guided by a strategic framework for tourism development for the Tsau //Khaeb (Sperrgebiet) National Park, which sets out high level aims and objectives for tourism development.

2.3 INTERNATIONAL LAWS AND CONVENTIONS

Relevant international conventions and treaties which have been ratified by the Namibian Government and which have become law through promulgation of national legislation are listed in Table 2-4 below.

TABLE 2-4: INTERNATIONAL CONVENTIONS AND TREATIES RATIFIED BY NAMIBIA

Conventions and Treaties	Summary of legislative provisions
Air and Atmosphere	
<i>Kyoto Protocol on the Framework Convention on Climate Change, 1997</i>	This Protocol was the key instrument on which the 1992 United National Framework Convention on Climate Change is based. It is the first legally binding global agreement setting out specific obligations for the reduction of the amount of greenhouse gases.
<i>Montreal Protocol on Substances that Deplete the Ozone Layer, 1987</i>	This Protocol lays down a timetable for the reduction of controlled substances that deplete the ozone layer and have adverse effects on health and the environment.
<i>Paris Agreement (United Nations Framework Convention on Climate Change), 2016</i>	Namibia signed the Paris Agreement on 22 April 2016 and entered it into force on the 4 November 2016. This Agreement aims to strengthen the global response to the threat of climate change by limiting the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognising that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century.
<i>United Nations Framework Convention on Climate Change – UNFCCC, 1992</i>	The UNFCCC objective is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The framework sets non-binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms.
<i>Vienna Convention for the Protection of the Ozone Layer, 1985</i>	The Convention is the first global agreement that recognised that the ozone was a serious enough problem to warrant international regulation.
Chemicals and Waste	
<i>Convention on the control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989)</i>	This Convention designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries.
<i>Stockholm Convention on Persistent Organic Pollutants, 2001</i>	This Convention is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment.
Flora, Fauna, and Protected Areas	
<i>African Convention for the Conservation of Nature and Natural Resources (Algeria, 1968) and the revised version (Maputo, 2003)</i>	The objectives of this Convention are to enhance environmental protection, to foster the conservation and sustainable used of natural resources, and to harmonise and coordinate policies in these fields.
<i>Convention on the Conservation of Migratory Species of Wild Animals, also known as the Convention on Migratory Species (CMS) or the Bonn Convention, 1983</i>	This Convention is an international agreement that aims to conserve migratory species within their migratory ranges. CMS covers a great diversity of migratory species. The Appendices of CMS include many mammals, including land mammals, marine mammals, and bats; birds; fish; reptiles and one insect.
<i>Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2000</i>	This Protocol is an international agreement on biosafety as a supplement to the Convention on Biological Diversity effective since 2003. The Biosafety Protocol seeks to protect biological diversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology.
<i>United Nations Convention on Biological Diversity (UNCBD), 1992</i>	This Convention has three main goals including: the conservation of biological diversity (or biodiversity); the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources.

Conventions and Treaties	Summary of legislative provisions
<i>Convention on International Trade of Wild Fauna and Flora Endangered Species, 1971 (CITES)</i>	CITES is a multilateral treaty to protect endangered plants and animals.
<i>Convention on Wetlands of International Importance (Ramsar Convention, 1971)</i>	This Convention is an international treaty for the conservation and sustainable use of wetlands.
<i>International Convention for the Conservation of Atlantic Tunas (ICCAT)</i>	This Convention provides for the management and conservation of tuna and tuna-like species in the Atlantic Ocean and adjacent seas.
<i>United Nations Convention to Combat Desertification in those Countries Experiencing serious Drought and/or Desertification, particularly in Africa, 1994</i>	This is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.
<i>Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)</i>	This Agreement deals with the conservation of migratory waterbirds and their habitats. Namibia is non-party range state; South Africa has been a contracting party since 2002.
<i>SADC Protocol on Wildlife Conservation and Law Enforcement, 1999</i>	This Protocol provides for collaborative measures to promote conservation and sustainable activities involving wildlife, including ensuring that activities within a jurisdiction do not cause damage to wildlife resources of other states.
Archaeology and Cultural Heritage	
<i>Convention concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)</i>	This Convention provides for the identification, protection, and conservation of the cultural and natural heritage for future generations.

3 EIA APPROACH AND METHODOLOGY

This chapter provides the details of the EIA Project Team, outlines the EIA assumptions, limitations, EIA methodology and describes the EIA process.

3.1 EIA PROJECT TEAM

The EIA project team and specialists appointed to undertake the EIA process are presented in Table 3-1. The curriculum vitae documentation for the SLR project team is attached in Appendix 1. SLR and specialist consultants have no vested interest in the proposed Project other than fair payment for consulting services rendered as part of the EIA process.

TABLE 3-1: QUALIFICATIONS AND EXPERIENCE OF THE EIA PROJECT TEAM AND SPECIALISTS

Company	Name	Qualifications	Experience (years)	Roles
EIA Project Team				
SLR Namibia / Africa	Stuart Heather-Clark	BSc (Hons) Civil Engineering, University of Cape Town MSc (Env. Sci), University of Cape Town	26	Project Director - QA/QC
	Jeremy Blood	MSc (Cons. Ecol.), University of Stellenbosch	23	Project Manager - Management of EIA process, specialist study review and report compilation
	Jessica Hughes	MSc (Zoology), University of Cape Town MPhil (Environmental Science), University of Cape Town	28	Biodiversity Technical Discipline Manager - Review and QA/QC of specialist studies
	Dylan Moodaley	MSc (Marine Ecology), University of the Western Cape	2.5	Assistant Project Manager – report compilation, management of specialists and public participation
	Warren McClelland	Nat. Dip. (Nature Conservation), Cape Peninsula University of Technology	17	Principal Ecologist - Review and QA/QC of specialist studies
	Robyn Christians	BSc. Environmental Restoration, Murdoch University, Western Australia LLB, University of Cape Town	5	Project Assistant - public participation management
	Werner Petrick	M. Env Mgt, Potchefstroom University; B. Eng, University of Pretoria	23	Associate – Liaison with authorities, process / report review, public participation
Specialist Team				
Enviroscience	Antje Burke	PhD (Landscape Ecology), University of Cape Town	33	Terrestrial Ecology Assessment
Independent	Jessica K	PhD (Avian Demography), University of Cape Town	22	Avifaunal Assessment
Independent	Dieter Noli	PhD (Archaeology), University of Cape Town	26	Archaeology Assessment

3.2 EIA ASSUMPTIONS AND LIMITATIONS

The assumptions and limitations pertaining to this EIA are listed below:

- SLR assumes that all relevant project information has been provided and that it was correct and valid at the time it was provided.
- The met mast and LIDAR locations and access routes are indicative; thus, the final locations may change slightly. This EIA and associated specialist studies has taken this into consideration.
- No significant changes to the project description or surrounding environment between the completion of the EIA process and implementation of the proposed Project that could substantially influence findings and recommendations with respect to mitigation and management will occur.

3.3 EIA OBJECTIVES

The EIA process has the following objectives:

- To provide the opportunity for I&APs to comment and make input into the EIA process.
- To identify potential impacts that could result from the proposed Project.
- To identify feasible alternatives related to the Project proposal.
- To assess potential impacts of the proposed Project and Project alternatives during the different phases of the Project.
- To define feasible mitigation or optimisation measures to avoid or minimise potential impacts or enhance potential benefits.
- Through the above, to ensure informed, transparent, and accountable decision-making by the relevant authorities, as well as the presentation of the results to the public.

3.4 EIA PROCESS

The EIA Regulations 2012 set out the procedures and documentation that need to be complied when undertaking an EIA process. The anticipated tasks and timing for the current EIA process (scoping with assessment) are presented in Figure 3-1. Key steps (excluding authority and public consultation) undertaken during the EIA are summarised below. The public consultation process undertaken during EIA process is summarised in Chapter 4.

3.4.1 Submit Application for ECC

An Application for ECC was compiled and submitted to MME, as the Competent Authority, on 19 April 2022. The application was also uploaded onto MEFT's online portal. On 21 April 2022, MEFT acknowledged that the application had been registered with application number APP-003748.

3.4.2 Identification and Confirmation of Key Issues and Impact

As is noted in Chapter 4, a Background Information Document (BID) was prepared and released for a 21-day review and comment period. The purpose of the BID was to convey information on the proposed Project and EIA process, as well as to invite I&APs to register on the Project database and provide initial comment on the proposed Project and scope of the assessment.

The key potential impacts that were identified for detailed assessment, and confirmed after the BID review and comment period, are summarised in Chapter 8. This information provided the basis on which the specialist studies and associated terms of references were determined.

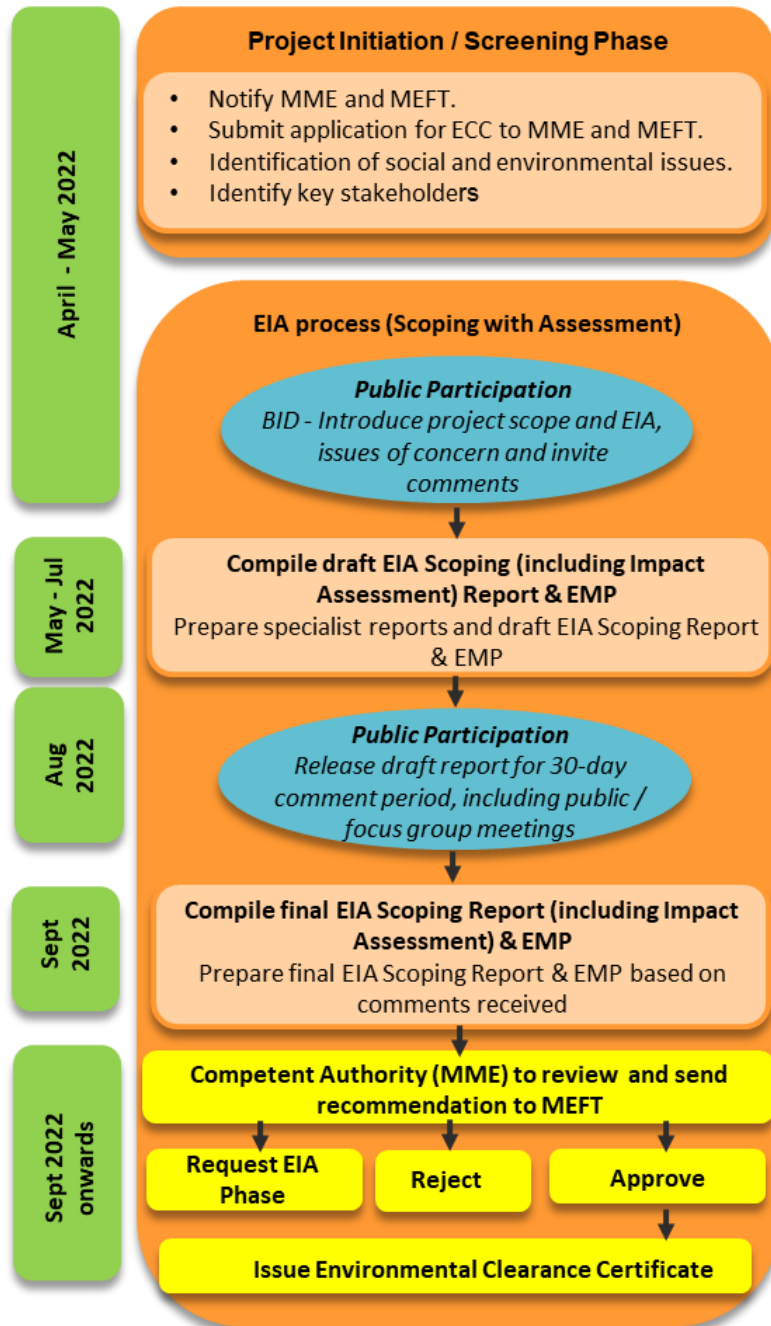


FIGURE 3-1: ILLUSTRATION OF THE SEQUENTIAL STEPS IN THE EIA SCOPING PROCESS

3.4.3 Specialist Studies and Site Visit

Three specialist studies were commissioned to address the key issues associated with the proposed Project. These included: (1) Terrestrial Ecology Assessment; (2) Avifaunal Assessment; and (3) Archaeological Assessment. The terms of reference of these studies are presented in Section 8.3.

As part of these studies, a site visit was undertaken between 1 and 10 May 2022. During this site visit the three specialists, together with MEFT representatives, gathered baseline data at each met mast and LIDAR site, as well as the access routes. This data was used by specialists to describe their respective baseline receiving environments, identify and assess environmental impacts that may occur as a result of the proposed Project (according to pre-defined rating scales - see Appendix 3.1), and recommend appropriate mitigation enhancement measures (including proposing alternative routes to access the sites).

3.4.4 Compilation and Review of Draft EIA Scoping Report and EMP

A Draft Scoping EIA Report and EMP was prepared in compliance with Section 8 and 15(2) of the EIA Regulations 2012. The specialist findings and other relevant information were integrated into this draft report.

The draft report was released for a 30-day review and comment period from 5 September to 5 October 2022. The objective of the review period was to ensure that I&APs were notified about the proposed Project, given a reasonable opportunity to provide comments on the findings of the EIA process. Steps that have been undertaken as part of this review process are summarised in Chapter 4.

3.4.5 Compilation of Final EIA Scoping Report and Completion of the EIA

This final Scoping EIA Report has also been prepared in compliance with the requirements of Section 8 and 15(2) of the EIA Regulations 2012 and has also been informed by comments received on the draft Scoping EIA Report and those issues raised during public meetings. All written submissions have been collated, and responded to, in a Comments and Responses Report (see Appendix 2.8).

As noted previously, this report is submitted to the MME: Energy Directorate, as the competent authority, for review and recommendation to MEFT: Directorate of Environmental Affairs who will make the final decision on the ECC application. The decision taken by MEFT will be distributed to all I&APs registered on the project database for information purposes.

4 PUBLIC CONSULTATION PROCESS

This chapter presents the principles of public consultation and the public consultation steps undertaken during the EIA process.

4.1 PRINCIPLES

The key principles of stakeholder engagement applied in this EIA conforms to international standards:

- Providing meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s);
- Providing information in advance of consultation activities and decision-making;
- Disseminating information in ways and locations that make it easy for stakeholders to access it;
- Respect for local traditions, languages, timeframes, and decision-making processes;
- Two-way dialogue that gives both sides the opportunity to exchange views and information, to listen, and to have their issues heard and addressed;
- Inclusiveness in representation of views;
- Processes free of intimidation or coercion;
- Clear mechanisms for responding to people's concerns, suggestions, and grievances; and
- Incorporating feedback into project or programme design and reporting back to stakeholders.

4.2 STAKEHOLDER IDENTIFICATION

A preliminary I&AP list was compiled based on SLR's existing databases from other EIAs undertaken in southern Namibia and input from local Namibian residents forming part of the EIA project team. This database focused on Namibian authorities (national, regional, and local), Organs of State, Non-Governmental Organisations (NGOs), Community-based Organisations and other key stakeholders with a potential interest in the proposed Project.

The preliminary I&AP database was updated in response to the advertisements, notification letters, and comments received on the BID, as well as people who attended the environmental and social screening meetings held as part of the larger green H₂ project. Additional I&APs have been added to the preliminary database based on comments received on public documents and attendance at meetings. At the time of compiling this report there were 409 registered I&APs (see Appendix 2.1 for the updated database).

4.3 INITIAL CONSULTATION AND DISCLOSURE

The main purpose of this phase of consultation was to provide initial notification to stakeholders about the proposed Project and EIA process, to further develop the I&AP database for the current Project, and to provide I&APs with an opportunity to provide initial comment on the proposed Project and scope of the assessment.

4.3.1 Pre-Application Authority Meetings

SLR and Hyphen held two online meetings with MME / MEFT and other key stakeholders (see Table 4-1). The purpose of these meetings was to, *inter alia*, introduce the project and EIA teams, provide notification of the commencement of the EIA process for the proposed Project and to confirm the process to be followed.

TABLE 4-1: PRE-APPLICATION STAKEHOLDER MEETINGS

No.	Date	Organisations	Objectives
1	25 March 2022	MEFT, MME, SLR, Hyphen	<ul style="list-style-type: none"> Introduce the Hyphen and SLR project teams. Provide an overview of both the larger green H₂ project and the met mast / remote sensing campaign.
2	13 April 2022	MEFT, MME, Namdeb, Sperrgebiet Diamond Mining, SLR, Hyphen	<ul style="list-style-type: none"> Outline the EIA process to be undertaken. Obtain confirmation that MME is the competent authority for the proposed met mast / remote sensing Project. Discuss permitting and logistics for the reconnaissance site visit.
3	19 April 2022	MEFT, MME, SLR, Hyphen	<ul style="list-style-type: none"> Discuss permitting and logistics for the reconnaissance site visit.
4	20 April 2022	Namdeb, Sperrgebiet Diamond Mining, SLR, Hyphen, Specialists (Antje Burke and Dieter Noli)	<ul style="list-style-type: none"> Discuss logistics for the reconnaissance site visit.

4.3.2 Availability of Background Information Document

A Background Information Document (BID) was compiled and released for a 21-day review and comment period from **20 April to 11 May 2022**. The purpose of the BID was to convey information on the proposed Project and EIA process, as well as to invite I&APs to register on the Project database and provide initial comment on the proposed Project and scope of the assessment.

Copies of the BID were made available in English and Afrikaans on the SLR website for download. Refer to Appendix 2.2 for a copy of the BID.

4.3.3 Advertising

Two sets of advertisements announcing the proposed Project, the availability of the BID and the I&AP registration / comment period were placed in the following newspapers on **20 and 27 April 2022**:

- **Republikein, the Sun and the Allgemeine Zeitung** (in English and Afrikaans); and
- **The Namibian** (in English).

The text of the advertisements and newspaper tear sheets is provided in Appendix 2.3.

4.3.4 Site notices

Site notices were placed at four locations in Lüderitz in English and Afrikaans, including the Lüderitz Public Library, Iikharas (Lüderitz) Regional Council, Lüderitz Town Council and the Safari and Tours (Information Centre) offices. A copy of the site notice and proof of placement is provided in Appendix 2.4.

4.3.5 Notification letter

All I&APs registered on the Project database were notified of the application, EIA process and BID comment and review period by means of a notification letter (see Appendix 2.5 for a copy of the letter). To facilitate the commenting process, a registration / comment form was attached to the BID.

4.3.6 Cell phone number for SMS and WhatsApp

While potential I&APs, particularly from vulnerable and disadvantaged communities, may not have access to the internet and email, Namibia has a high level of cell phone usage. In order to facilitate registration and engagement, a cell phone number was provided in all notifications (notification letter, site notices and BID) so that SLR could be contacted via SMS or WhatsApp messaging.

4.3.7 Initial I&AP Comments and Responses on BID

All correspondence received from I&APs during the BID review and comment period (19 in total received via email and WhatsApp) is attached as Appendix 2.6. Initial comments received have been consolidated and responded to in a Comments and Responses Report (see Appendix 2.8). All submissions received were related to acknowledgment, the stakeholder database and offer of services, except for the recommendation from the National Botanical Research Institute that a botanical study¹ should be undertaken.

4.4 CONSULTATION ON AND DISCLOSURE OF THE DRAFT EIA SCOPING REPORT & EMP

4.4.1 Availability of the Draft EIA Scoping Report & EMP

The Draft EIA Scoping Report & EMP was distributed for a 30-day review and comment period from **5 September to 5 October 2022**. The objective of this review and comment period was to ensure that I&APs were notified about the proposed Project and given an opportunity to provide comments on the findings of the EIA and associated specialist studies.

Copies of the draft report were made available on the SLR website for download, as well as the following locations for the duration of the comment period:

<u>Location</u>	<u>Name of facility</u>
<u>Lüderitz</u>	<u>Lüderitz Library</u>
<u>Aus</u>	<u>Aus Settlement Office</u>
<u>Rosh Pinah</u>	<u>Rosh Pinah Public Library</u>
<u>Oranjemund</u>	<u>Oranjemund Public Library</u>
<u>Windhoek</u>	<u>Windhoek Public Library</u>

¹ The Terrestrial Ecology Assessment undertaken as part of this EIA includes an assessment of both flora and fauna - refer to Appendix 3.2.

4.4.2 Notification Letter

All I&APs registered on the Project database were notified of the comment and review period by means of a notification letter (in English and Afrikaans) (see Appendix 2.5 for a copy of the letter and proof of distribution). To facilitate the commenting process, a copy of the Executive Summary (in English and Afrikaans) was attached to the letter.

4.4.3 Cell Phone Number for Calls, SMS and WhatsApp

In order to facilitate engagement during this review and comment period, a cell phone number (+264 81 357 2109) was provided in all notifications so that SLR could be contacted via SMS or WhatsApp messaging.

4.4.4 Public Meetings

Two public meetings were held during the draft Scoping EIA Report review and comment period - one meeting was held in Lüderitz (Nest Hotel) and one online (Microsoft TEAMS) on 20 and 26 September 2022, respectively. The purpose of these meetings was to provide an overview of the Project proposal, EIA process and findings of the impact assessment, as well as provide stakeholders with the opportunity to raise any issues, concerns, or comments. Minutes of these meetings (including presentation and attendance register) are presented in Appendix 2.7.

In addition, a focus group meeting was held with the Namibian Civil Aviation Authority (NCAA) on 3 October 2022. The purpose of this meeting was to discuss various aspects related to the met masts (including distance from the Lüderitz aerodrome, mast colour and visual aids such as flashing lights) in order to facilitate the NCAA's formal comment / approval of the met masts.

Subsequent to the meeting with NCAA, SLR submitted an application form (FSS-AGA-FORM-32) for the erection of the proposed met mast structures. Hyphen will comply with any recommendations made by the NCAA. A copy of the NCAA decision will be provided to MEFT.

4.4.5 I&AP Comments and Responses on Draft EIA Scoping Report

All written submissions received during the Draft EIA Report comment and review period are presented in Appendix 2.6. All issues raised by I&APs during the entire public participation process – by e-mail, telephone or during stakeholder meetings – have been consolidated into an updated Comments and Responses Report (see Appendix 2.8). A summary of the main issues / comments raised through the public participation process is provided below:

- Potential impact on the TKNP's sensitive and unique biodiversity.
- Protection of the sensitive Kaukausib Spring area.
- Potential impact on avifauna and proposed mitigation.
- Compliance with NCAA regulations.
- Potential impact of the larger green H2 project (which will be subject to a separate EIA process).

4.5 DISCLOSURE OF ECC DECISION

MEFT: DEA's decision will be uploaded onto the SLR website for information purposes. All I&APs registered on the Project database will be notified via email.

5 NEED AND DESIRABILITY

This chapter describes the need and desirability for the proposed Project. “Need and desirability” is the consideration of the strategic context of a development proposal within the broader societal needs and the public interest.

The “need and desirability” of the proposed Project from the perspective of wider society and policy ‘fit’ is addressed in terms of the following:

- National and International Policy and Planning Frameworks
 - > Namibia Vision 2030;
 - > The Fifth National Development Plan;
 - > Namibia’s Industrial Policy;
 - > Namibia's National Energy Policy;
 - > Paris Agreement - United Nations Framework Convention on Climate Change (2015);
 - > Namibia's Climate Change Policy Framework;
 - > International Energy Agency: Net Zero by 2050;
 - > Harambee Prosperity Plan II 2021 – 2025; and
 - > Southern Corridor Development Initiative (SCDI).
- Regional and local planning guidance.

The above sources are reviewed below and compatibility of ‘fit’ summarised in Section 5.3.

5.1 CONSISTENCY WITH NATIONAL AND INTERNATIONAL POLICY AND PLANNING FRAMEWORKS

5.1.1 Namibia Vision 2030

In 2004, Namibia adopted Vision 2030, which outlines the country's development programmes and strategies to achieve its national objectives. One of the major objectives of Vision 2030 is to “*ensure the development of Namibia’s ‘natural capital’ and its sustainable utilisation, for the benefit of the country’s social, economic, and ecological well-being*”.

The proposed met mast and remote sensing project compliments the Vision 2030 targets by generating employment opportunities during construction and operation, skills development, and transfer in the rapidly expanding green hydrogen/economy and increasing electrical/power sector contributions from local service providers.

5.1.2 Fifth National Development Plan 2017/18 – 2021/22 (NDP5)

Vision 2030 is being implemented through a series of five-year National Development Plans. NDP5 aims to achieve rapid industrialisation, while adhering to the four integrated pillars of sustainable development:

- Economic Progression;
- Social Transformation;
- Environmental Sustainability; and
- Good Governance.

NDP5 recognises the use of Namibia’s natural resources in an efficient and sustainable way to achieve sustainable development and improve the welfare of the nation’s citizens. In this regard, it emphasises the importance of

partnerships between government, the private sector, communities, and civil society in ensuring that economic progress is achieved in an environment of social harmony.

It also plans to achieve economic progression by developing value added industrialisation, substituting imports for locally produced goods, creating value-chains of production, and to accelerate Small and Medium Enterprise (SME) development (NPC, 2017).

The proposed met mast and remote sensing project directly contributes towards the NDP5 pillar 1 (Economic Progression) and pillar 3 (Environmental Sustainability) objectives.

5.1.3 Harambee Prosperity Plan II 2021 – 2025

The Harambee Prosperity Plan II (HPPII) (2021-2025) is a Plan that details the tangible commitment of Namibian Government to deliver improved results and to build an enhanced, resilient economy for the benefit of all citizens. Building on the inaugural HPP (2016-2020), the HPPII is a targeted Impact Plan, consisting of short to medium terms goals in the interest of; economic recovery, enhancing service delivery, engendering inclusive growth, and strategically accelerating national development towards Vision 2030 and prosperity for all. After a few years of recurrent droughts and recessionary conditions, as well as the global COVID-19 pandemic, the HPPII further aims to ensure Namibia is expectant to respond to global opportunities and domestic socio-economic challenges (HPPPII, 2021:10).

The HPPII contains five pillars, namely (1) Effective Governance, (2) Economic Advancement, (3) Social Progression, (4) Infrastructure Development and (5) International Relations and Cooperation. Economic Advancement is aimed to be achieved through three goals and sixteen activities, with the three goals being:

- Goal 1: Optimising Stewardship of Natural Resources;
- Goal 2: Enhancing Productivity of Priority Economic Sectors; and
- Goal 3: Developing Complementary Engines of Growth.

The larger green H₂ project particularly aligns with the HPPII Goal 3 'Developing Complimentary Engines of Growth', Activities 1-3. These activities are detailed as follows.

- Activity 1: Develop an implementation plan to attract private sector investment into the Green and Blue Economy;
- Activity 2: Investigate the feasibility of Green Hydrogen and Ammonia as a transformative strategic industry; and
- Activity 3: Design and offer competitive investment incentives to facilitate local and foreign direct investment attraction and retention factors.

An Inter-Ministerial Green Hydrogen Committee (GHC) was constituted to oversee the development of the opportunity set during the HPPII period. A preliminary analysis by the World Bank of the green hydrogen market and levelized cost of hydrogen (LCOH) demonstrates that Namibia could produce highly competitive green ammonia; however, with little national demand, exports will be key to the green hydrogen strategy (HPPPII, 2021:36). With its world-class renewable energy resources and increasing demand for green hydrogen worldwide, Namibia has immense potential to be an entrant into this new market and a catalyst for economic growth.

The HPPPII indicates that Namibia has committed to reducing carbon dioxide emissions into the atmosphere and supports the goals of COP21 (21st Conference of the Parties). Moreover, efforts for economic recovery detailed in the HPPPII highlight that Namibia is targeting a primarily renewable energy mix. In an environment where resources are scarce, sustainable public-private partnerships are essential to fully leverage and deliver key infrastructure projects to spur economic growth and to realize the goal of positioning Namibia as a logistics hub with attractive world-class facilities.

The proposed met mast and remote sensing project directly contributes towards the HPP pillar 2 (Economic Advancement) and pillar 4 (Infrastructure Development) objectives.

5.1.4 Namibia's Industrial Policy

In 2012, the then Ministry of Trade and Industry (MTI) developed Namibia's Industrial Policy. Three years after drafting the Industrial Policy, the MTI produced an execution strategy for industrialisation in 2015 called "*Growth at Home*" (MTI, 2015).

The strategy advocates a targeted approach towards industrialisation. In the first phase of Growth at Home, sectors in which Namibia already has some sort of comparative advantage will be targeted (MTI, 2015). Mining (and other extraction) is identified as one of a number of particular sectors to be targeted. The strategy sets out a broad outline of how downstream industries should be developed to ensure that the job creation and socio-economic benefits which stem directly and indirectly from primary production are maximised (MTI, 2015).

The proposed met mast and remote sensing project is critical for the larger green H₂ project as Hyphen needs to understand the wind resource suitability of the selected concession areas. The larger green H₂ project will directly contribute to the industrialised vision set out in Namibia's Industrial Policy.

5.1.5 Namibia's National Energy Policy

The National Energy Policy spells out the Government of Namibia's intent, direction and undertakings regarding the development and future of the Namibian energy sector (MME, 2017).

For the electricity sector, the key policy thrusts are the development of local generation capacity to improve security of supply through appropriate planning at national level, reviewing the present electricity market model, ensuring the on-going viability and development of the transmission and distribution networks, strengthening the regulatory framework, and shaping the electricity mix of the future (MME, 2017).

The wind data collection from the proposed met mast and remote sensing project, which is critical to Hyphen's larger green H₂ project, also will contribute to the National Energy Policy's goals of:

- ensuring the security of all relevant energy supplies to the country;
- creating cost-effective, affordable, reliable and equitable access to energy for all Namibians;
- promoting the efficient use of all forms of energy; and
- incentivising the discovery, development and productive use of the country's diverse energy resources.

5.1.6 Paris Agreement - United Nations Framework Convention on Climate Change (2015)

The Paris Agreement is a comprehensive framework that aims to guide international efforts to limit GHG emissions and to meet challenges posed by climate change. The Paris Agreement was adopted on 12 December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC CoP21). The agreement was signed by Namibia in April 2016.

The long-term goals of the Paris Agreement are:

- Limit the global temperature increase to below 2°C above pre-industrial levels, while pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
- Increasing countries' ability to adapt to the effects of climate change and to foster climate resilience.
- Encouraging low GHG emissions development that does not compromise food production.
- Making finance flows consistent with a pathway towards low GHG emissions and climate resilient development.
- Reaching a peak in GHG emissions 'as soon as possible', while recognising that the timeframes for achieving this will differ between developed and developing countries.
- Achieving carbon neutrality from 2050 onwards.

Each individual country is responsible for determining their contribution (referred to as the "nationally determined contribution") in reaching this goal. The Agreement requires that these contributions should be "ambitious" and "represent a progression over time". The contributions should be reported every five years and are to be registered by the UNFCCC Secretariat. As a signatory to the Agreement, Namibia will be required to adopt the agreement within its own legal systems, through ratification, acceptance, approval, or accession.

As a signatory to the Paris Agreement, Namibia is required to investigate alternatives to existing industries which have high carbon-emissions. A shift away from coal-based energy production within the energy sector and increased reliance on alternative energy sources is therefore anticipated.

Hyphen's larger green H₂ project is one of the initiatives for developing an alternative energy source that will contribute to the goal of global decarbonisation and achieving carbon neutrality by 2050. The proposed met masts and remote sensing campaign will allow Hyphen to refine its understanding of the wind resource characteristics and optimise the design) and layout of the wind energy facility to ensure it operates as efficiently as possible.

5.1.7 Namibia's Climate Change Policy Framework

Climate change has been identified as a critical threat to sustainable development, the environment, and general welfare of society in Namibia. Namibia has the most arid climate of all southern African countries, and its economy is, therefore, exposed to difficult and harsh conditions, with water accessibility a serious challenge.

A large proportion of the Namibian people are reliant on the natural environment for their livelihood. It is therefore a natural resource-based economy, and the arid climate and variability in climatic patterns, as well as a limited adaptive capacity of the population due to poverty and high divergence of income levels exacerbate the challenge. This makes Namibia one of the most vulnerable countries to climatic change impacts (Kamwi,

2015). Namibia has recognised the threat posed by climate change and has put an appropriate policy framework in place to deal with this threat.

The key milestones in Namibia's response to climate change include the following (Kamwi, 2015):

- In 1995 Namibia ratified the United Nations Framework Convention on Climate Change (UNFCCC). The ultimate objective of the Convention is the stabilisation of greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system.
- Namibia established the National Climate Change Committee (NCCC) in 2001.
- Namibia developed their National Climate Change Policy in 2010-2011.
- Namibia published a National Disaster Risk Management Plan in 2011. This Plan aims to provide guidance and strengthen national capacity for disaster risk management and to provide a framework for sectoral and regional disaster risk management in Namibia.
- The National Climate Change Strategy and Action Plan (NCCSAP) lays out the guiding principles responsive to climate change that is effective, efficient, and practical. It further identifies priority action areas for adaptation and mitigation.
- The new climate action plan (Intended Nationally Determined Contribution) was submitted to the UNFCCC in September 2015, ahead of the 2015 Paris Agreement. It was converted to a Nationally Determined Contribution in 2016.
- In April 2016 the president of the Republic of Namibia signed the Paris Agreement and followed that up in September 2016 by ratifying the Agreement. Each individual country is responsible for determining their contribution (referred to as the "nationally determined contribution") in reaching this goal. The Agreement requires that these contributions should be "ambitious" and "represent a progression over time". The contributions should be reported every five years and are to be registered by the UNFCCC Secretariat. As a signatory to the Agreement, Namibia will be required to adopt the agreement within its own legal systems, through ratification, acceptance, approval, or accession.

The most recent estimates as reported by Namibia Country Diagnostic (2017) puts Namibian GHG emissions per capita at 9.15 Gg CO₂-eq with the total national emissions estimated at 0.02% of the global total. Namibia aims to reduce GHG emissions by 89% by 2030, compared to the "Business as Usual" scenario. The focus areas to achieve this mitigation objective are sustainable energy, transport and Agriculture, Forestry and Other Land Use (AFOLU).

5.1.8 Southern Corridor Development Initiative (//Kharas Region)

As highlighted in the HPPII, the Government of Namibia has been concentrating its efforts on the development of complementary engines of growth through the accumulation of new productive capacities in strategic sectors such as that of renewable energy, as a means to ensure the growth of Namibia's economy. One of the key actions detailed in the HPPII to achieve Goal Three (i.e., Developing complementary engines of Growth) is the establishment of the SCDI. The SCDI aims to comprise of a portfolio of complementary projects and infrastructure that unlocks the potential and expands opportunities engendered by green hydrogen and ammonia as a transformative, strategic industry in Namibia (NIPDB, 2021). This portfolio of complimentary projects includes:

- A green hydrogen and ammonia plant (with wind, solar, electrolysis and desalination assets);

- A new deep-water port in Lüderitz;
- A wind blade manufacturing plant;
- A green steel plant and fertilizer plant;
- Ammonia supply to the green scheme near Neckartal Dam; and
- Transmission assets.

The SCDI includes the Tsau//Khaeb National Park. Preliminary market estimates indicated that the //Kharas Region of the SCDI stands to absorb potential foreign direct investment (FDI) of “US\$6 billion, produce 2 million tonnes of ammonia, generate in excess of \$800 million in revenue per annum and house generation assets of 5 GW with the capability to produce power at less than 3 US cents/kWh” (HPPPII, 2021:36). Such an investment would be transformative not only for the Southern Region of Namibia, but for the country as a whole. The SCDI has developed a structure for implementation as indicated in Figure 5-1 below:

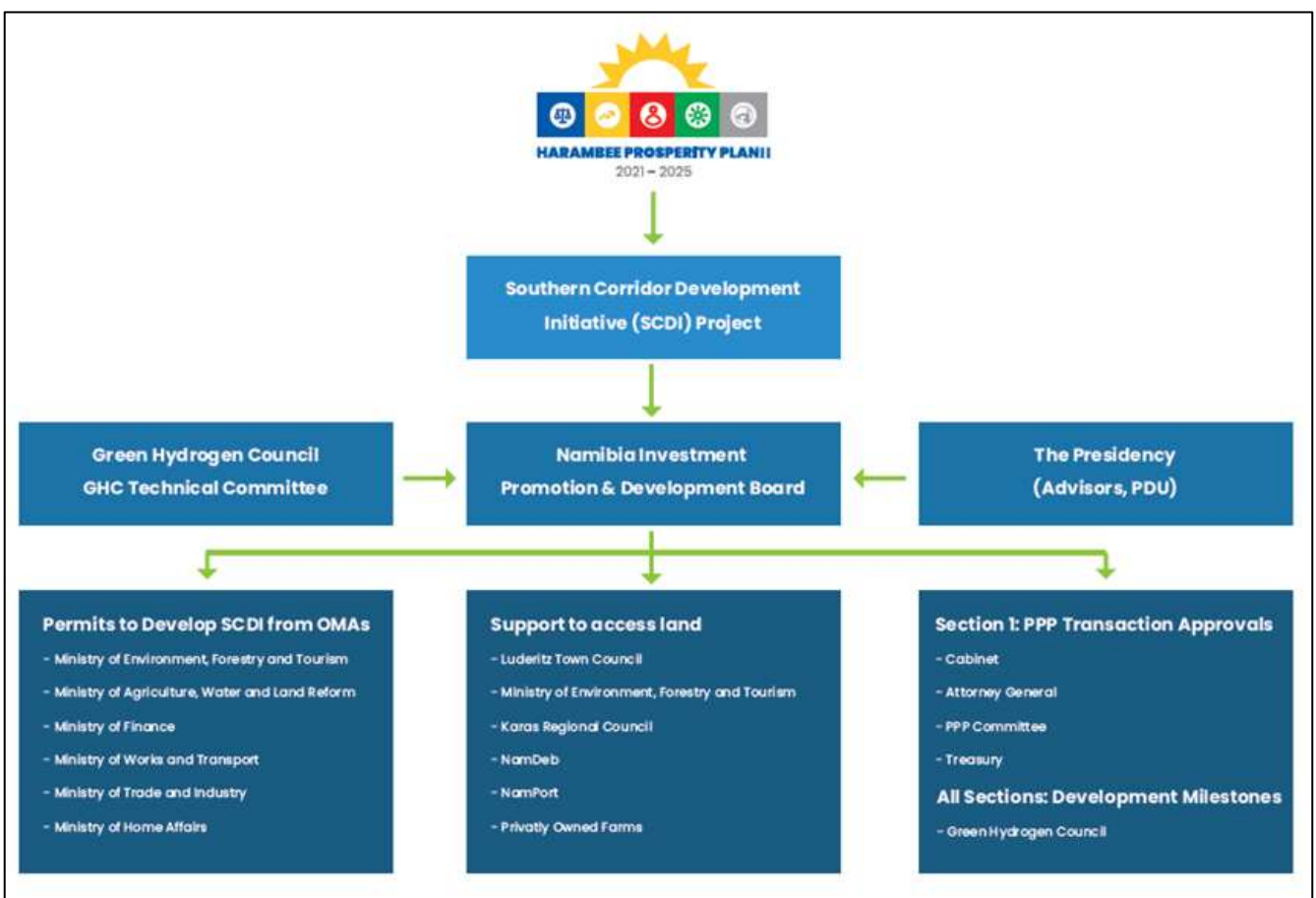


FIGURE 5-1: IMPLEMENTING STRUCTURE FOR THE SCDI (//KHARAS REGION)

Source: NIPDB, 2021

5.1.8.1 Proposed legal framework to guide implementation of the SCDI (//Kharas Region) (NIPDB, 2021)

The Nature Conservation Amendment Act, 1996 (Act 5 of 1996), as amended by the Nature Conservation Amendment Act (Act 3 of 2017), vests wide-ranging powers in the MEFT Minister to authorise other parties to provide services on behalf of the State within proclaimed protected areas and on other State land including the provision of climate combating services through the award of concessions. The term “concession” for the

purposes of the SCDI is defined in accordance with the National Policy for Tourism and Wildlife Concessions on State Land (2007) (the “Concession Policy”), which was developed by MEFT and approved by the Namibian Cabinet in November 2007. A concession means “the right, whether full or restricted or shared or exclusive, to conduct feasibility activities and / or to commercially use State-owned plant and / or animal resources (collectively referred to as wildlife resources) on business principles in proclaimed protected areas and any other State Land for a specified period of time.” In the absence of a procedure prescribed in law concerning the awarding of concessions, the Minister of Environment & Tourism has the authority to establish a process that will govern such awards and comply with the general requirements of fair and reasonable administration. Accordingly, the Ministry has adopted the concession policy framework to deal with such arrangements. The framework serves as a policy guide for the MEFT to deal with concessions in proclaimed protected areas and on other State land in a standardized and transparent manner. The Springbok and Dolphin Concessions within the TKNP have been established in this way.

5.2 LOCAL AND REGIONAL SOCIO-ECONOMIC POLICY

With respect to regional planning, the socio-economic development objectives of the Kharas Region have a focus to promote, facilitate, and coordinate sustainable socio-economic development (KRC, 2017). They include the following:

- Grow the economy to achieve shared growth;
- Harness the region’s assets and endowments;
- Develop the region’s greatest asset, its human capital;
- Harmonise environmental integrity and human and social development with economic development;
- Government must be developmental, competent, caring and facilitating;
- Private sector must grow a shared economy to provide employment; and
- Organised labour must protect workers from exploitation while promoting labour productivity.

As regional and local planning cuts across all sectors, the planning and implementation of various development programmes of the region requires the full participation of line ministries, regional council, local authorities, private sector, and communities at large.

5.3 COMPATIBILITY OF ‘FIT’ OF THE PROJECT

A preliminary analysis of the green hydrogen market and levelized cost of hydrogen (LCOH) shows Namibia could produce highly competitive green ammonia (ESMAP, 2020). However, with little national demand, exports will be key to the green hydrogen strategy. The global ammonia market today is 180 Mt driven by fertilizers and mining explosives production. The global market is expected to grow to over 500 Mt by 2050 driven by maritime shipping and power systems decarbonisation especially by major developed economies with net-zero policies for 2050.

In order to position Namibia to compete in a global market for green ammonia, the government needs to lead the development of a sector that is designed to achieve a globally competitive price and sufficient infrastructure for maritime export. The cost of ammonia is principally driven by the cost of electricity and economies of scale, and large-scale ammonia production requires large-scale, low-cost renewable energy development. A minimum initial scale of 0.5 Mt/yr of green ammonia production would require around 1 000 MW of solar PV and wind investment – for comparison Namibia’s domestic peak power demand is roughly 650 MW. Learning from its

experience with small (<50 MW) investments in renewable energy, Namibia needs to find ways to achieve a step-change in renewable energy development if it wants to build a green hydrogen industry.

With its abundant, world-class renewable energy resources and increasing demand for green hydrogen worldwide, Namibia could be an early entrant in this new market. Countries such as Australia, Chile, Middle Eastern countries, Morocco, New Zealand, and Norway are beginning to pursue GW-scale investments on the basis of national green hydrogen strategies. The Government of Namibia is focusing its efforts on achieving large-scale, low-cost renewable energy development and designing models for sustainably maximizing fiscal revenue and local development in renewable energy investments and green ammonia production. Namibia's solar and wind resources give it a long-term competitive advantage in producing green hydrogen and green ammonia. Such an investment would be transformative not only for the Southern Regions of Namibia, but for the country as a whole, and while the probability of it coming to fruition still requires various feasibility studies to be conducted, the significance of the opportunity warrants a coordinated and focused effort. The SCDI shall include a portfolio of complementary projects and infrastructure that maximises the opportunity presented by green hydrogen and ammonia for the country, which include the deepening and management of the Lüderitz Port and supply of excess energy to the Southern African Power Pool (SAPP).

In July 2021, as part of the SCDI, Namibia issued a Request for Proposals (RFP) for bidders to bid on two concession areas to develop feasibility reports for green hydrogen development in the TKNP. This green hydrogen development is inclusive of wind and solar facilities, substations, and transmission lines, and hydrolyser and ammonia facilities with a marine terminal for export. In November 2021, the Namibian government issued a notice of award stating its intention to appoint Hyphen as the preferred bidder to develop the country's first large-scale vertically integrated green hydrogen project within two concession areas in the TKNP.

As part of the overall project, Hyphen is proposing to install 10 met masts and to use LIDAR remote sensing to better understand the suitability of the wind resource within the identified development area in the two concession areas. The proposed met masts and remote sensing campaign will allow Hyphen to:

- Collect site specific wind resource data and refine its understanding of the wind resource characteristics, seasonality, and patterns; and
- Optimise the design (wind turbine type) and layout of the wind energy facility to ensure it operates as efficiently as possible, thereby maximising the project's generation capacity.

6 PROJECT DESCRIPTION

This chapter describes the proposed Project, including the various components, activities, and feasible Project alternatives.

6.1 PROJECT OVERVIEW

As noted previously in the previous chapter, Hyphen is proposing to install 10 met masts and to use LIDAR to better understand the suitability of the wind resource within the two concession areas.

6.1.1 Met Masts

6.1.1.1 Number and Location

The met masts will be located within Hyphen's two concession areas (namely Springbok and Dolphin) in the TKNP. The number and location of met masts were determined based on industry standards for wind measurement campaigns, where sufficient masts are required over the identified development area to reduce uncertainty of the available wind resource in both the horizontal and vertical planes. To this end and due to the extent of and changing elevation within the identified development area, 10 met masts are proposed each representing a specific wind resource coverage area (Figure 6-1). Co-ordinates for the met mast sites are presented in Table 6-1.

It is envisaged that construction of each met mast will take in the order of three weeks and there could be up to a maximum of 18 people on site at any time during construction.

TABLE 6-1: SITE CO-ORDINATES

No.	Site	Latitude	Longitude
1. Met Mast sites			
	S1	26°58'58.80"S	15°29'16.80"E
	S2	27° 1'58.80"S	15°39'25.20"E
	S3	26°56'20.40"S	15°44'49.20"E
	S4	27° 1'26.40"S	15°46'19.20"E
	S5	26°54'0.00"S	15°48'43.20"E
	D6	27° 3'50.40"S	15°30'21.60"E
	D7	27° 6'54.00"S	15°32'56.40"E
	D8	27° 8'31.20"S	15°34'55.20"E
	D9	27°13'15.60"S	15°30'3.60"E
	D10	27° 6'3.60"S	15°46'8.40"E
2. LIDAR sites			
	Lidar 1	26°55'55.32"S	15°39'10.51"E
	Lidar 1a	26°54'53.90"S	15°36'39.47"E

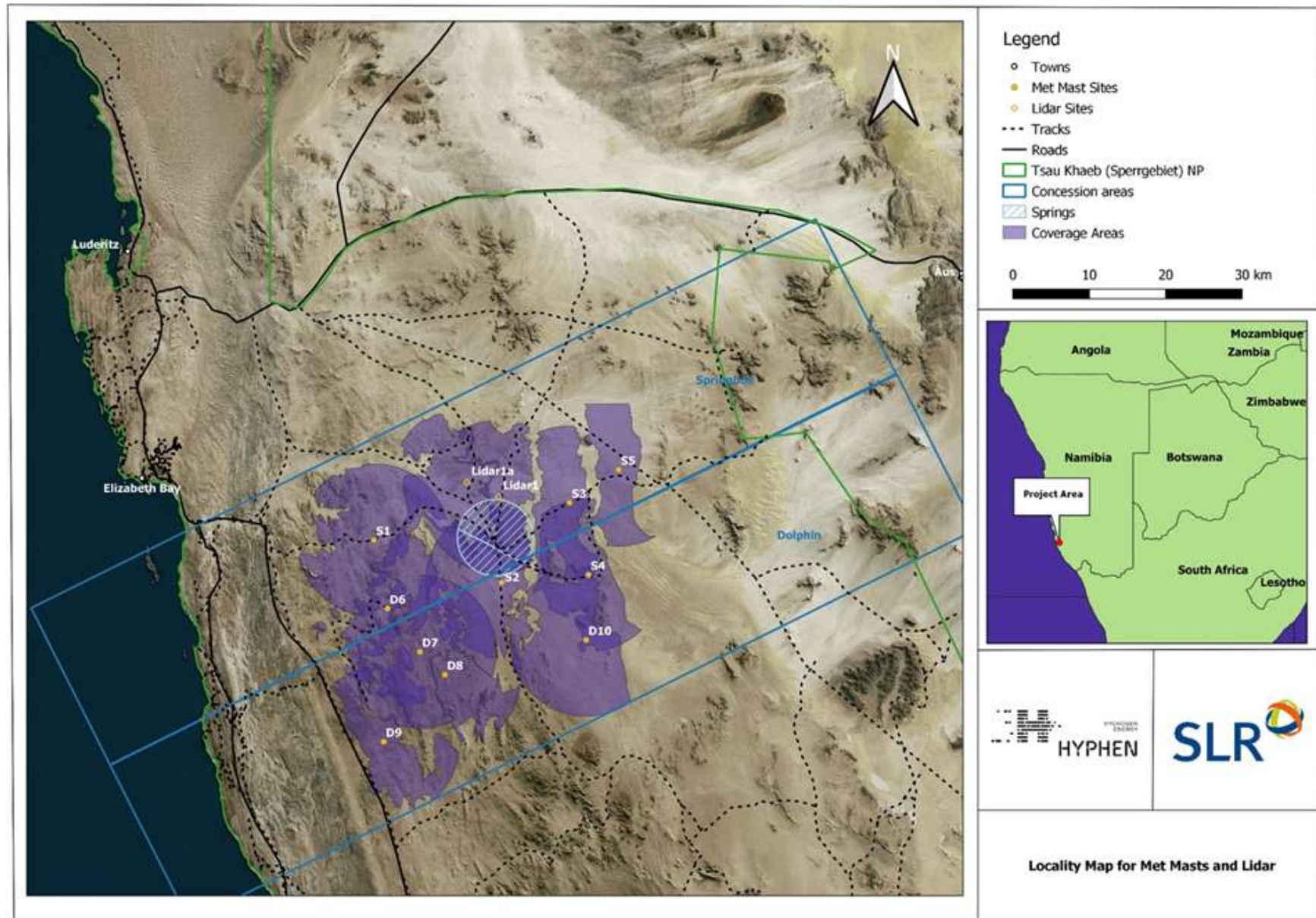


FIGURE 6-1: LOCALITY MAP FOR MET MASTS AND LIDAR SHOWING COVERAGE AREAS

6.1.1.2 Structure

Meteorological masts are typically tall lattice structures with measuring instrumentation installed at various heights. The type of mast proposed is a triangular steel lattice mast with a maximum structure height of up to 120 m and held in place by guy wires (cable stays) to anchor the mast (Figure 6-2 and Figure 6-3). The guyed lattice mast type is preferred as it can be installed without the need for large cranes, reducing the machinery required for installation.

Each met mast tower is installed by bolting 3 m tower sections to the section below it, starting from the foundation (base of mast) and working up to 120 m. The mast structure will be painted in red and white alternating colours in line with civil aviation requirements.

A laydown area (20 m x 40 m) for the mast structure will be required at each site.



FIGURE 6-2: STEEL GUYED LATTICE MAST SECTION

Source: <https://mastertowers.co.za/>

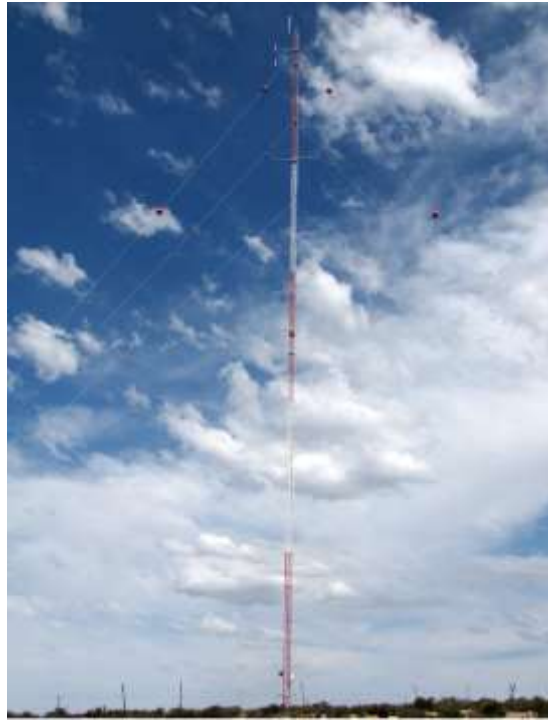


FIGURE 6-3: AN INSTALLED STEEL GUYED LATTICE MAST

Source: Hyphen

6.1.1.3 Foundation

Each met mast foundation occupies an area of approximately 1.5 m² but maybe larger depending on the site geotechnical conditions. A typical example of a mast foundation is shown in Figure 6-4. The foundation depth is typically up to 0.6 m deep but may be deeper in more sandy areas. The excavation is filled with steel reinforcing and cement. However, since the mixing of concrete on site is problematic, it is proposed to use a pre-cast base as the foundation. Only the top of the foundation will be visible.

The total disturbed area during met mast construction is 6.26 m² (2.5 m x 2.5 m). Any excess cement or spoil will be removed from site and only the final foundation footprint will remain.

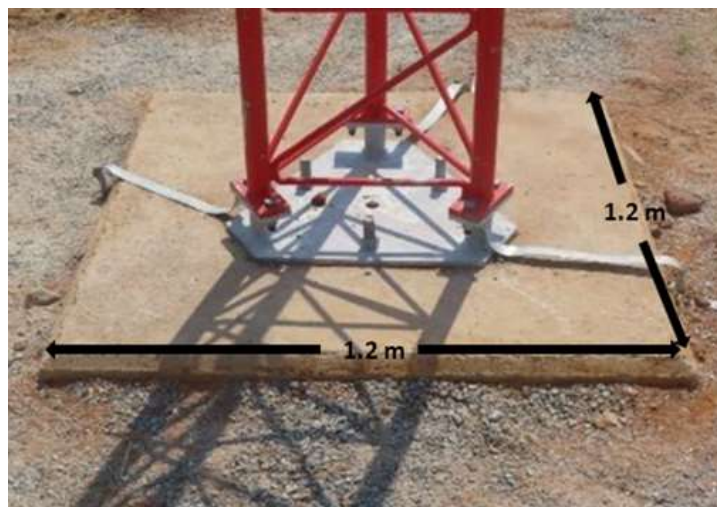


FIGURE 6-4: MET MAST FOUNDATION

Source: Hyphen

6.1.1.4 Anchors

To stabilise the met masts, each mast will have 12 ground anchors. The guy wires attach the met mast tower to the ground at different heights. Guys wires are attached to the mast from three directions and the anchors are spaced at 40 m, 60 m, 70 m, and 80 m from the centre of the mast. Sandbags will be placed over the anchors to prevent the wind from exposing the anchors over time, jeopardising the mast stability.

Depending on geotechnical conditions the anchors can be either a rock anchor or buried steel anchors.

- **Rock anchors:** A rock anchor may be used if bedrock occurs on surface or close to the surface. A rock anchor will require drilling of exposed rock to a minimum depth of 80 cm (Figure 6-5a). A rod is then inserted into the drilled hole and cemented in place with special adhesive. The guy wire connections are either bolted directly to the anchor or connected via a based plate (Figure 6-5b).

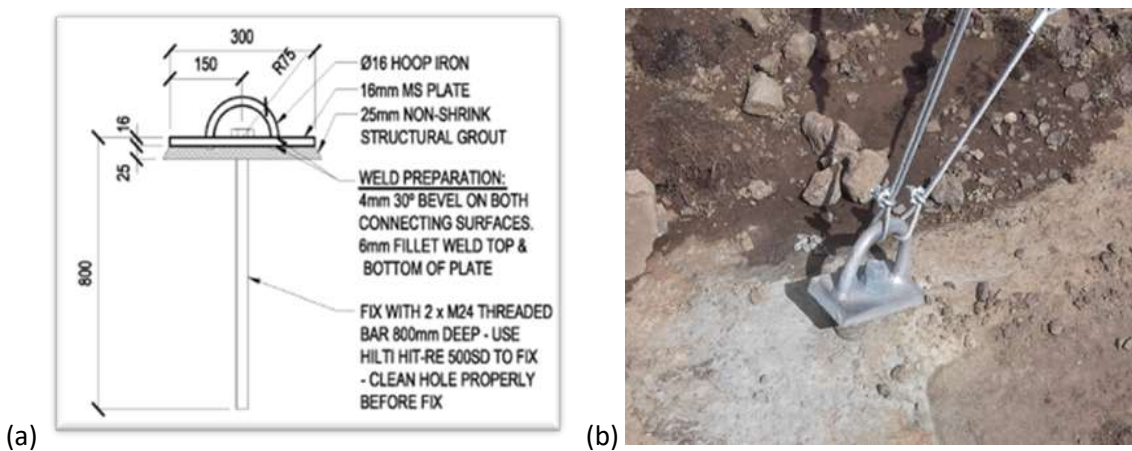


FIGURE 6-5: ROCK ANCHORS

Source: Hyphen

- **Steel anchors (preferred):** The most likely type of anchor for the Project are buried steel anchors. The installation of a steel anchor includes the excavation of a hole to a depth of up to 2 m (Figure 6-6a). A steel rod and plate are then placed at the bottom of the excavation and the excavated material is placed back into the hole. Only the steel guy wire is exposed at the surface as shown in Figure 6-6b.

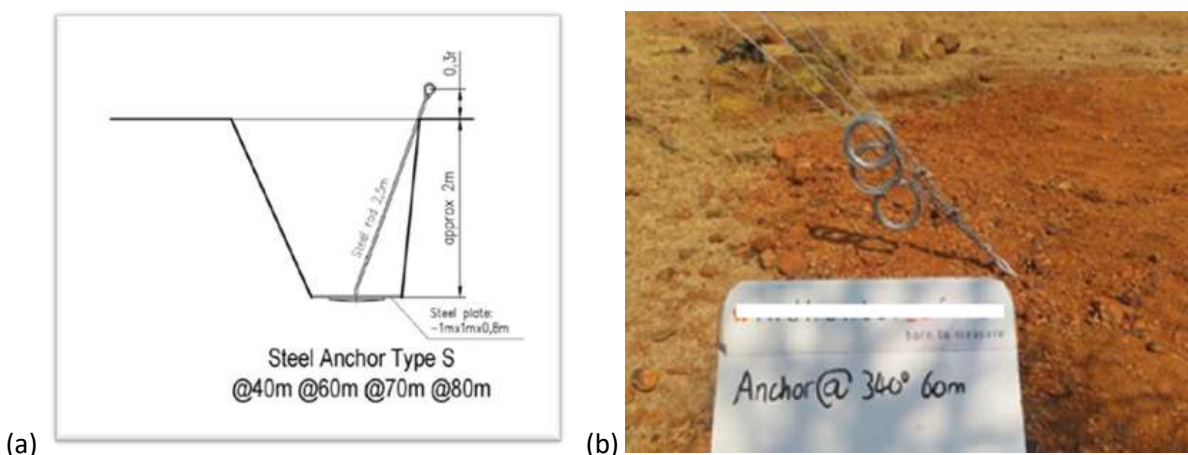


FIGURE 6-6: STEEL ANCHORS

Source: Hyphen

6.1.1.5 Instruments

Instruments will be installed at various heights on the met mast. Typical instruments that are installed on each mast include:

- Anemometers (Figure 6-7a).
- Wind vanes (Figure 6-7b).
- Pressure sensors.
- Temperature sensors (Figure 6-7c).
- Humidity sensors (Figure 6-7c).

Climatic data from the met masts will be automatically routed to the datalogger (Figure 6-7d), which transfers the data to a server and then to a receiving base for monitoring and analyses. The data are usually recorded in 10-minute intervals and the data are transmitted via a small text file on a daily basis.

In addition to the instruments, the following will be installed on the mast:

- A solar panel (Figure 6-7e) and battery will be installed to provide power to the mast, enabling it to transmit the daily data file.
- For protection, the masts will be fitted with anti-climb devices to prevent unauthorised access and vandalism / theft (Figure 6-7f).
- A lightning rod will be installed at the tip of the mast (± 122 m) to conduct lightning down the mast through a copper cable, which is earthed at the foundation.
- Aviation (obstacle) lighting (Figure 6-7g) and visibility markers will be provided in compliance with the NCAA regulations.

6.1.2 LIDAR Remote Sensing

6.1.2.1 Number and Location

The LIDAR will be located at two sites within the identified development area each representing a specific coverage area (Figure 6-1). Co-ordinates for the LIDAR sites are presented in Table 6-1.

6.1.2.2 Method

The LIDAR remote sensing method uses the Doppler effect to measure vertical wind profiles at higher elevations (up to 200 m). This method works by transmitting short pulses of infrared laser light into the atmosphere. These beams hit particles and aerosols in the air, which scatter a small fraction of that light energy back to the sensor. The climatic data are usually recorded in 10-minute intervals and the data are transmitted to a server on a daily basis for monitoring and analyses. Data will be used to supplement the met mast data in mapping the wind speed and direction, turbulence, and wind shear.

Unlike the met masts, the LIDAR sensor is mobile (Figure 6-8) and will be moved from one site to another to further reduce wind resource uncertainty.

	
<p>(a) Anemometer</p>	<p>(b) Wind Vane</p>
	
<p>(c) Temperature / Humidity sensor</p>	<p>(d) Datalogger</p>
	
<p>(e) Solar Panel</p>	<p>(f) Anti Climb Device</p>
	
<p>(g) Aviation Light</p>	

FIGURE 6-7: MAST INSTRUMENTS AND EQUIPMENT

Source: Hyphen

6.1.2.3 LIDAR specifications (indicative)

There are a variety of LIDAR sensors on the market. One example of a LIDAR is the WINDCUBE (Figure 6-8b), which will serve as a ‘typical’ example of a LIDAR available on the market:

- Dimensions: 55 cm x 56 cm x 55 cm (height x width x depth).
- Weight: 46 kg.
- Power consumption: Between 45 and 50 W.
- Power supply: Up to four solar panels and lithium batteries housed on a small trailer / temporary ground pad (Figure 6-8a).

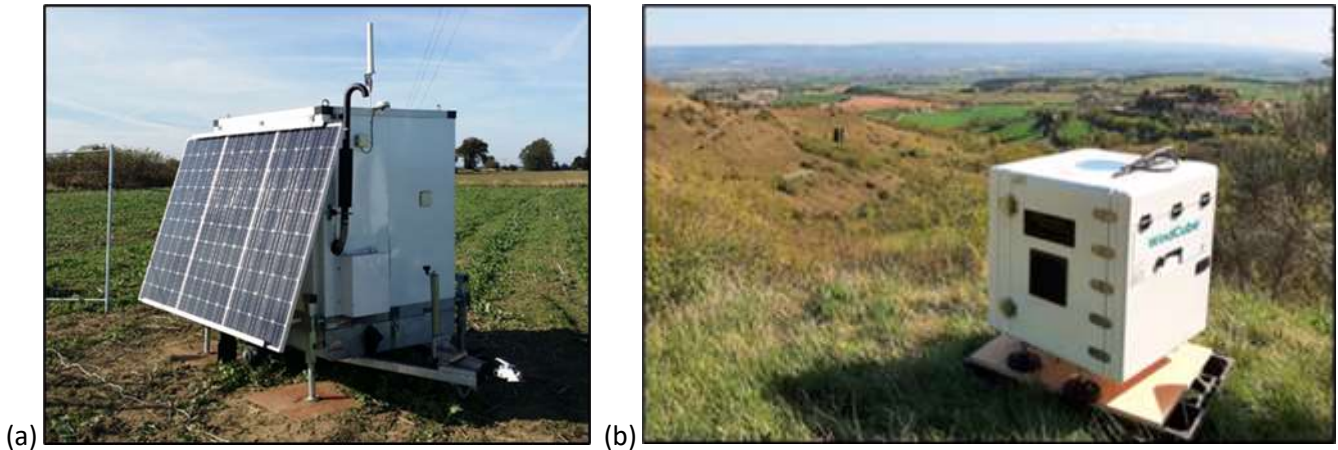


FIGURE 6-8: EXAMPLES OF MOBILE LIDAR SENSORS

Source: (a) Hyphen; (b) <https://www.vaisala.com/>

6.1.3 Site Access

6.1.3.1 Vehicles

During construction the sites will be accessed using a 4x4 vehicle (including trailer) and an eight-ton low bed truck (Figure 6-9), which transport equipment the 150 tonnes of equipment to site (15 tonnes per mast to site).



FIGURE 6-9: EXAMPLE OF EIGHT-TON TRUCK THAT WILL BE USED TO TRANSPORT EQUIPMENT TO SITE

Source: Windhunter

6.1.3.2 Access Routes

Initial access routes were identified using existing tracks, where possible. However, new tracks were required to access the more remote sites, which were identified in the field by the specialists in consultation with MEFT during the May 2022 site visit (Figure 6-13a). After the site visit, the initial route network was amended by the specialists in order to avoid various sensitive areas, including the Kaukausib spring area, although many of these were existing tracks (Figure 6-13b).

In order to confirm site accessibility of the revised access routes, the met mast contractor and MEFT undertook another site visit in July 2022. Based on certain problem areas (sand and slope), various refinements were required to the route network to improve accessibility, which were discussed and agreed to with the specialists and MEFT. The final proposed access route network is presented in Figure 6-10 and Figure 6-13c.

Access into the TKNP will be via the Rotkopf gate (20 km east of Lüderitz), which is controlled by Namdeb and the Sperrgebiet Diamond Mining companies. It should, however, be noted that that Hyphen is in the process of requesting access to the park from MEFT, via a separate entrance, to enable ease of access to the project site.

6.1.3.3 Earthworks / Clearing

The final access network (Figure 6-10c) was chosen to minimise environmental impacts, while allowing accessibility to construction vehicles. This said, minor clearing or grading is required along certain sections where the sand will be pushed to the side of the track:

- Site 1 (26°52'44.02"S 15°24'32.77"E): Soft sand in riverbed crossing - Track to be cleared / graded with an excavator and / or TLB for a distance of approximately 10 - 15 m.
- Site 2 (26°55'44.10"S 15°35'30.20"E): Soft sand in riverbed crossing - Track to be cleared / graded for a distance of approximately 20 m (Figure 6-11a).
- Site 3 (27° 6'25.70"S 15°31'50.50"E): Soft sand - Track to be cleared / graded for a distance of approximately 5 - 10 m (Figure 6-11b).
- Site 4 (7° 6'42.70"S 15°32'10.70"E): Soft sand saddle - Track to be cleared / graded for a distance of approximately 1 km (Figure 6-11c). Sand saddle height varies from 1 - 2 m.
- Site 5 (27° 6'25.70"S 15°31'50.50"E): Soft sand - Track to be cleared / graded for a distance of approximately 5 - 10 m (Figure 6-11d).

6.1.4 Equipment Maintenance

After the construction is completed, which estimated to be three weeks per mast, a third-party specialist will undertake a quality assurance (QA) / quality control (QC) inspection to measure and assure the quality of the met masts and LIDAR installation and to verify they meet Hyphen's expectations.

Four planned maintenance visits will be undertaken for each met mast over a 12-month period. A small team will drive to each location and conduct a visual and technical assessment of the masts and sensors every three months. Unplanned emergency visits may be required to repair any issues or defects that are detected.

Masts could remain on site for the duration of the larger green H₂ project, decommissioned or repositioned / reused to serve as the wind farms operational met masts. Decommissioning will involve dismantling and

removal, and the materials reused or recycled where possible. LIDARs are typically located at a position for a minimum of 6 months before being moved to another location or being removed from site.

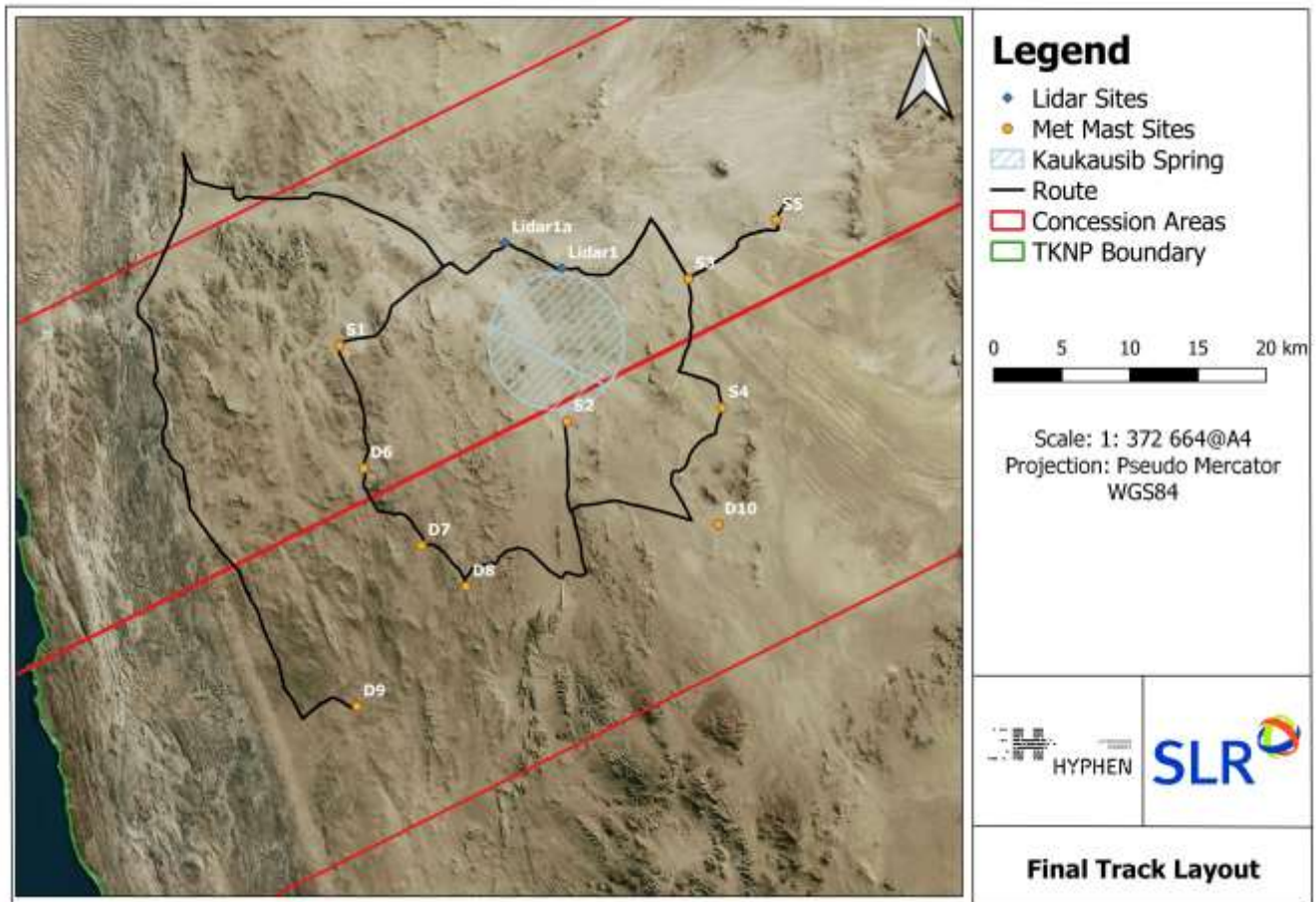


FIGURE 6-10: FINAL ACCESS ROUTE LAYOUT

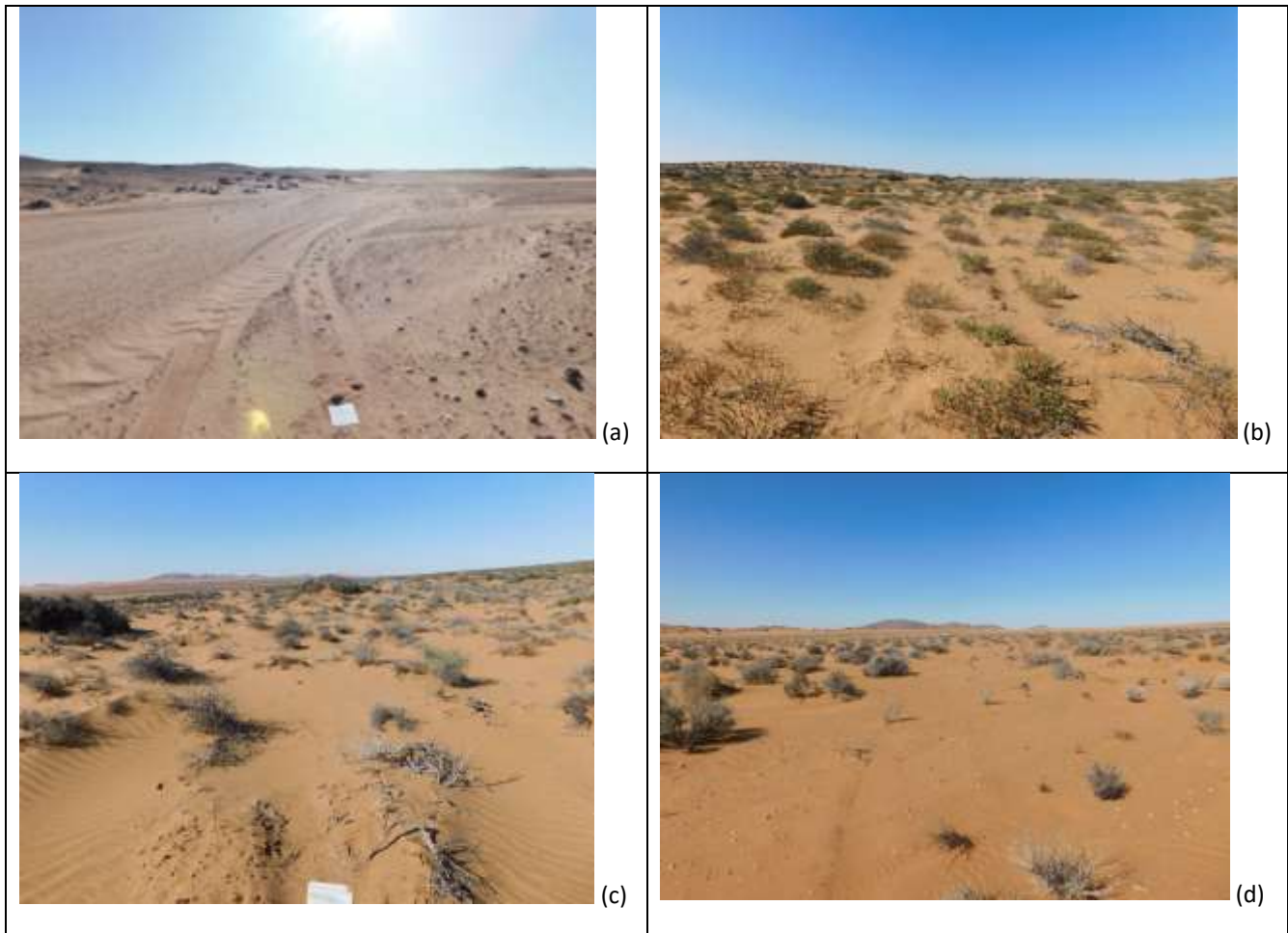


FIGURE 6-11: ACCESS TRACK IN CERTAIN AREAS REQUIRE SOME GRADING / CLEARING TO IMPROVE ACCESIBILITY FOR TRUCK

Source: Windhunter

6.2 PROJECT ALTERNATIVES

The Environmental Management Act No. 7 of 2007, requires that alternatives are considered during the EIA process. According to the EIA Regulations 2012, an alternative is defined as follows:

“in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to –

- (a) the property on which or location where it is proposed to undertake the activity;*
- (b) the type of activity to be undertaken;*
- (c) the design or layout of the activity;*
- (d) the technology to be used in the activity; and*
- (e) the operational aspects of the activity.”*

In addition to the above, the no-go alternative is also considered in this study. Table 6-2 describes the Project alternatives considered by Hyphen in the development of the proposed Project.

TABLE 6-2: SUMMARY OF THE PROJECT ALTERNATIVES

No.	Alternatives	Description
1. Site / location alternatives		
1.1	Development area and met mast / LIDAR locations	<p>Since Hyphen is the preferred bidder to develop the country’s first large-scale green H₂ project in two concession areas in the TKNP, the met masts and LIDAR will be limited to these two concession areas.</p> <p>Key to the success of the larger proposed green H₂ project is the renewable energy resource (wind and solar). In order to ensure that the resource is optimised, Hyphen undertook an initial screening of the energy potential (wind and solar) of the concession areas based on the Namibian wind and solar resource maps to define the development footprint. The proposed development footprint was further refined based on biodiversity sensitivity, whereby Hyphen avoided all "very high biodiversity" sensitivity areas identified in the TKNP management plan.</p> <p>To this end and due to the extent of and changing elevation within the identified development area, 10 measurement sites were selected each representing a specific wind resource coverage area (Figure 6-1). The initial layout included a mast site within the Kaukausib spring area. However, in order to avoid this sensitive area, Hyphen relocated the site to outside the 5 km buffer and changed the met mast to LIDAR, which has a smaller footprint and is less invasive.</p> <p>This EIA assumes that the met mast and LIDAR positions are fixed in the position provided by Hyphen. Any significant changes in final site placement of the met mast and LIDAR sites will need to be confirmed with the terrestrial ecologist or MEFT (TKNP official).</p>
2. Technology alternatives		
2.1	Wind Measurement Technology	Hyphen is proposing to use two different wind measurement technologies to better understand the suitability of the wind resource in the identified development area, namely met masts (with instruments) and LIDAR. Both technologies are assessed in this EIA.
	Mast Tower Sections	Several mast tower structures are available for the erection of a wind measurement mast. Two alternatives were considered for the proposed Project. The first is the triangular steel lattice mast tower sections, which is the preferred alternative, as it is more mobile (~3m sections), reaches greater heights, easy to climb, and can be installed without the need for large cranes, reducing the machinery required for installation. The alternative structure section type is a tubular steel pole (tubular towers). Although these are less expensive than lattice mast tower sections, they are limited to the height they can achieve, and their design makes equipment maintenance difficult. The triangular steel lattice is preferred and described in this report, the tubular towers would result in no additional impacts or result in differences in impact significance.
	Measurement Equipment	Wind measurement equipment quality standards vary from supplier to supplier. Equipment that is not Class 1 certified is of lower quality and thus the reliability of the data collected is more uncertain. Class 1 equipment is, however, more expensive when compared to those that are not certified. For the proposed Project, Class I equipment is preferred as it is internationally calibrated by accredited laboratories and thus has higher reliability and data accuracy. There would be no additional impacts or differences in impact significance relating to the choice of measurement equipment.

No.	Alternatives	Description
3. Design alternatives		
3.1	Access routes	<p>Initial access routes were identified using existing tracks, where possible. However, new tracks were required to access the more remote sites, which were identified in the field by the specialists in consultation with MEFT during the May 2022 site visit (Figure 6-13a). After the site visit, the initial route network was amended by the specialists in order to avoid various sensitive areas, including the Kaukausib spring area, although many of these were existing tracks (Figure 6-13b).</p> <p>In order to confirm site accessibility of the revised access routes, Windhunter Africa (met mast contractor) and MEFT undertook another site visit in July 2022. Based on certain problem areas (sand and slope), various refinements were required to the route network to improve accessibility, which were discussed and agreed to with the specialists and MEFT. The final proposed access route network is presented in Figure 6-13c.</p> <p><u>Access into the TKNP will be via the Rotkopf gate (20 km east of Lüderitz), which is controlled by Namdeb and the Sperrgebiet Diamond Mining companies. It should, however, be noted that that Hyphen is in the process of requesting access to the park from MEFT, via a separate entrance, to enable ease of access to the project site.</u></p> <p>This EIA assess the potential impacts related to the initial access route network, as well as the final proposed access route network. Any significant changes to the access routes will need to be confirmed with a terrestrial ecologist and MEFT.</p>
3.2	Mast anchors type	Both Rock anchors and Steel anchors were assessed. There are no additional impacts or differences in impact significance relating to the choice of mast anchor. The preferred solution for the Project is the Steel anchors.
3.3	Mast stability	Typically for the foundation and guy wire anchor blocks concrete is mixed and poured on site. The benefit of this method is that sand and cement bags can be easily handled and transported. This, however, carries the risk of accidental spillages and need for water onsite. This method to stabilise the masts is, therefore, not the preferred method. The preferred alternative is to use precast foundations and blocks for each mast. Although these precast blocks are heavy and cumbersome to work with. However, they have the least environmental impact.
4. No-Go alternative		
4.1	No-go	The no-go alternative is presented in Section 9.5.

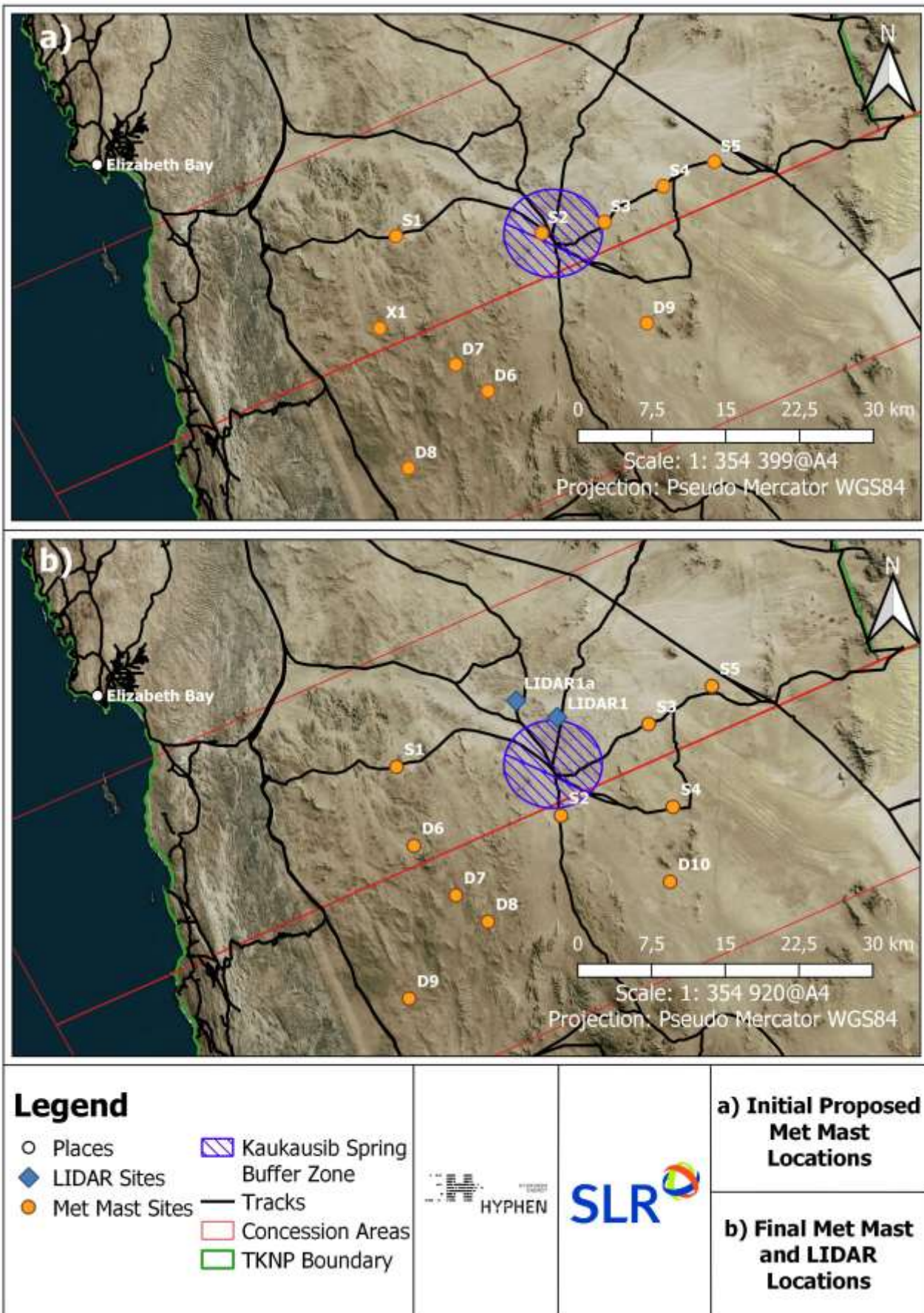


FIGURE 6-12: MEASUREMENT SITE ALTERNATIVES

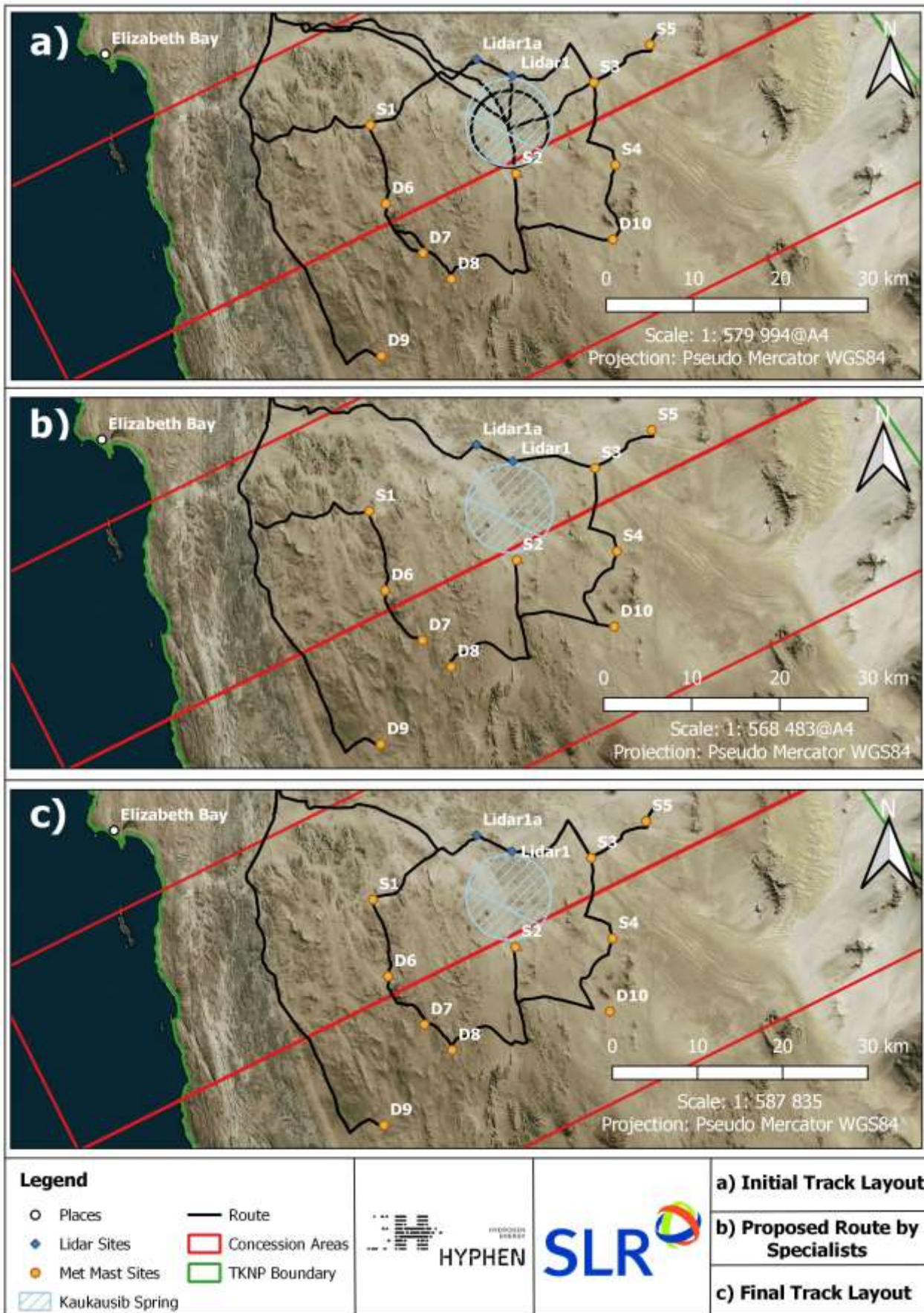


FIGURE 6-13: ACCESS ROUTE ALTERNATIVES

7 DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the attributes of the physical, biological, socio-economic, and cultural receiving environment associated with the met mast and remote sensing project. The proposed Project is situated in the //Kharas Region of Namibia, which is the southernmost, largest, and least densely populated of the 14 regions of Namibia.

An understanding of the environmental and social context and sensitivity within which the proposed Project activities would be located is important to understanding the potential impacts.

7.1 AREA OF INFLUENCE

The Project area of influence considers the spatial extent of potential direct and indirect impacts of the proposed Project and was used to define the boundaries for baseline data collection.

The area of influence for the proposed Project includes the spatial extent of the development footprint of the larger proposed green H₂ project within the TKNP. While the concession areas stretch about 15 km offshore, the proposed Project area is completely onshore / terrestrial, and the offshore environment is not considered in this section. The area of influence is thus focussed on the development footprint and the specific wind resource coverage area (Figure 7-1).

7.2 CLIMATE

Namibia is one of the largest and driest countries in sub-Saharan Africa. In general, the country is hot and dry with sparse and erratic rainfall. Most of the country is defined as very arid, arid, or semi-arid, with two deserts, namely the Kalahari and Namib, covering large portions of the west and east of the country, respectively. Aridity decreases towards the central plateau regions, and the great escarpment between Namib desert and central plateau (DWD 2022, MEFT 2020a).

The northward flowing cold Benguela current is largely responsible for the aridity of the country, as it brings cold air to the western shores. The Benguela current, which is driven by a high-pressure system, generally suppresses rainfall. During the summer months, the Inter-Tropical Convergence Zone (ITCZ) draws moisture from the equator to the northern and eastern regions of the country, which leads to rainfall between October and April (rainy season).

Namibia's climate is characterised by persistent droughts, variable rainfall patterns, high temperature variability, and scarcity of water. Mean annual rainfall is around 278 mm, ranging from 650 mm in the north-east to less than 50 mm in the south-west and along the coast. Average monthly rainfall is highest in January (~62 mm), February (~66 mm), and March (~55 mm). Namibia is an arid, water deficient country, with very high evaporation rates (at least five times greater than average rainfall over most of the country).

Namibia's mean annual temperatures range from 14.3°C to 24.2°C (Figure 7-1). In general, temperatures are higher in the continental regions, reaching above 22°C. There is a distinct seasonal temperature regime in the continental regions with highest temperatures occurring just before the rainy season. The lowest temperatures occur during the dry season, from June to August. Along the coast, mean annual temperatures are moderated by the Benguela current, reaching below 16°C in the south.

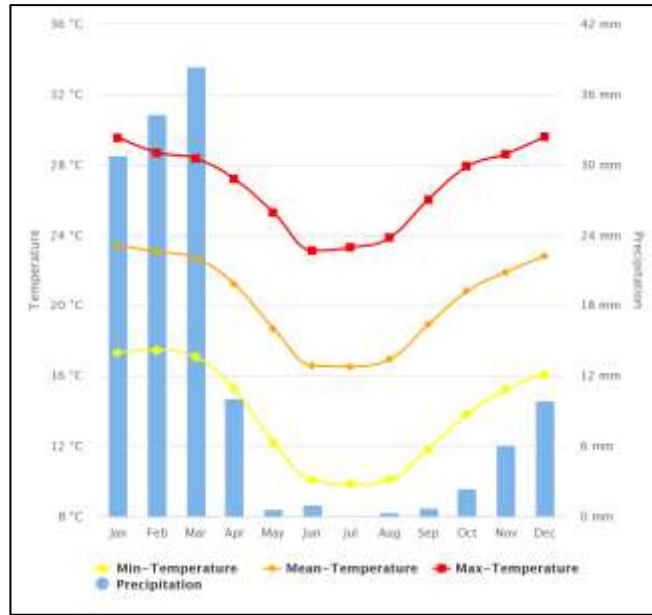


FIGURE 7-1: MONTHLY MINIMUM, MEAN AND MAXIMUM AND RAINFALL FROM 1991 TO 2020

Source: <https://climateknowledgeportal.worldbank.org/country/namibia/climate-data-historical>

Forming part of the Namib Desert, the //Kharas Region is Namibia’s most arid region, with a median annual rainfall of 15-70 mm with high unpredictability. Several months (Oct to Jan) typically receive no rainfall. Windy and cold conditions can occur along the coast due to the cold South Atlantic current. Climatic details for Lüderitz are provided in Table 7-1 below

TABLE 7-1: CLIMATIC CONDITIONS FOR LÜDERITZ

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Average high (°C)	21.4	21.3	21.1	19.9	19.2	19.0	17.9	17.2	17.3	18.0	19.2	20.5	19.3
Average low (°C)	14.0	14.3	13.8	12.6	11.7	11.2	10.4	10.2	10.5	11.4	12.3	13.5	12.1
Average precipitation (mm)	0	1	2	2	3	3	1	2	1	0	0	0	17

Source: Deutscher Wetterdienst

Coastal fog is a key climatic feature that maintains several of the ecosystems and their biota. Due to the flat coastal topography, windblown fog can extend considerable distances inland from the coastline (up to 112 km) (Mitchell *et al.*, 2020). As the Namibian interior is warm (particularly in summer), localised low-pressure systems are created which draws the cold southerly winds towards the inland desert areas. These winds manifest themselves in the form of strong prevailing south to south-westerly winds.

7.3 LANDFORMS

The TKNP comprises 16 different landform units, which are influenced by geology and geomorphological processes. Most of the landform units support a number of different vegetation types. These landforms are largely determined by topography, substrate and associated geomorphological processes, climate variables and small-scale topography. In general, the “inselbergs” landform contains the largest number of vegetation types

(16), followed by the “northern gravel and sand plains” landform (7 vegetation types). In some instances, one vegetation type may occur in different landforms (e.g., gum milk-bush shrubland, occurs on outwash plains and on the northern gravel and sand plains) (Burke 2006). The met masts and LIDAR sites are located in four different landforms refer to Table 7-2 and Figure 7-2.

TABLE 7-2: LANDFORM DESCRIPTIONS THAT MET MAST AND LIDAR SITES OCCUR IN

Landform	Landform description	Site
Drainage Basin	Kaukausib area, vegetation very sparse, medium biodiversity importance	S1, S2, Lidar 1, Lidar 1a
Northern Gravel and Sand Plain	Eastern Lüderitz plains area, notable plant species: <i>Euphorbia gummifera</i> and <i>Stipagrostis ciliata</i> , medium biodiversity importance	S3, S5, D6
Eastern Sand Plain	Klinghardt's Sand Plain area, notable plant species: <i>Euphorbia gummifera</i> , medium biodiversity importance	S4
Central Gravel and Sand Plain	Western Klinghardt's plains, notable plant species: <i>Euphorbia gummifera</i> , medium biodiversity importance	D7, D8, D9

7.4 VEGETATION

Vegetation of the TKNP forms the northernmost portion of the Succulent Karoo Biome, which extends through the Northern Cape of South Africa, and which is of international conservation importance. The TKNP has been left untouched by livestock grazing by virtue of the area remaining set aside for diamond mining.

The vegetation in the Project areas is dominated by dwarf shrubs of various species and the shrub *Euphorbia gummifera*. In the broader context the proposed met mast and LIDAR sites are placed in Kaukausib-drainage dwarf shrubland, northern gravel and sand plain grassland, *Euphorbia* shrubland and Western Klinghardt-plain shrubland (Burke 2006) (Figure 7-3). The succulent shrub *Brownanthus arenosus* is frequent on sand plains throughout the area and is typically accompanied by the shrub *Salsola* sp. where sand is mixed with calcrete outcrops. The bushman candle *Sarcocaulon patersonii* is also common on sandy and gravel plains. Populations of *Othonna cylindrica*, accompanied by *Stipagrostis lutescens*, *Cladoraphis spinescens* and *Calobota* sp. are present in more mobile sand.

The met masts and LIDAR sites are all positioned on plains, but vegetation types differ on these plains depending on depth of sand cover, sand movement and existence of calcrete hard pans and gravel cover. Areas with deep sand cover (> 30cm) and continuous sand movement support small hummocks forming in the lee of shrubs. Perennial vegetation cover does not exceed 15% on these plains and hummocks, and many dead plants were observed which may indicate a turn-over of vegetation as a result of the prolonged drought experienced in this area. The vegetation at each site is described in Table 7-3 and photographs are presented in Figure 7-4 to Figure 7-6.

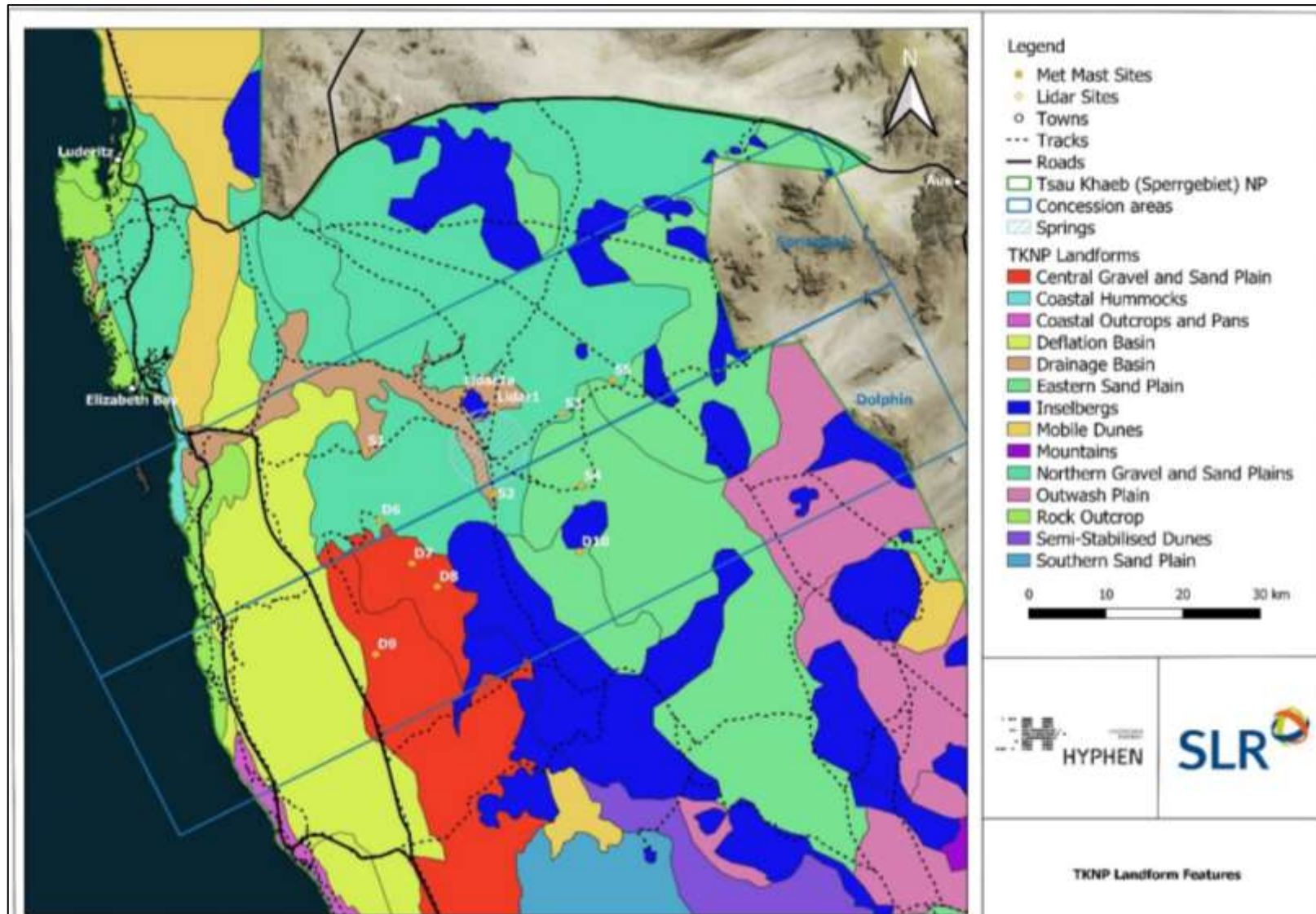


FIGURE 7-2: LANDFORM MAP

Source: Burke 2006; MEFT 2019; MEFT 2020a

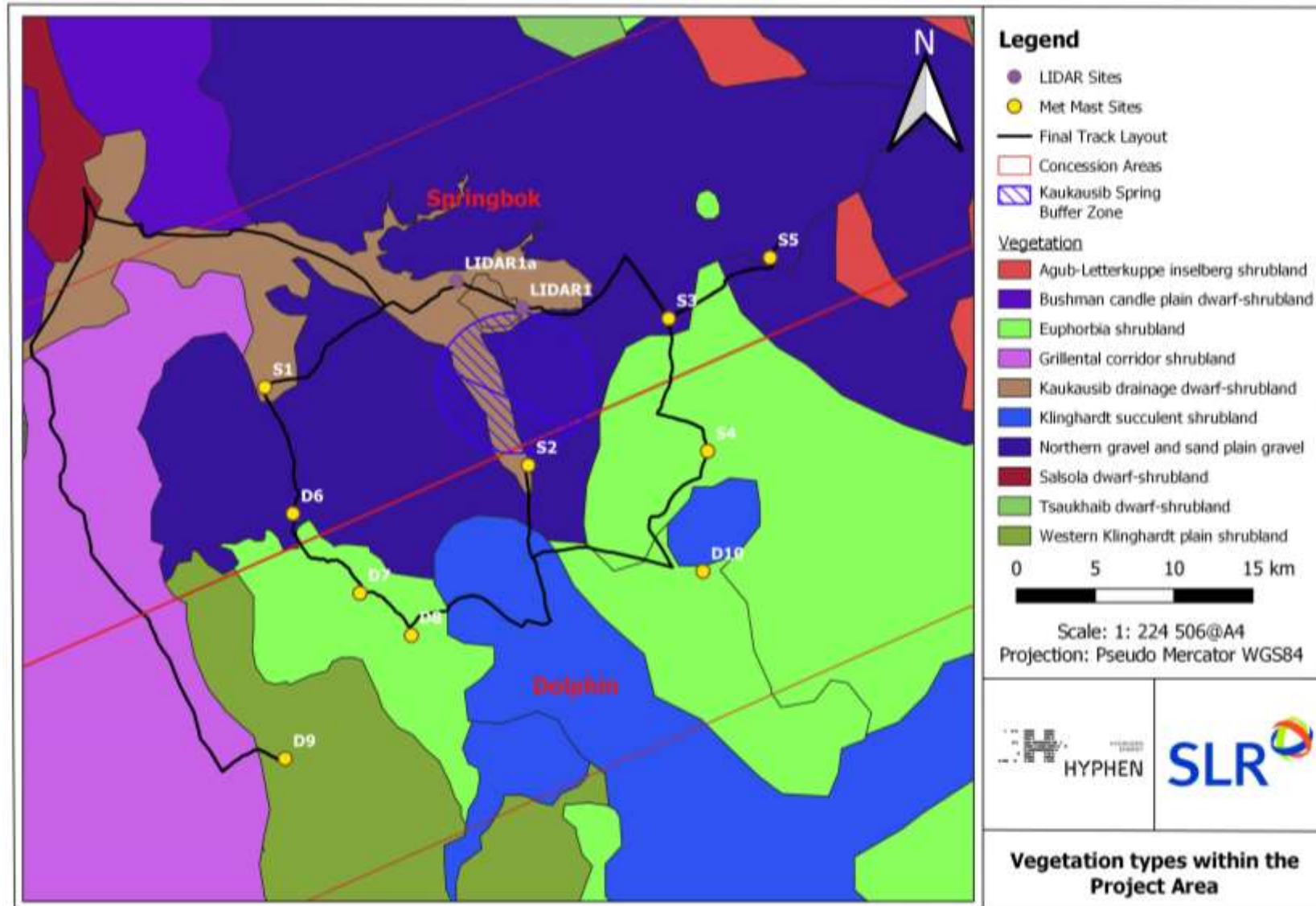


FIGURE 7-3: VEGETATION TYPES OF THE TSAU // KHAEB NATIONAL PARK

Source: Burke 2006; MEFT 2019; MEFT 2020a

TABLE 7-3: DESCRIPTION OF VEGETATION AT EACH PROJECT SITE

Site	Veg Type	Description	Comments
S1	Kaukausib drainage dwarf-shrubland	Gravel plain with ephemeral grassland	No vegetation during survey, but <i>Polemanniopsis namibensis</i> in vicinity.
S2	Kaukausib drainage dwarf-shrubland	Sand plain with ephemeral grassland	No vegetation during survey, but <i>Polemanniopsis namibensis</i> nearby.
S3	Northern gravel and sand plain grassland	Sand and quartz gravel plain with ephemeral grassland	<i>Polemanniopsis namibensis</i> range starts west of this site.
S4	Euphorbia shrubland	<i>Euphorbia gummifera</i> – <i>Stipagrostis obtusa</i> sand and calcrete plain	
S5	Northern gravel and sand plain grassland	<i>Euphorbia gummifera</i> – <i>Stipagrostis obtusa</i> sand and calcrete plain	Red-listed <i>Zygophyllum applanatum</i> at met mast site (Figure 7-7).
D6	Northern gravel and sand plain grassland	<i>Euphorbia gummifera</i> shrubland on sand plain and calcrete	
D7	Euphorbia shrubland	<i>Euphorbia gummifera</i> and <i>Salsola</i> sp. on calcrete plain	
D8	Euphorbia shrubland	<i>Euphorbia gummifera</i> shrubland on sand plain	
D9	Western Klinghardt plain shrubland	<i>Brownanthus arenosus</i> and <i>Euphorbia gummifera</i> shrubland on sand plains	<i>Dracophilus dealbatus</i> , <i>Eberlanzia</i> sp. and <i>Euphorbia chersina</i> near met mast site.
D10	Euphorbia shrubland	<i>Salsola</i> sp. shrubland on sand plain and calcrete	
LIDAR 1	Kaukausib drainage dwarf-shrubland	Sand and calcrete plain with ephemeral grassland	No vegetation during survey, but <i>Polemanniopsis namibensis</i> (Figure 7-8) nearby.
LIDAR 1A	Kaukausib drainage dwarf-shrubland	Sand and calcrete plain with ephemeral grassland	

Source: Burke 2022

7.4.1 Plant Species of Conservation Concern

Despite the dry season survey in May 2022, some 90 plant species were recorded during the field work. Twenty-three (23) of these are of conservation importance (i.e., 25% of the species recorded during the site survey), either by being legally protected, red-listed or CITES-listed. Seven species are endemic to the Sperrgebiet (Table 7-4).

The majority of the plant species of conservation concern occur in rocky habitats such as inselbergs, outcrops and rocky ridges, all of which fall outside the met mast and LIDAR sites. However, one of the dominant plant species in the study area (namely *Euphorbia gummifera*) is CITES-listed, although it occurs in large numbers in different habitats throughout a wide range in the Sperrgebiet and beyond this area, including in the Northern Cape of South Africa. Its large size and continuous presence all year round makes it an important ecosystem component by offering shelter, habitat, and food for a variety of small and large wildlife.

The near-threatened *Zygophyllum applanatum* grows in the eastern part of the study area and was recorded at Site S5 (Figure 7-7). Three other species of conservation importance grow on sand plains in the south-western part of the study area and were recorded near Site D9: *Dracophilus dealbatus*, *Eberlanzia* sp. and *Euphorbia chersina* (Table 7-4).



(a) Sand plains with *Euphorbia Gummifera* hummocks are prominent in the western part of the Project area



(b) Small, scattered rock outcrops can support higher biodiversity than sandy plains.



(c) Access in the western part of the planned positions of the meteorological masts traverses relatively well vegetated sand plains – here access to d9 (left) and d7 (right), with a Bushman Candle *Sarcocaulon Patersonii* in the foreground



(d) Eastern part of the Project area showing good grass cover along the access road to Site S5. The large shrub *euphorbia gummifera* (middle ground) is prominent throughout the Project area.

FIGURE 7-4: PHOTOGRAPHS OF VEGETATION IN THE PROJECT AREA

Source: Burke 2022



FIGURE 7-5: PHOTOGRAPHS OF VEGETATION AT EACH PROJECT SITE

Source: Burke 2022



FIGURE 7-6: PHOTOGRAPHS OF VEGETATION AT EACH PROJECT SITE

Source: Burke 2022

TABLE 7-4: PLANT SPECIES OF CONSERVATION IMPORTANCE RECORDED AT THE METEOROLOGICAL MAST SITES AND ALONG THE ACCESS ROUTES

Plant species	Confirmed Locations	National Red List	Global Red List	Protected	Endemic to Sperrgebiet	Rare
<i>Acacia erioloba</i>	dry river			p(F)		
<i>Aloidendron dichotomum</i>	inselbergs	VU		p(F)		
<i>Amphiglossa thuja</i>	inselbergs				Sp E	R
<i>Aridaria noctiflora ssp. noctiflora</i>	D9			p		
<i>Cephalophyllum ebracteatum</i>	D8 access			p		
<i>Crassula deceptor</i>	inselbergs and outcrops			p		
<i>Crassula ausensis ssp. ausensis</i>	inselbergs			p		
<i>Cynanchum meyeri</i>	inselbergs				near Sp E	
<i>Eberlanzia clausa</i>	inselbergs and outcrops			p		
<i>Eberlanzia sp</i>	D8, D9			p		
<i>Ectadium latifolium</i>	LIDAR1a				Sp E	
<i>Euphorbia chersina</i>	D9 access	C2				
<i>Euphorbia cibdela</i>	inselbergs	C2				
<i>Euphorbia dregeana</i>	inselbergs	C2				
<i>Euphorbia gummifera</i>	D9, D6, D7, D8, D10	C2				
<i>Euphorbia lignosa</i>	inselbergs and outcrops	C2				
<i>Juttadinteria attenuata</i>	D8 access			p	Sp E	
<i>Juttadinteria deserticola</i>	D8 access			p		
<i>Othonna graveolens</i>	inselbergs	NT				
<i>Dracophilus dealbatus</i>	D9, D9 access			p		
<i>Pelargonium cortusifolium</i>	inselbergs and outcrops				Sp E	
<i>Polemanniopsis namibensis</i>	S1, S2, S3, LIDAR1 & 1a	VU			Sp E	
<i>Psammophora modesta</i>	inselbergs and outcrops			p		
<i>Psammophora nissenii</i>	D8, D9			p		
<i>Stipagrostis garubensis</i>	Inselbergs				Sp E	
<i>Zygophyllum applanatum</i>	S5	NT				

Notes: p = protected Nature Conservation Ordinance, p(F)= protected Forest Act; NT=near-threatened, VU=vulnerable, R=rare, Sp E= Sperrgebiet endemic, C2 =CITES Appendix II

Source: Burke 2022



FIGURE 7-7: RELATIVELY INCONSPICUOUS RED-LISTED SMALL SHRUB ZYGOPHYLLUM APPLANATUM OCCURS AT SITE S5

Source: Burke 2022

Two plant species are listed as ‘vulnerable’ on Namibia’s red data list for plants (Loots 2005)—the quiver tree *Aloidendron dichotoma* and the desert parsley shrub *Polemanniopsis namibensis* (Figure 7-8). Quiver trees in the Project area only occur on inselbergs (thus are unlikely to be impacted by the proposed Project) and are also widespread. The desert parsley *Polemanniopsis namibensis*, however, occurs on plains and lower ridges and, although none were identified at the met mast or LIDAR sites, could potentially be impacted by construction activities and is thus the key plant species of concern in the Project area. Its known distribution range overlaps almost completely with the two concession areas within which there are a few discrete locations (Figure 7-9). This species occurs around sites S1, S2, S3, LIDAR1 and LIDAR1a.



FIGURE 7-8: POLEMANNIOPSIS NAMIBENSIS IS ENDEMIC TO THE SPERRGEBIET AND ONLY KNOWN FROM A FEW POPULATIONS IN THE KAUKAUSIB VALLEY IN SPRINGBOK AND DOLPHIN CONCESSION AREAS

Source: Burke 2020a

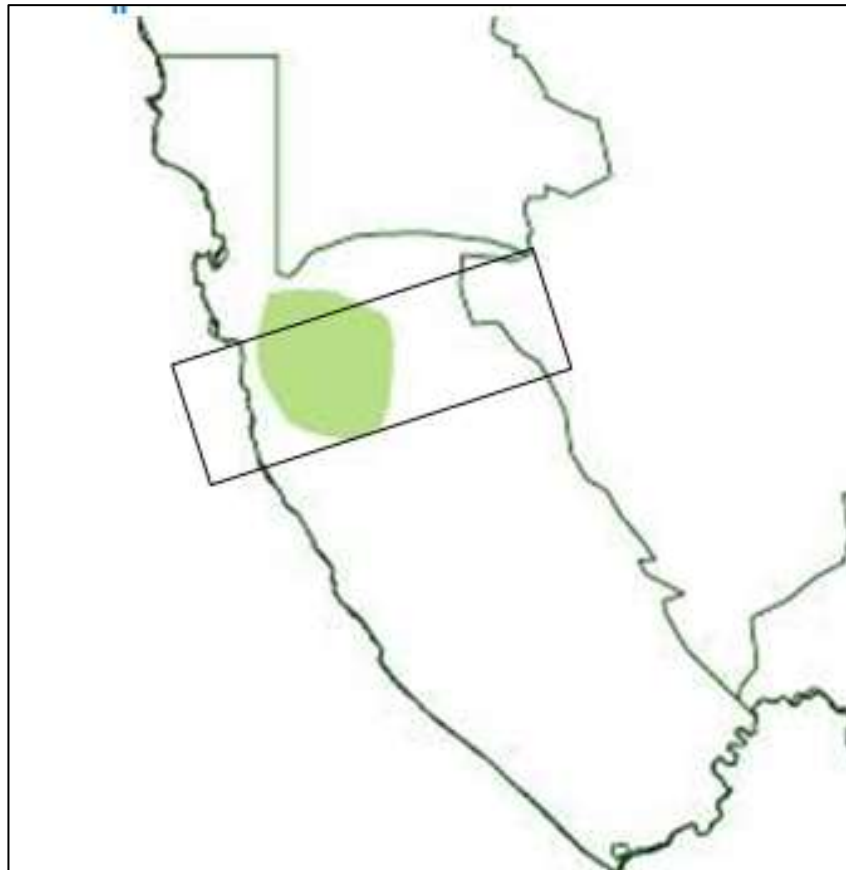


FIGURE 7-9: CONCESSION AREAS (APPROXIMATE) IN RELATION TO THE DISTRIBUTION RANGE OF POLEMANNIOPSIS NAMIBENSIS

Source: Burke 2020a

Besides the species mentioned above no other plant species with a limited distribution are likely to be affected based on available plant data (Burke & Loots 2020). In this context the questionable status of the *Salsola* species needs to be mentioned. According to the published literature Namibia has 63 indigenous *Salsola* species, 31 of which are endemic to the country (Botschantzev 1974; Klaassen & Kwembeya 2013). Several of these endemic species occur in the Sperrgebiet and could possibly occur in the concession areas.

7.4.2 Critical Habitat Triggers

The key plant species of concern in the project area is the shrub desert parsley *Polemanniopsis namibensis* (Figure 7-8). Its known distribution range (i.e., the only place on earth where it occurs) overlaps almost completely with the two Hyphen concession areas within which there are a few discrete locations (Figure 7-9). There is also one small population towards Rotkop, just outside the northern boundary of the Springbok concession, but the bulk of the known populations are in the central Kaukausib valley and adjacent areas to the north and south. This species occurs around sites S1, S2, S3, LIDAR 1 and LIDAR1a. This is the only species confirmed in the vicinity of the met mast

infrastructure that could qualify for critical habitat under IFC PS6 thresholds, although other threatened and range restricted flora species occur on inselbergs in the wider area which may also qualify (see Table 7-4).

7.5 TERRESTRIAL FAUNA

Distribution and abundance of terrestrial fauna across the Project area is poorly known and no comprehensive faunal surveys have been conducted in the Project area. Mammals such as springbok, oryx, brown hyena, black-backed jackal, bat-eared fox, and cape fox occur in low abundance, but are known to move through the area, and are more likely to be found near water sources such as the Kaukausib spring. A few amphibians and reptiles are endemic or near endemic to the desert regions of Namibia including Desert rain frog (*Breviceps macrops*) (IUCN: NT); Nama dwarf tortoise (*Chersobius solus*) (VU); and Namaqua dwarf adder (*Bitis schneideri*), which may occur in the Project area.

The May 2022 field survey confirmed that there were more signs of wildlife in the more vegetated areas, and closer to the permanent water source of the Kaukausib Spring. Tracks of small mammals, reptiles and birds were visible throughout the sandy plains and confirmed by sightings of scrub hares, snakes, and many different reptile species during the field survey. A network of wildlife tracks leads from all directions to the Kaukausib spring, some beyond the 5 km buffer indicated in the TKNP Management Plan.

A list of fauna observed during fieldwork is summarised in Table 7-5. A total of 14 reptile and six mammal species were confirmed during fieldwork, none of which are globally threatened and only hyena which is near threatened (NT). Of note, seven sites of hyena presence (latrines or scats) were observed and a group of 15 oryx were seen drinking water at the Kaukausib Spring and scared off by the cars. Individual sightings of klipspringer, bat-eared fox, Cape fox and dassie were also recorded, and three sightings of Cape hare. An old rodent burrow was seen at Site D6. Location of reptile sightings are shown in Figure 7-10 with photos of representative individuals shown in Figure 7-11. Photos and location of mammal sightings are shown in Figure 7-12 and Figure 7-13, respectively.

TABLE 7-5: FAUNA SPECIES RECORDED IN THE PROJECT AREA DURING THE MET MAST SURVEY AND CONSERVATION STATUS

Fauna species confirmed	Conservation status	Evidence of occurrence	Habitats where recorded
Mammals			
Brown hyena <i>Hyaena brunnea</i>	NT	Scats / latrines only	7 locations
Oryx <i>Oryx gazella</i>	LC	Direct Obs	15 individuals drinking at Kaukausib Spring
Klipspringer <i>Oreotragus oreotragus</i>	LC	Direct Obs	Rocky slope (Pavianberg)
Cape Hare <i>Lepus capensis</i>	LC	Direct Obs	From vegetated deep sand to vegetated low rocky slopes, but not on bare gravel plains
Cape fox <i>Vulpes chama</i>	LC	Direct Obs	Grassy, comparatively well vegetated terrain (the most north-eastern part of our survey)
Dassie rat <i>Petromus typicus</i>	LC	Direct Obs	Vegetated rocky hill slope with lots of boulders and rock cracks

Fauna species confirmed	Conservation status	Evidence of occurrence	Habitats where recorded
Reptiles			
Spotted Desert Lizard <i>Meroles suborbitalis</i>	LC	Direct Obs	Various, from barren gravel plain to fairly well vegetated compact sandy / low rocky ridge
Wedge-snouted Sand/Desert Lizard <i>Meroles cuneirostris</i>	LC	Direct Obs	Well-vegetated deep sand hummocks
Smith's Desert Lizard / Giant desert lizard <i>Meroles ctenodactylus</i>	LC	Direct Obs	Low rocky ridge flanked by sandy plain
Knox's Desert Lizard <i>Meroles knoxii</i>	LC	Direct Obs	Relatively well vegetated sandy plain
Plain Sand Lizard ¹ <i>Pedioplanis inornata</i>	LC	Direct Obs	Mostly in rocky terrain, either on inselberg slopes or on fairly flat broken rocky/sandy areas
Knobel's (Southern) Rock Agama <i>Agama Atra</i>	LC	Direct Obs	Broken rocky terrain with rock cracks; one individual in an eroded drainage line with cracks
Western Rock Skink (melanistic Luderitz race) <i>Trachylepis sulcata</i>	LC	Direct Obs	Rocky outcrops / inselbergs; potentially eastern distribution limit of "nigra" (Portik <i>et al.</i> 2010)
Blind Legless Skink <i>Typhlosaurus</i> sp	LC	Direct Obs	Deep sand
Bibron's or Turner's Gecko <i>Chondrodactylus bibronii/turnerii</i>	LC	Direct Obs	Deep rock cracks on Jagdkuppen
Common Barking Gecko <i>Ptenopus garrulus</i>	LC	Direct Obs	Sparsely vegetated gravel plain
Namaqua Chameleon <i>Chameleo namaquensis</i>	LC	Direct Obs	Well vegetated sandy hummocks
Dwarf Beaked Snake <i>Dipsina multimaculata</i>	LC	Direct Obs	Sparsely vegetated coarse sand plain with broken calcrete layer
cf. sand snake ² <i>Psammophis</i> sp.	LC	Track	Well vegetated sandy hummocks/ slopes
Horned adder <i>Bitis caudalis</i>	LC	Direct Obs	Resting in the shade of a shrub on the lower slopes of an inselberg

Source: Kemper, 2022; Burke, 2022

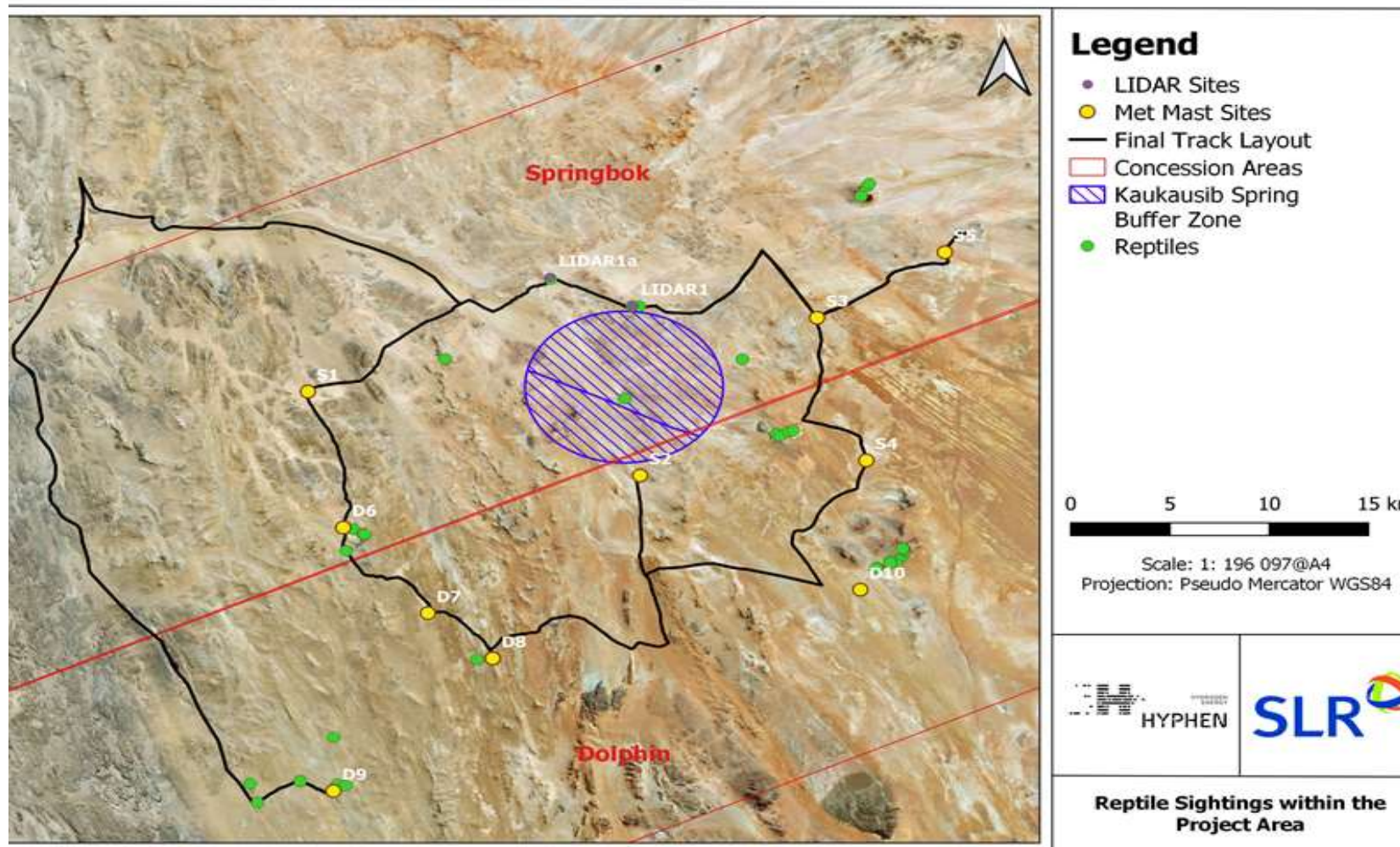


FIGURE 7-10: POSITIONS OF REPTILE SIGHTINGS RECORDED DURING THE MAY 2022 FIELD SURVEY IN RELATION TO MET MAST / LIDAR STATION LOCATIONS, KAUKAUSIB SPRING (RED AND BLACK CIRCLE) AND TRACK NETWORK (BLUE LINES)

Source: Kemper 2022

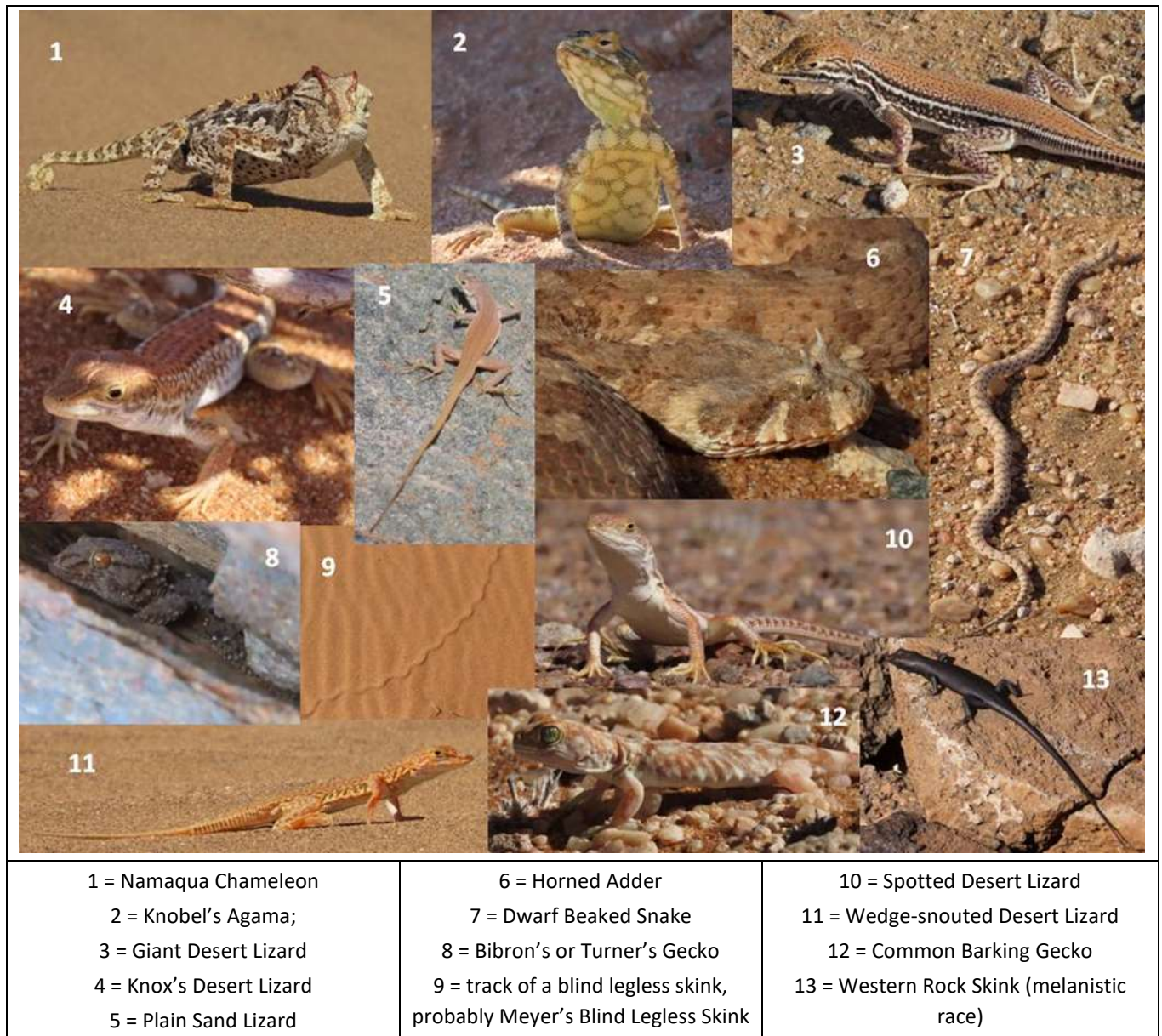


FIGURE 7-11: REPTILE SPECIES ENCOUNTERED DURING THE MAY 2022 FIELD SURVEY

Source: Kemper 2022

	
<p>Herd of oryx near Kaukausib Spring</p>	<p>Kaukausib Spring</p>
	
<p>Recently used hyena latrine at Kaukausib Spring</p>	<p>Cape fox</p>
	
<p>Flushed Cape hare</p>	<p>Klipspringer on inselberg</p>

FIGURE 7-12: PHOTOS OF SOME MAMMAL SPECIES SEEN DURING FIELDWORK

Source: Kemper in Burke 2022

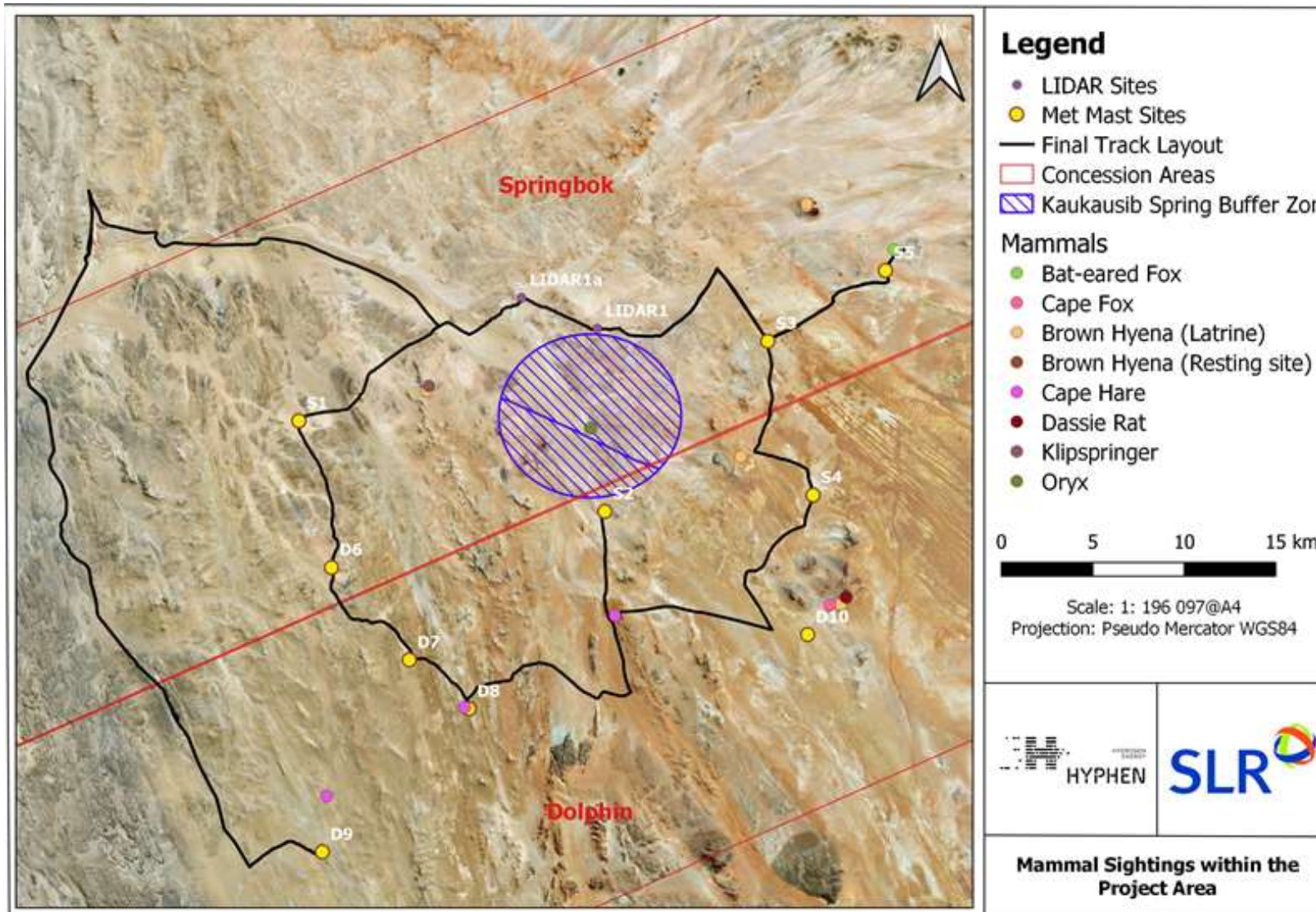


FIGURE 7-13: MAP SHOWING LOCATION OF MAMMAL SIGHTINGS DURING THE MAY 2022 SITE VISIT

Source: Kemper

7.6 AVIFAUNA

7.6.1 The avifauna of the broader Project area

Due to the harsh climatic conditions, avian abundance and diversity are expected to be extremely poor in the broader Project area. Relatively well-vegetated habitats, such as mosaics of sandy / gravelly flat to undulating plains, rocky outcrops and ridges, inselbergs, as well as vegetated drainage courses, flooded ephemeral pans and natural fresh-water springs are likely to support a more abundant and varied birdlife than the more featureless landscapes such as the flat, barren gravel plains.

The occurrence, abundance, richness, and diversity of birdlife in the broader Project area are largely dictated by regional rainfall patterns. Years of poor local rainfall (especially if coupled with exceptionally good rainfall further inland) may yield extremely few birds, while good local rainfall events may draw birds that are not necessarily desert-adapted from inland areas further west.

During the field survey in May 2022 (dry conditions), a total of 30 bird species were identified and mapped (Table 7-6). Many sightings were of Grey-backed Sparrow-Larks and Barlow's Larks. Few raptors were seen; most sightings were associated with rocky outcrops / hills and were of Rock Kestrels. Figure 7-14 to Figure 7-16 summarise the distribution of the sightings. A literature search tentatively identified a further 19 species that are most likely to occur in the broader impact zone (Table 7-6). This excludes potential uncommon or rare visitors, or birds that may accidentally get blown into the area from further east during strong "east wind" episodes and that would not normally occur there.

7.6.2 Priority species and their habitats

A list of priority bird species, assumed to be potentially at risk from the proposed Project is provided below. These species were selected on the basis of their:

- National and/or global conservation status
- Level of endemism
- Perceived collision risk
- Relative abundance (presumed) on the site and broader impact zone, and
- Estimated ecological significance of the local population.

Out of the 49 listed bird species known (or suspected) to occur in the broader Project area (Table 7-6), five species were identified as priority species; two of which were seen during the field survey (namely Barlow's Lark and Gray's Lark). In addition, an old, abandoned egg of a Ludwig's Bustard (globally Endangered) was also identified, confirming its presence (and breeding area) in the broader Project area. The five priority species are briefly discussed below.

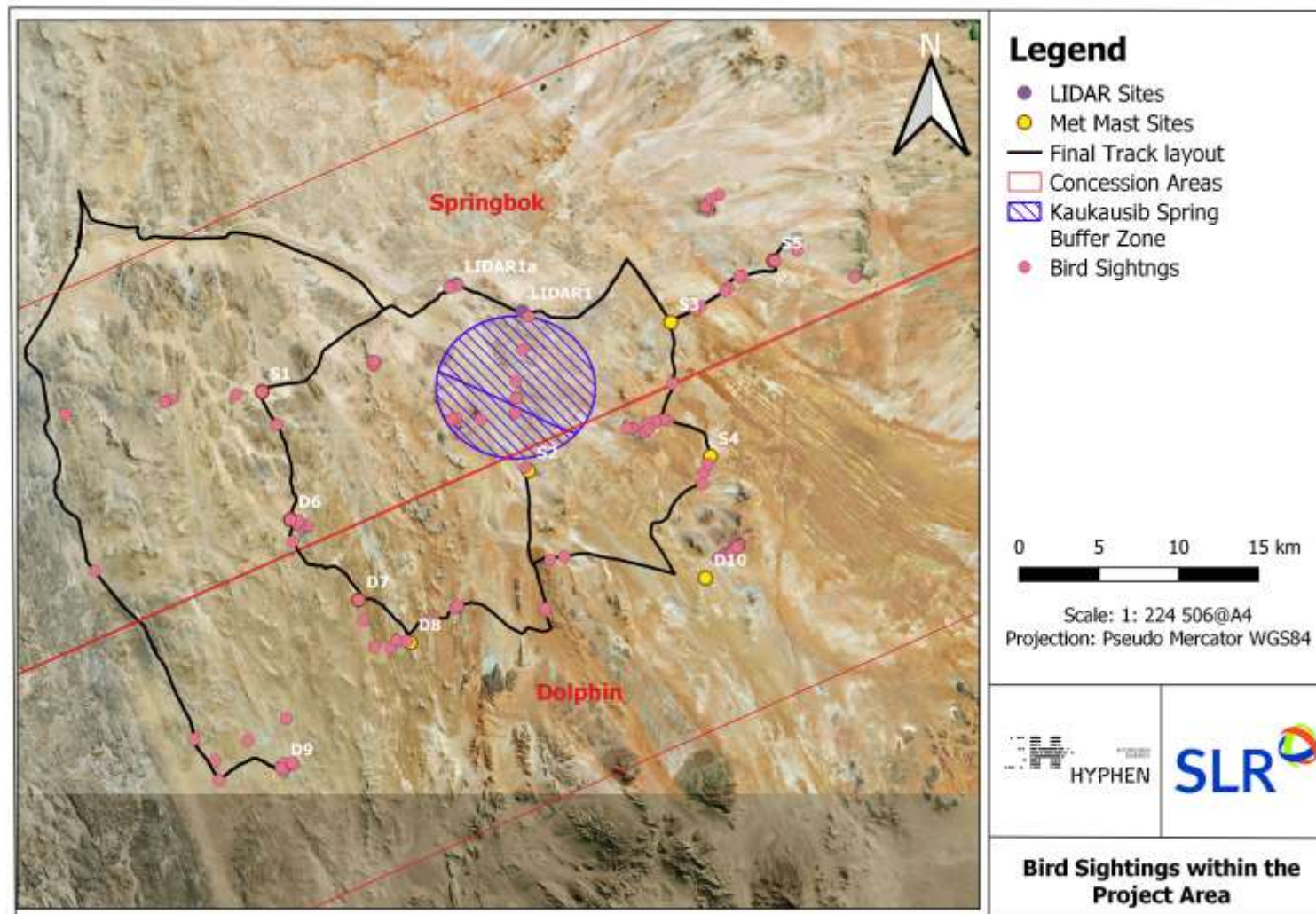


FIGURE 7-14: POSITION OF ALL BIRD SIGHTINGS (PURPLE CIRCLES) RECORDED DURING THE MAY 2022 FIELD SURVEY IN RELATION TO MET MAST / LIDAR LOCATIONS, KAUKAUSIB SPRING (RED AND BLACK CIRCLE) AND TRACK NETWORK (BLUE LINES)

Source: Kemper 2022

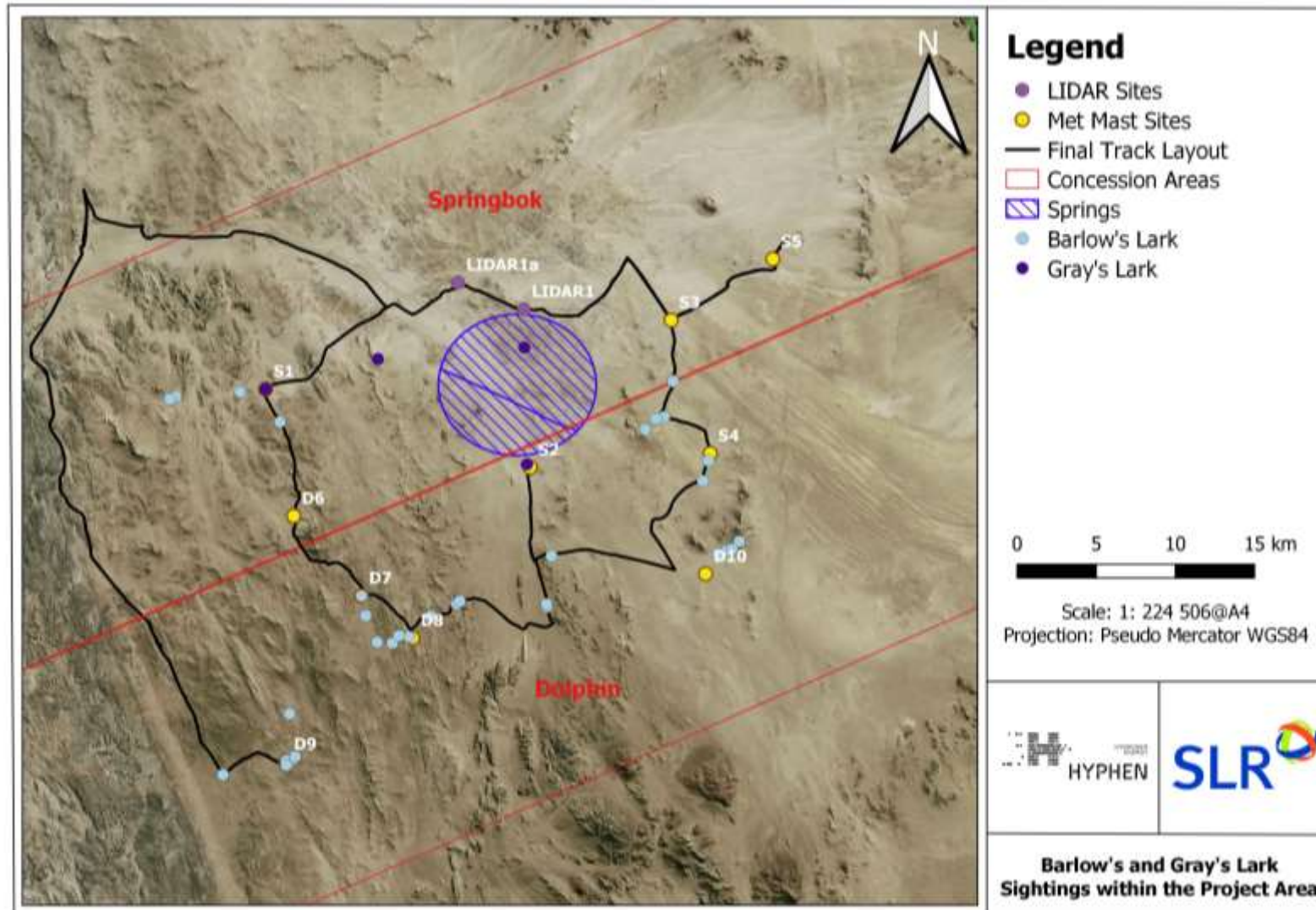


FIGURE 7-15: POSITIONS OF BARLOW'S LARK (LIGHT BLUE CIRCLES) AND GRAY'S LARK (DARK BLUE) SIGHTINGS RECORDED DURING THE MAY 2022 FIELD SURVEY IN RELATION TO MET MAST / LIDAR LOCATIONS, KAUKAUSIB SPRING (RED AND BLACK CIRCLE) AND TRACK NETWORK (BLUE LINES)

Source: Kemper 2022

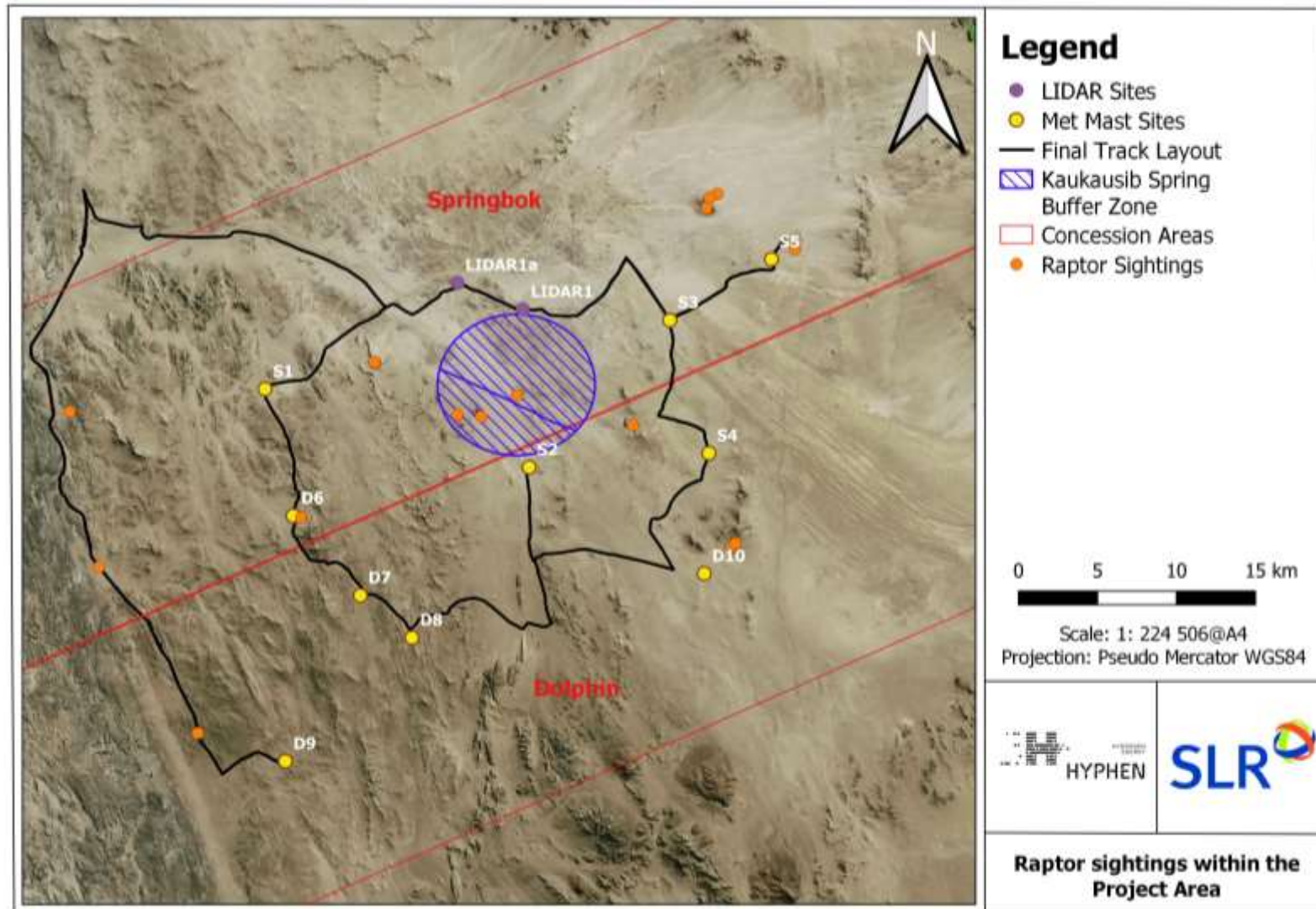


FIGURE 7-16: POSITIONS OF RAPTOR SIGHTINGS RECORDED DURING THE MAY 2022 FIELD SURVEY IN RELATION TO MET MAST / LIDAR LOCATIONS, KAUKAUSIB SPRING AND TRACK NETWORK

Source: Kemper 2022

TABLE 7-6: LIST OF BIRD SPECIES MOST LIKELY TO OCCUR IN THE BROADER PROJECT AREA, THEIR LOCAL/GLOBAL CONSERVATION STATUS, LEVEL OF REGIONAL ENDEMICITY, RESIDENCE STATUS AND LOCAL IMPORTANCE

LC = Least Concern (i.e., not considered threatened), NT = Near Threatened, VU = Vulnerable, EN = Endangered. **Species in bold** were seen during the May 2022 field survey. Species shaded in green constitute priority species. Nomenclature follows Sinclair *et al.* 2020.

Species	Latin name	Global conservation status ¹	Namibian conservation status ²	Southern African endemicity	Local residence status; congregatory?	Estimated importance of broad impact zone population
Alpine Swift	<i>Tachymarptis melba</i>	LC	LC		Migrant	Low
Barlow's Lark	<i>Calendulauda barlowi</i>	LC	LC	Near-endemic to south-western Namibia Range-restricted³	Resident	High
Barn Swallow	<i>Hirundo rustica</i>	LC	LC		Migrant	Low
Black-chested Snake-Eagle	<i>Circaetus pectoralis</i>	LC	LC		Resident / nomad	Low
Bradfield's Swift⁴	<i>Apus bradfieldi</i>	LC	LC	Near-endemic	Resident / nomad	Low
Burchell's Courser	<i>Cursorius rufus</i>	LC	LC	Near-endemic	Nomad	Low
Cape Bunting	<i>Emberiza capensis</i>	LC	LC	Near-endemic	Resident	Low
Cape Sparrow	<i>Passer melanurus</i>	LC	LC	Near-endemic	Resident	Low
Common Ostrich	<i>Strutio camelus</i>	LC	LC		Resident	Low
Double-banded Courser	<i>Rhinoptilus africanus</i>	LC	LC		Resident / nomad	Low
Dusky Sunbird	<i>Cinnyris fuscus</i>	LC	LC	Near-endemic	Resident	Low
Familiar Chat	<i>Oenanthe familiaris</i>	LC	LC		Resident	Low
Gray's Lark	<i>Ammomanopsis grayi</i>	LC	LC	Near-endemic to Namibia	Resident	High
Greater Flamingo	<i>Phoenicopterus roseus</i>	LC	VU		Breeding migrant ⁵	Low to Medium ⁵
Greater Kestrel	<i>Falco rupicoloides</i>	LC	LC		Resident	Low
Grey Tit	<i>Melaniparus afer</i>	LC	LC	Endemic	Resident	Low to Medium
Grey-backed Cisticola	<i>Cisticola subruficapilla</i>	LC	LC	Near-endemic	Resident	Low to Medium

Species	Latin name	Global conservation status ¹	Namibian conservation status ²	Southern African endemism	Local residence status; congregatory?	Estimated importance of broad impact zone population
Grey-backed Sparrow-Lark	<i>Eremopterix verticalis</i>	LC	LC		Resident / nomad; congregatory	Low
Jackal Buzzard	<i>Buteo rufofuscus</i>	LC	LC	Endemic	Resident	Low
Karoo Chat	<i>Emarginata schlegelii</i>	LC	LC	Near-endemic	Resident	Low
Karoo Eremomela	<i>Eremomela gregalis</i>	LC	LC	Endemic	Resident	Low
Karoo Korhaan	<i>Eupodotis vigorsii</i>	LC		Endemic	Resident	Low
Karoo Prinia	<i>Prinia maculosa</i>	LC	LC	Endemic	Resident	Low
Lanner Falcon	<i>Falco biarmicus</i>	LC	LC		Resident / nomad	Low
Lark-like Bunting	<i>Emberiza impetuani</i>	LC	LC	Near-endemic	Nomad; congregatory	Low
Lesser Flamingo	<i>Phoenicopterus minor</i>	NT	VU		Breeding migrant ⁵	Low to Medium ⁵
Ludwig's Bustard⁶	<i>Neotis ludwigii</i>	EN	EN	Near-endemic	Nomad	Medium to High
Mountain Wheatear	<i>Oenanthe monticola</i>	LC	LC	Near-endemic	Resident / nomad	Low
Namaqua Dove	<i>Oena capensis</i>	LC	LC		Resident / nomad	Low
Namaqua Sandgrouse	<i>Pterocles namaqua</i>	LC	LC	Near-endemic	Resident / nomad	Low
Pale Chanting Goshawk	<i>Melierax canorus</i>	LC	LC	Near-endemic	Resident	Low
Pied Crow	<i>Corvus albus</i>	LC	LC		Resident	Low
Red-billed Quelea	<i>Quelea quelea</i>	LC	LC		Nomad; congregatory	Low
Red-capped Lark	<i>Calandrella cinerea</i>	LC	LC		Resident / nomad	Low
Red-headed Finch	<i>Amadina erythrocephala</i>	LC	LC	Near-endemic	Resident / nomad; congregatory	Low
Rock Kestrel	<i>Falco rubicolus</i>	LC	LC		Resident	Low
Rock Martin	<i>Ptyonoprogne fuligula</i>	LC	LC		Resident	Low
Rüppell's Korhaan	<i>Eupodotis rueppellii</i>	LC	LC	Near-endemic to Namibia	Resident	Low

Species	Latin name	Global conservation status ¹	Namibian conservation status ²	Southern African endemism	Local residence status; congregatory?	Estimated importance of broad impact zone population
Southern Fiscal	<i>Lanius collaris</i>	LC			Resident	Low
Speckled Pigeon	<i>Columba guinea</i>	LC	LC		Resident	Low
Spike-heeled Lark	<i>Chersomanes albofasciata</i>	LC	LC	Near-endemic	Resident	Low
Spotted Eagle-Owl	<i>Bubo africanus</i>	LC	LC		Resident	Low
Spotted Thick-knee	<i>Burhinus capensis</i>	LC	LC		Resident	Low
Stark's Lark⁴	<i>Spizocorys starki</i>	LC	LC	Near-endemic	Resident / nomad; congregatory	Low
Three-banded Plover	<i>Charadrius tricollaris</i>	LC	LC		Resident	Low
Tractrac Chat	<i>Cercomela tractrac</i>	LC	LC	Near-endemic	Resident	Low
Verreaux's Eagle⁴	<i>Aquila verreauxii</i>	LC	NT		Resident	Low
Western Barn Owl	<i>Tyto alba</i>				Resident	
White-throated Canary	<i>Crithagra flaviventris</i>	LC	LC	Near-endemic	Resident	Low
Yellow Canary	<i>Chritagra flaviventris</i>	LC	LC	Near-endemic	Resident / nomad; congregatory	Low

Notes:

¹IUCN 2022

²Simmons *et al.* 2015

³IFC 2019

⁴Suspected ID

⁵overflight only

⁶no direct sightings but on long-abandoned egg

Table 7-7 lists habitat preferences for priority species seen and/or suspected to occur in the area, and therefore their likelihood of occurrence at individual mast locations and/or access roads.

TABLE 7-7: HABITATS ASSOCIATED WITH PRIORITY BIRD SPECIES SEEN DURING THE MAY 2022 SURVEY

Bird species ¹	Habitat preference						
	Sparsely vegetated gravel plain	Sparsely vegetated, grass- or low shrub-dominated sand plain, often with broken calcrete layer	Sandy plain / undulating vegetated hummocks, usually with scattered stands of <i>Euphorbia gummifera</i>	Low rocky / broken rock outcrop / ridge	Inselberg / mountain	Drainage system	Permanent (but poorly vegetated) fresh-water spring (Kaukausib)
Barlow's Lark	Low	High	High	Medium to High	Low to Medium	High	Low
Gray's Lark	High	Low to Medium	Low	Low to Medium	Low	Low	Low to Medium
Ludwig's Bustard	Low to Medium	High	Medium to High	Medium to High	High ²	Medium to High	Low to Medium

Notes:

1. The Greater Flamingos and Lesser Flamingos are considered priority species but are, however, not associated with any habitats listed here, but may traverse the area. The exact routes taken by flamingos and flight altitudes are not known and it, therefore, remains unclear whether the met mast structures pose a collision risk.
2. Fairly flat sections on broken rock terrain on lower- to mid-mountain slopes constitute favourable breeding habitat.

Source: Kemper, 2022

7.6.2.1 Ludwig's Bustard

The Ludwig's Bustard is a large, heavy, secretive bird, which is easily disturbed. It is a nomadic partial migrant and may occur and breed in the general Project area after good to exceptional winter rains. Even in poor rainfall years there may be sporadic sightings. This species is known to be highly susceptible to collision mortality with power lines (Shaw 2011; Scott and Scott 2016), and this is thought to be primarily responsible for the species' recent rapid decline, which led to the species moving from Least Concern to globally Endangered in 2010 (IUCN 2022) and being listed as Endangered in Namibia (Simmons *et al.* 2015). As noted above, an abandoned, partially sun-bleached egg was located during the field survey confirming its presence (most likely in rocky areas). Owing to the paucity of data, no estimates on the size of the population in the broader Project area can be made, but it is likely that in good rainfall years when food is plentiful, several dozen bustards – if not more – could spend significant time in the Project area.

7.6.2.2 Barlow's Lark

The Barlow's Lark has a narrow distribution that is limited to south-western Namibia, extending into South Africa where it may hybridise with the Karoo Lark. With an alleged extent of occupation of less than 18 000 km² (Ryan *et al.* 2008), it qualifies as range-restricted. The Barlow's Lark was frequently seen during the May 2022 field survey (Figure 7-15) and, therefore, seems to be locally common in the Project area. Most sightings were in well vegetated habitats and no or few individuals were seen in the north-eastern parts of the Project area.

7.6.2.3 Gray's Lark

The Gray's Lark is endemic to the Namib desert and occurs from southern Angola to the Koichab Pan area (and clearly extends as far west as parts of the Lüderitz peninsula). The southern subspecies, *Ammomanopsis grayi grayi*, occurs from Cape Cross southwards. Although its range and habitats are relatively restricted, it is not considered threatened. This species is a shy ground nester that is restricted to poorly vegetated gravel plains and is susceptible to disturbance, displacement, and habitat damage/loss. The Gray's Lark's drab light sandy-grey plumage blends well with its surroundings and nests are well camouflaged. During the field survey, nine individuals were recorded, and all four observations were on barren gravel plains between sites S1, S2 and L1 (Figure 7-15).

7.6.2.4 Greater Flamingo

These long-lived birds generally occur throughout the year and in seasonally fluctuating numbers along Namibia's coastline, including at the Orange River mouth, south of the Project area, and in bays and pans around the Lüderitz peninsula, north-west of the Project. In southern Africa they only breed infrequently at Etosha Pan in Namibia and Sua Pan in Botswana when local conditions are suitable, and breeding success is generally poor. This is the main reason for the species being considered Vulnerable in Namibia (Simmons *et al.* 2015). Its large size, sporadically nomadic nature, and tendency to make long-distance travels at night make this bird susceptible to collision risk (Scott and Scott 2016). The flight paths taken to their inland breeding sites are not known, nor is it established whether these routes vary and how the birds navigate, e.g., whether they orientate themselves by landmarks such as filled pans or inselbergs. There is a chance that they may traverse the broader Project area, but no qualitative or quantitative data exist to confirm this or predict the frequency of occurrence or the number of birds it may involve.

7.6.2.5 Lesser Flamingo

The Lesser Flamingo is more restricted in its southern African distribution than the Greater Flamingo but occurs around the Orange River mouth and the Lüderitz peninsula. Locally its numbers fluctuate greatly seasonally and between years. Like the Greater Flamingo, it too only breeds when conditions are suitable and with poor breeding success. In southern Africa the species breeds at Etosha pans in Namibia and Sua Pan in Botswana, as well as at Kamfers Dam near Kimberley in South Africa. There is some evidence that birds from Kamfers Dam, including recently fledged individuals, frequent the Lüderitz area (Jessica Kemper *pers. obs.*). No data are available on the long-distance flight paths to and from their breeding sites, making it impossible to estimate the extent to which this species may be impacted. It too is listed as Vulnerable in Namibia (Simmons *et al.* 2015) and is considered Near Threatened globally (IUCN 2022). Like the Greater Flamingo, it is also a heavy, large species with a tendency to travel long distances at night, making it prone to collision with power lines and similar obstacles (Scott and Scott 2016).

7.7 BIODIVERSITY SENSITIVITY

The biodiversity sensitivity presented here has been derived from the biodiversity importance and management zones presented in the TKNP Management Plan (MEFT 2020a). Eleven of the sites are located in areas with "medium biodiversity" sensitivity and one site within an area of "high biodiversity" sensitivity - refer to Table 7-8 and Figure 7-17.

TABLE 7-8: BIODIVERSITY VALUE AND STATUS CRITERIA USED TO ASSIGN ECOLOGICAL SENSITIVITY

Category	Criteria	Rules	Site
Very High	<ul style="list-style-type: none"> ≥ 1 plant species endemic to mapping unit ≥ 150 plant species ≥ 5 park endemics ≥ 10 protected species 	At least two criteria apply	N/A
High	<ul style="list-style-type: none"> ≥ 100 plant species ≥ 5 park endemics ≥ 5 protected species 	At least two criteria apply	D9
Medium	<ul style="list-style-type: none"> ≥ 50 plant species ≥ 1 Namib endemic ≥ 1 protected species poor data, but protected or Namib endemics expected 	One criterion applies	S1, S2, S3, S4, S5, D6, D7, D8, D10, Lidar 1, Lidar 1a
Low	Not applicable	None of the criteria apply	N/A
Special value habitat ¹	Important habitats for flagship species, e.g., feeding or breeding sites (Seals, Damara Terns), special habitat for wildlife or providing essential ecosystem function (e.g., wetland, permanent springs) or lichen fields.	Recognised of national importance	N/A
Natural monument ²	Natural feature of outstanding importance (e.g., Bogenfels rock arch, Roter Kamm Crater).	Recognised of national importance	N/A

Notes:

1. Special value habitats are zoned as Special Management in the management plan
2. Natural monuments are not a terrestrial ecological feature but are retained in this table for the sake of completeness. Bogenfels rock arch is the key landscape feature proposed as a national monument.

Adapted from: Burke 2019

7.8 TKNP ZONING

In terms of the TKNP Management Plan (MEFT 2020), the Park has five management zones, each with specific restrictions (Figure 7-17). Management zones include:

- Development and Infrastructure
- Managed Resource Use;
- Special Value;
- Minimal Disturbance; and
- Wildlife Management.

Zoning of the TKNP is based primarily on the terrestrial ecological importance of different portions of the Park balanced with areas required for mining. The zoning provides a summary of known biodiversity patterns and features in the TKNP which largely reflects terrestrial ecology patterns.

Eight of the sites are located in the "Minimal Disturbance Area" and four sites within the "Wildlife Management Area" - refer to Table 7-9 and Figure 7-17. As stated in the TKNP Management Plan (MEFT 2020a), regardless of the management zone, all development in the TKNP requires an EIA to be undertaken as prescribed.

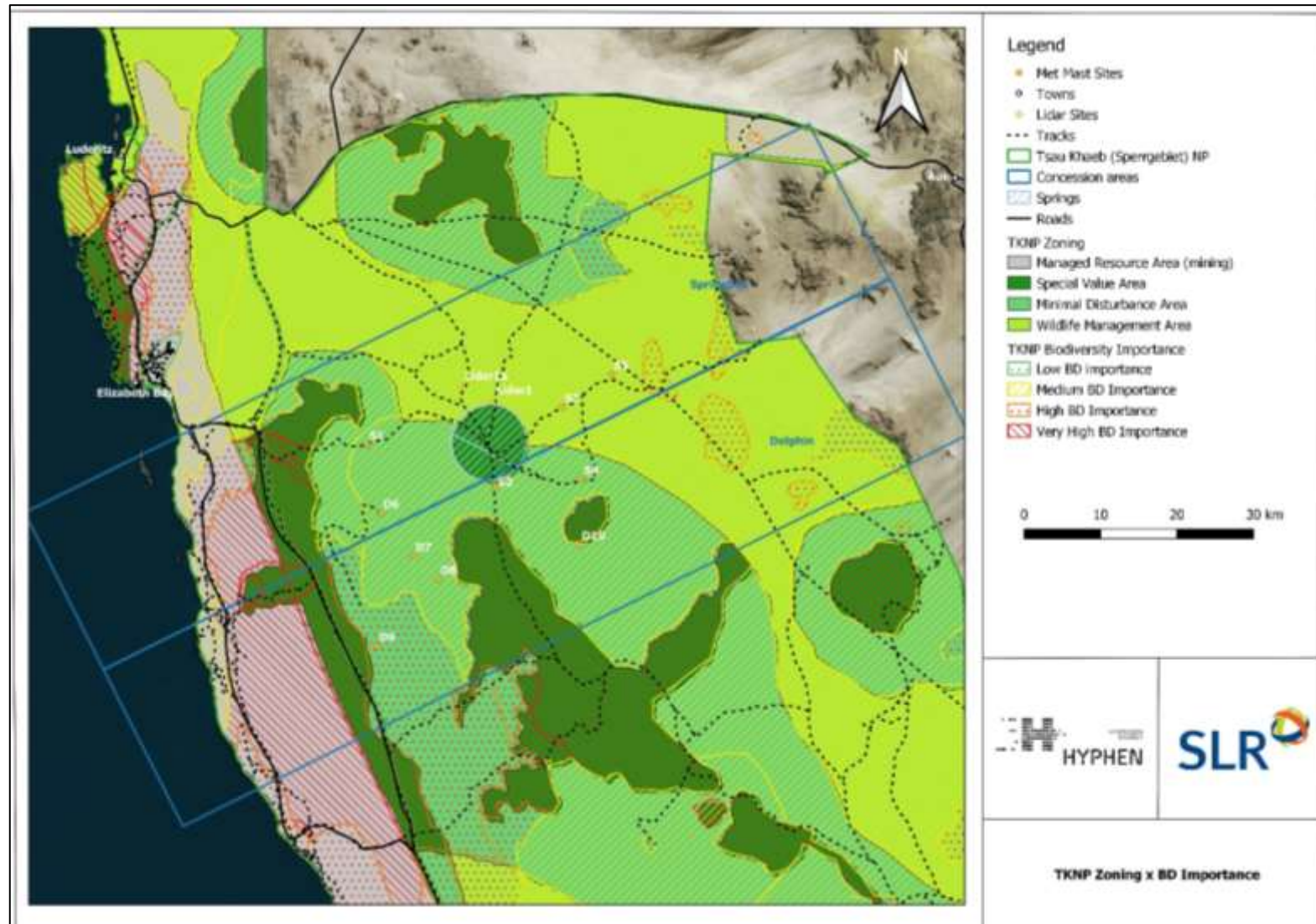


FIGURE 7-17: TKNP ZONING MAP AND BIODIVERSITY IMPORTANCE

Source: (Burke 2006, MEFT 2019, 2020a)

TABLE 7-9: KEY PROPERTIES OF TKNP ZONING AREAS AND MET MAST AND LIDAR SITES

TKNP Zoning	Description of Area	Key Properties	Management Guideline	Site
Development and Infrastructure	Major roads, airfields, Park and Mine stations and Tourism development areas		<ul style="list-style-type: none"> • These zones provide for the infrastructure needed for park management as well as tourism and recreation opportunities. • It includes the existing mining facilities, wind farm as well as park management infrastructure. • Any new developments must be compatible with the objectives of the park, and negative impacts on the protected area must be minimised. 	N/A
Managed Resource Area (mining)	Mining licences / active mining	Areas subject to mining licenses	The same management guidelines as for the minimal disturbance zones, except that mining can take place or that horses are protected as outlined in this management.	N/A
	Namib horse management area	Area designated for the protection and management of the Namib horses		
Special Value Area	Springs	Important habitats for flagship species, e.g., feeding or breeding sites, special habitat for wildlife or providing essential ecosystem function (e.g., wetland).	<ul style="list-style-type: none"> • Not suitable for roads • Where re-routing of roads is required, old parts should be rehabilitated. • No mining or prospecting is allowed according to the policy on mining and prospecting in protected areas. • No tourism infrastructure development within these areas. • Guided tourism is permitted but precautions are needed to avoid impacts on rare plant species (e.g., through the environmental guidelines that will be developed for each tourism concession). • No new patrol camps. • No artificial water to be provided. 	N/A
	Rocky outcrops (Kowis mountains, Lüderitz peninsula, Tsaukhaib-Haalenberg inselbergs, Grillental-Pomona corridor, Boegoeberg, Klinghardt mountains, Tsaus mountain, Heioab-Aurus mountain range, Chamnaub inselbergs, Rooiberg-Nudavib mountains, Skorpion inselbergs, Obib	As areas of very high ¹ or high ² plant biodiversity (endemic plants).		

TKNP Zoning	Description of Area	Key Properties	Management Guideline	Site
	mountains, Schakalsberge and the Orange River valley.		<ul style="list-style-type: none"> • Prioritise rehabilitation. • Close non-essential tracks. 	
	Natural feature / monument	<ul style="list-style-type: none"> • Natural feature of outstanding importance. • High scenic and tourism values. 		
	Riverine band	<ul style="list-style-type: none"> • High biodiversity. • Rare and sensitive habitat that has already been impacted by mining. • Important habitats for flagship species, e.g., feeding or breeding sites, special habitat for wildlife or providing essential ecosystem function (e.g., wetland). • Ramsar Site. 		
	Fossil and archaeological sites	<ul style="list-style-type: none"> • High scientific and cultural values. • Sensitive to disturbance. 		
Minimal disturbance area	Buffer Zones	Areas of medium ³ biodiversity importance that interconnect areas of high or very high biodiversity or provide a buffer zone around such areas. These areas may still contain populations of endemic or threatened plants.	<ul style="list-style-type: none"> • No new roads should be constructed in this area • Only guided tourism • No harvesting • No permanent structures to be developed (except possible rest / picnic points, 	S1, S2, S4, D6, D7, D8, D9, D10

TKNP Zoning	Description of Area	Key Properties	Management Guideline	Site
			<p>which must be developed in a way that blend into the environment)</p> <ul style="list-style-type: none"> • No off road driving • No mining or prospecting is allowed according to the policy on mining and prospecting in protected areas 	
Wildlife Management area	Remainder of the Park except the Managed Resource Use Zone	Lower sensitivity (but may include important localised plants, e.g., endemic <i>Polemanniopsis namibensis</i> – only recorded from 3 sites in the park).	<p>Same management guidelines as for the minimal disturbance zones, except that the following tourism activities can be offered by tourism concessionaires:</p> <ul style="list-style-type: none"> • Game drives and viewing • Guided hiking and biking trails • Bush picnics • Stargazing tours 	S3, S5, Lidar 1, Lidar 1a

Notes:

1. Very high sensitivity: Areas where at least two of the following four criteria must be satisfied: ≥1 plant species endemic to mapping unit; ≥150 plant species; ≥5 park endemics; ≥10 protected species.
2. High sensitivity: Areas where at least two of the following three criteria must be satisfied: ≥100 plant species; ≥5 park endemics; ≥5 protected species.
3. Medium biodiversity: At least one of the following four criteria must be satisfied for designating areas as Medium biodiversity zones: ≥ 500 plant species; ≥ 1 Namib endemic; ≥ 1 protected species; poor data, but protected or Namib endemics expected

Source: MEFT 2020

7.9 MINING

The Namibian Minerals (Mining and Prospecting) Act, 1992 (No. 33 of 1992) allows for various types of prospecting and mining licences, issued by MME, covering both small-scale and formal activities. Many of Namibia's conservancies, protected areas and national parks have abundant mineral potential and prospecting in these areas has been and continues to be a common activity in Namibia (NACOMA, 2008). Diamonds (and zinc more recently) have been mined in the TKNP for more than a century particularly in the //Kharas Region (Ministry of Environment and Tourism, 2019).

MME has issued a policy particularly addressing mining and prospecting activities in environmentally sensitive areas. The areas of specific interest in relation to biodiversity are those gazetted as "Protected Areas" and exploitation of mineral resources is allowed under the Minerals (Mining and Prospecting) Act, 1992 (No. 33 of 1992). The Minerals (Mining and Prospecting) Act, 1992 grants MME access since the development of mining is considered crucial to the Namibian economy. Yet recently, the MME has emphasised proper environmental consideration of prospecting and mining activities in the licensing procedures and the policy envisages controlled prospecting and mining in these areas under conditions that satisfy the protection of the environment (Ministry of Environment and Tourism, 2019). National parks, as well as other protected areas, can be used for various development activities including mining, if conscientious attention is given to avoiding, reducing, or mitigating impacts, as well as restoration efforts are implemented to ensure the protected areas are conserved.

7.9.1 Diamond Mining

The marine diamond mining industry is dominated by a few major companies, notably Namdeb Holdings (Pty) Ltd (which operates most of the coastal mining areas), De Beers Marine Namibia (Pty) Ltd (which operates in the Atlantic 1 mining licence area offshore of Oranjemund), Samcor, and Diamond Fields International Ltd.

Namdeb Diamond Corporation is the operator for all land-based licences of Namdeb Holdings, and it holds the above long-term mining licences, which include both onshore and offshore (shallow water) mining. With much of the land-based mining having been mined out over the last 100 years, the Namibian government made an official announcement in 2020 that tax relief will be provided for Namdeb's land-based diamond mining operations. In 2020, Namdeb concluded its sale of its Elizabeth Bay mine to Sperrgebiet Diamond Mining.

Namdeb's southern coastal mining area is situated within Mining Licence (ML) No. 43, which stretches from the Orange River to Chameis Bay (about 100km north of Oranjemund). Namdeb's northern coastal mine area consists of discrete operations within mining licences ML-44 (Bogenfels), and ML-46 (Douglas Bay).

Five of the sites are located within existing Exclusive Prospecting Licence (EPL) and ML areas (Figure 7-18). These include:

- ML-44 Namdeb Holdings (Pty) Ltd: Bogenfels (Site D9).
- EPL-6691 Bonya Explorations (Pty) Ltd (Site S5).
- EPL-7659 Elina Nekulu Ndilimeke Elias (Site S3).
- EPL-7084 Elina Nekulu Ndilimeke Elias (Lidar 1, Lidar 1a)

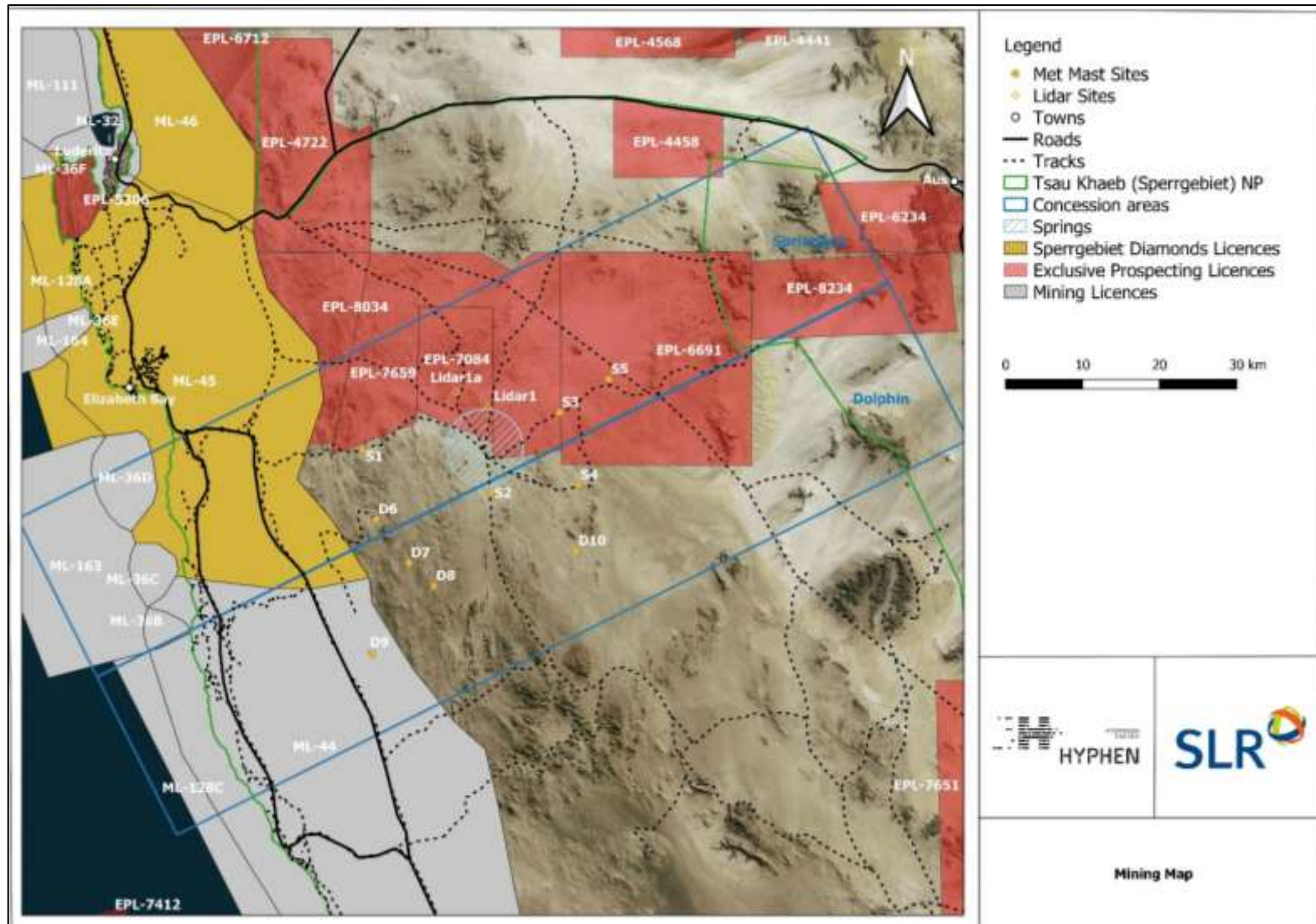


FIGURE 7-18: MINING LICENSES AND EPL AREAS MAP

Source: Namibia Mining Cadastre Map Portal 2022

7.10 TOURISM

7.10.1 Existing Tourism and Recreation in Tsau//Khaeb National Park

Existing tourism and recreation in the TKNP are limited to:

- Guided day visits: Some local operators offer day tours into the TKNP to visit the Roter Kamm meteor crater and Bogenfels Rock Arch (Figure 7-19) and the old Pomona Mining town (www.info-namibia.com).
- There is no accommodation in the park and no person is allowed to overnight for tourism purposes.
- Tourism expansion through opening the area to tourism concessionaires is underway (see Section 7.10.2).

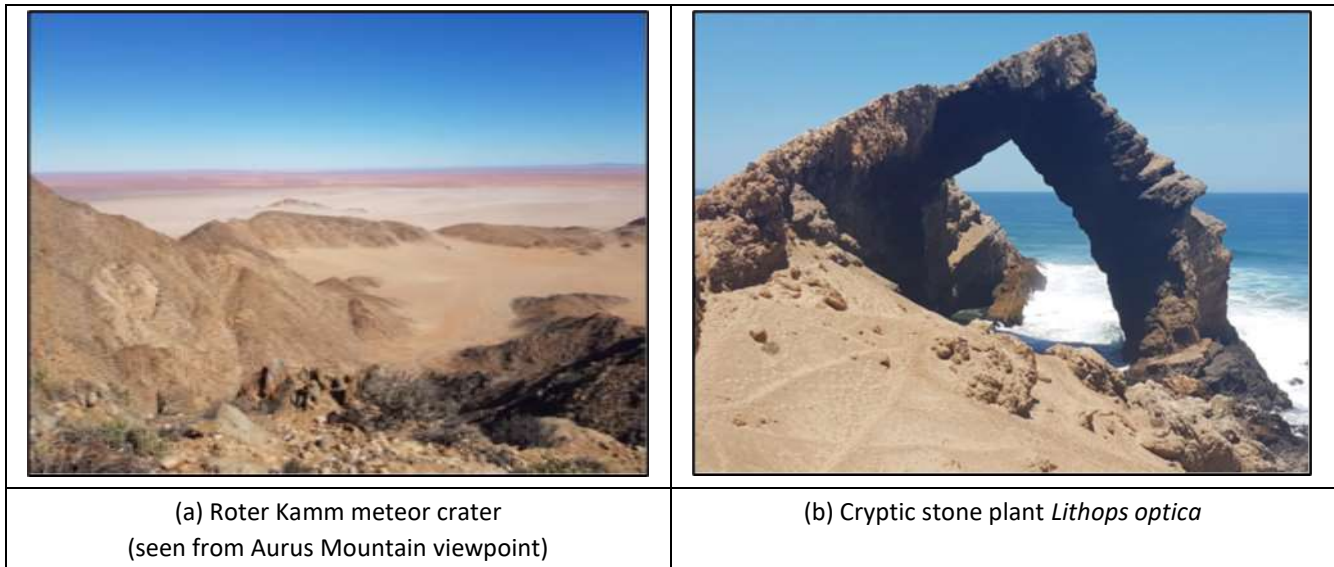


FIGURE 7-19: TOURISM FEATURES IN THE TKNP

7.10.2 Planned Tourism and Recreation in the TKNP

The following key points summarise the vision for tourism in the TKNP:

- **Tourism drawcards:** TKNP is recognised as having high tourism potential for low impact tourist activities to capitalise on its unspoiled wilderness, rare and endemic species, natural landscape monuments (such as Roter Kamm and Bogenfels), seal colonies, historical artefacts and structures, such as the historic or ghost mining towns, a Ramsar Site and river adventures (Orange River).
- **Tourism Development Plan:** MEFT’s 2020 Tourism Plan for the TKNP (MEFT 2020b) provides a framework for tourism development in the Park. The Plan proposes the maintenance of a central low impact “wilderness” area with a range of Tourism Development Areas (TDAs) to be developed in phases around the periphery of the Park. The restricted access, fragile environment, and lack of supporting infrastructure for tourism have led the MEFT to offer very few concessions to tour operators under the ‘Namdeb Special Agreement Arrangement’. It is envisaged that tourism products (attractions, activities, facilities and services) could be developed in each TDA based on the needs and demands of the specific tourism market segment targeted for that TDA.
- **Tourism Development Areas:** Six TDAs have been identified across the TKNP, including: (1) Northern Dunes TDA; (2) Aus-Lüderitz Link TDA; (3) Eastern TDA; (4) Coastal and Mining History TDA; (5) Oranjemund Coastal / Orange River TDA and (6) Southern TDA (Figure 7-20). Within each of these TDAs, a number of

specific concessions have been identified. The following concessions were advertised in April 2021: (1) Northern Sand and Sea; (2) Lüderitz Peninsula; (3) Kolmanskop; (4) Lüderitz Coast & Mining; (5) Game viewing and Roter Kamm; and (6) Orange River. Within these TDAs tourist activities are based on guided activities only (except in the Lüderitz Peninsula which would offer increased accommodation facilities). The only TDA relevant to the proposed met mast and remote sensing project is the Aus-Lüderitz Link TDA which overlaps with four sites: S3, S5, LIDAR1, LIDAR1a (Figure 7-20). The Aus-Lüderitz Link TDA award status is still pending, and the concession length is 12 years. Features of the Aus-Lüderitz Link TDA include: Namib feral horses; Tsakhaib Mountains; the old wagon trail; historic railway houses; views to the north-east of Dikke Willem Mountain; natural springs in the Kuakas River; views from Kaukausib Riverbed picnic site; and multiple game-viewing spring sites.

- **Tourism access:** Potential gateways to the park are envisaged at Lüderitz, Aus, Rosh Pinah and Oranjemund. The plan is to enable tourists to flow around the core wilderness area, with Lüderitz providing an entrance experience largely, but not exclusively, for the overseas tour groups that are part of packaged tours. New access control facilities will include symbolic (unmanned) gates at Swartkop Gate, Sendelingsdrift Gate, Obib Gate, Aus cattle grid Gate, Garub Gate, Rotkuppe and Kolmanskop Gate (MEFT 2020b). It further states that no road or track shall be graded except the Chameis and Rotkuppe Roads, noting that consideration is being given to declaring the Chameis Road a public road in which instance it will be maintained by the Roads Authority.
- **Tourism and security:** To allow for tourism development in the TKNP, MEFT and MME have initiated a process to exclude the area falling outside the Namdeb Mining License Areas in the Park from such security restrictions, as well as to relax certain restrictions for access to certain parts of Namdeb mining license areas for controlled tourism.

7.11 ARCHAEOLOGY AND CULTURAL HERITAGE

The archaeological material present in the TKNP and its adjacent areas in general has in the past been categorised as being from the Early Stone age (ESA, about one million to 200 000 years ago), the Middle Stone Age (MSA, about 200 000 years ago to 40 000 years ago), the Late Stone Age (LSA, about 40 000 years ago to the present) and from the historical period (about 500 years ago to the present).

7.11.1 Overview of the Archaeology and History of the TKNP

Davis and Walsh (1955) drew attention to the existence of ESA material in the diamondiferous raised beaches north of Oranjemund. Rudner and Grattan-Bellew (1964) reported ESA, MSA and LSA material from along the Sperrgebiet coastal region, and Rudner (1968) reported on pottery from the same area. Corvinus (1977, 1983) found ESA, MSA and LSA material between Arriesdrift and Obib on the northern banks of the Orange River, and ESA material on the raised beaches to the north of Oranjemund. Wendt (1972, 1975a, 1975b, 1976, 1978, 1980, 1981) conducted extensive research on the history, rock art, ESA, MSA and LSA of those parts of the south-western Namib lying outside the Sperrgebiet. Cruz-Urbe and Klein (1983) reported on some of the faunal remains of Wendt's excavations, as did Avery (1985). Noli investigated the archaeology of the Koichab River Area to the north of the road between Lüderitz and Aus (Noli 1989), the Sperrgebiet coastline and its boundary with the Orange River (Noli 1995) and the road from Lüderitz to Oranjemund, Sendlingsdrift, Rosh Pinah and Aus (Noli 1988). The summary presented below is based on these sources and the May 2022 site visit.

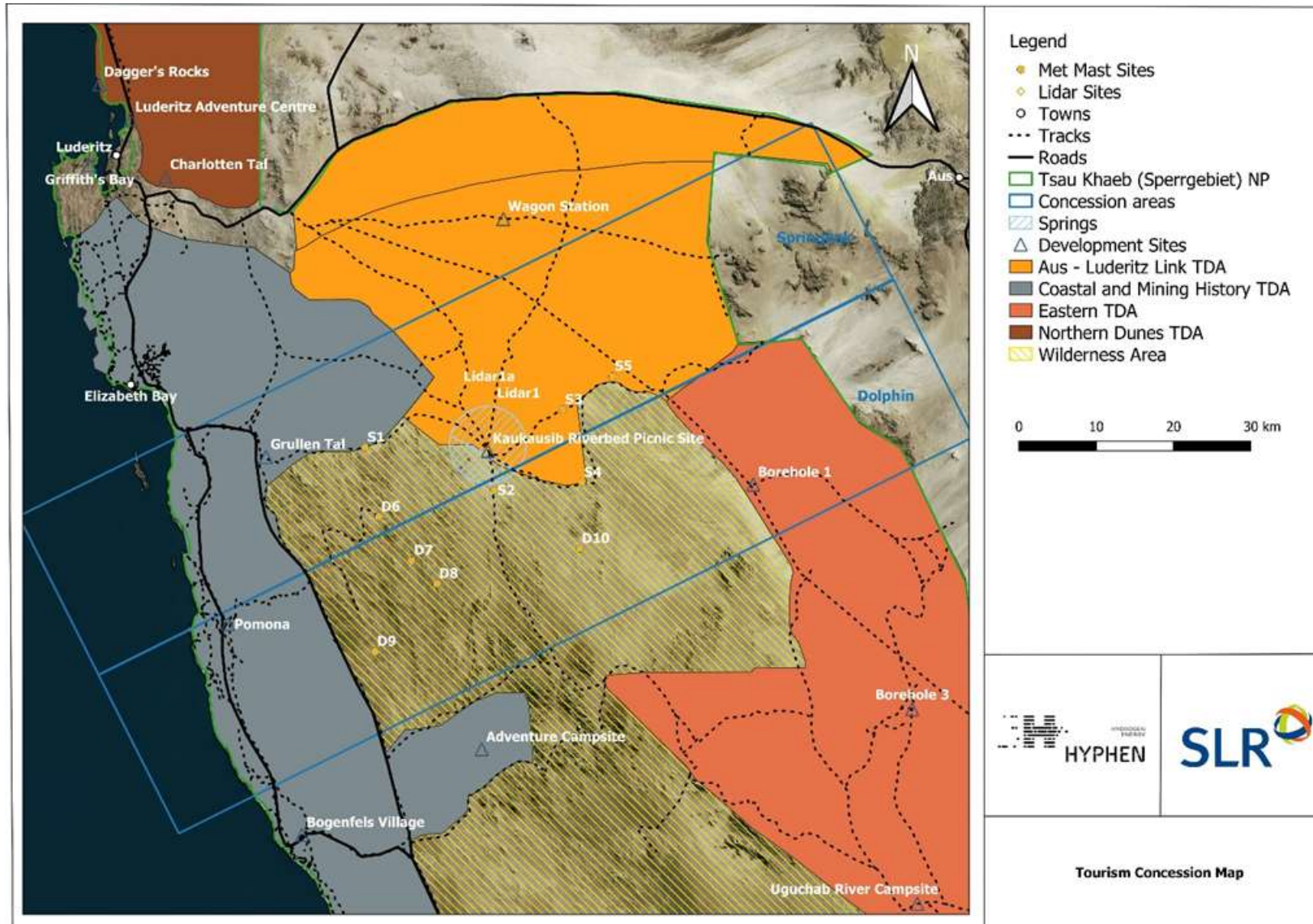


FIGURE 7-20: TOURISM CONCESSION MAP

Source: MEFT 2020b

ESA artefacts such as hand-axes, cleavers, knives, scrapers, discoids, picks, spheroids, choppers, untrimmed flakes and cores made from river cobbles are found on the Proto/Meso-Orange deposits along the Orange River below Sendelingsdrift. These deposits are 50-80m high banks of sand, gravel and stones which were deposited by the Orange River some 17 million years ago, after which the river cut through them, so that they now form bluffs overlooking the river. At one time similar artefacts made from beach cobbles were found on the raised beaches between Oranjemund and Affenruecken, but these sites have now been largely destroyed by mining activities.

The ESA artefacts are from the Acheulian industry, indicating an age of between about one million and 200 000 years. Their distribution suggests that ESA people used the Orange River valley as a route to the coast, and ventured up the coast for some 70 km, but did not penetrate into the interior of the Namib desert. The amounts of cores, flakes, and half-finished tools, as well as numerous cores with pieces which can be re-fitted, indicate that the tools were manufactured along the Orange River. Thus far, however, only one living site has been found, located some 4 km north of the Orange River at Obib. As the mean sea level was lower during much of the ESA than it is today, many other coastal ESA sites could have been submerged, while floods could have destroyed any ESA sites located in the sandy area adjacent to the river. Isolated ESA artefacts have been found away from the coast and from the Orange River, but these are of little significance, as they could easily have been brought in by MSA or LSA people as sources of raw material.

MSA artefacts in the form of blades, points, scrapers, and flakes have been found within about 12 km of the Sperrgebiet coastline, mainly at vantage points (such as the tops of hills) or at present or past water sources (such as springs and dry pans) in presently inhospitable areas. This suggests that conditions may have been slightly wetter than they are at present during at least some of the MSA period. MSA sites are rarely found closer than about 3 km to the coast, a phenomenon that could be attributed to changes in sea level, which may have submerged most coastal MSA sites. As was the case with ESA artefacts, MSA artefacts also occur on the Proto/Meso-Orange River deposits along the Orange River below Sendelingsdrift and may have occurred more numerous next to the river itself before floods destroyed them. In addition, MSA artefacts also occurred on vantage points along the river. Accounts of MSA material being found well away from both the coastline and the river are limited, but both open sites and rock shelters have been reported. The most spectacular rock shelter is the Apollo 11 site, the evidence from which suggested an MSA occupation until about 25 000 years ago. In 1988, Daan Marais found a fossilized human skullcap near Oranjemund, which is thought to be from the MSA.

The LSA is generally believed to have lasted from about 40 000 years ago to the present. In addition to stone tools, such as flakes, cores, microliths (stone tools smaller than 5cm in length) and grindstones, it includes ostrich eggshell water containers, ostrich eggshell beads, seabird eggshell, seashells, bone, pottery, glass, metal, charcoal, and wood. The lower Orange River, being both a water source and a natural route to the interior, is rich in LSA sites, which are concentrated in the sandy area lying between the river and the Proto/Meso-Orange deposits. The LSA inhabitants of the area, like the MSA people before them, made extensive use of open sites, but did not hesitate to use rock shelters when these were conveniently located. The coastal evidence suggests that sites with formal microlithic tools may date to between 5 600 and about 2 400 years ago, whereas evidence from the interior suggests that microliths may have been introduced about 10 000 years ago. Pottery is generally taken as having been introduced into southern Africa about 2 000 years ago. With three exceptions, however, all dated sites with pottery in southern Namibia are from the last 500 years, so that pottery sites can generally be taken as being both free of microliths and being only about 500 years old in the south-western Namib. Stone

circles and graves, though rarely directly dated, are generally attributed to the LSA. LSA people probably only entered the Namib Desert after good rains, never permanently or even on a regular basis.

Both painted and engraved rock art exists in the area. A painted rock slab from the Apollo 11 cave has been reliably dated to 28 000 years, but the age of the rest of the art, as well as the identity of the artists, is still very much under discussion. According to Wendt (1978), however, the heavily patinated naturalistic engravings of both humans and animals should be attributed to “Bushmen” and may be about 6 000 or 8 000 years old. The abstract engravings should, on the other hand, be attributed to the Nama of Bethanien, which means that they were only made during the last 500 years.

The end of the LSA coexisted with the beginning of historic times. It would seem that hunting and gathering Nama in possession of ceramics entered the southern Namib some 500 years ago, either displacing or absorbing the remnants of the original population. These Nama may have been the “Bushmen” referred to by the early travellers. Who the original inhabitants were is not known, but small groups of Damaras lived at least as far south as the 26 degrees south prior to the 19th century. During the course of the 19th century both the “Bushmen” and the Damara were displaced, enslaved or exterminated by various waves of nomadic Nama herders, who had first crossed the Orange River from the south in the 17th century. The Nama herders were in turn subjugated by the German colonial forces. In 1931, the Lüderitz police rounded up the last two groups of free-roaming hunter-gatherers of the south-western Namib in the vicinity of the Aurus Mountains. The adults were variously charged with trespassing in the diamond area, having unlicensed dogs and weapons, and the possession of klippspringer and gemsbok skins and gemsbok meat, and were jailed for up to five months. Once their survival strategies had been curtailed, the Namib nomads ceased to exist.

The legacy left by the Namib nomads is not only made up of the archaeological record, but also of an intricate system of roads and tracks. The reason for this is that the first Germans used the last Bushmen as guides. As these Germans were either travelling on foot, or on horseback, or with ox wagons, they were very reliant on the ready availability of water en route. It follows that the Bushmen would have guided the colonials along the best routes with the best water sources. These routes, dutifully mapped by the Germans, eventually became paths, tracks, and dirt roads, still leading past the water sources, which often became the locations of the farmhouses, or even of towns. Inside the Sperrgebiet, where many of the German tracks fell into disuse after WWI, and where the Bushmen no longer roam, the old routes have now completely disappeared. They can, however, still be followed by the simple expedient of using German maps pre-dating WWI, especially the 1:100 000 series prepared by Sprigade and Lotz (1913). These maps not only show the routes with great accuracy, but also indicate the waterholes. Along these routes and at the waterholes, German artefacts can be found, and archaeological sites abound.

The German and subsequent mining activities, which commenced in 1908 with the discovery of diamonds in the vicinity of Kolmanskop, have also left substantial amounts of traces in the Sperrgebiet. These, however, are mainly limited to a narrow coastal strip some 16 km wide, most of the earlier activity having taken place between Lüderitz in the north and Bogenfels in the south. The remains are largely in the form of four major ghost towns (Kolmanskop, Elisabeth Bay, Pomona, and Bogenfels), ruined diamond plants, abandoned diamond workings, disused narrow gauge railway lines and derelict mining equipment. Due to the proximity of the sea, the moisture from the fogs and the strong winds, these historical remains are rapidly deteriorating. Some of the houses (one or two in each of the ghost towns) have been restored and are being maintained, but these represent the minority.

While the modern mining period – which started in the late 1920’s with the discovery of diamonds in the vicinity of the Orange River mouth – was initially limited to the coastal strip between Chamais in the north and Oranjemund in the south, this is no longer the case. Mining at Elizabeth Bay and pocket beaches, the workings along the Orange River itself and the efforts of land and sea-based subcontractors have ensured that the entire coastline of the Sperrgebiet, as well as the adjacent banks of the Orange River, have been subjected to extensive mining and prospecting activities. As a result, old fuel drums, oil stains, plastic, wrecked cars and abandoned earth moving equipment remain in the area.

7.11.2 Sites identified in the TKNP during the site visit

A total of 28 new sites and one previously known site were located during the May 2022 site survey. These included ten with historic material, two with ESA artefacts, 13 with MSA artefacts, 12 with LSA artefacts, eight with ostrich eggshell fragments, one with decorated ostrich eggshell fragments, one with ostrich eggshell beads, two with land snail, four with grindstones, nine with rock shelters, one with pottery and one with charcoal artefacts. Refer to Figure 7-21 and Figure 7-22 for some of the photographs of the archaeological finds from the site visit.

7.11.2.1 Historic Sites and Mining Equipment

The ten sites with historic material did not contain any evidence related to mining equipment. The material largely consisted of the remains of glass bottles and tins, the only exceptions being the remains of an iron cooking pot and a stone beacon, as well as some iron piping at Kaukausib Spring. This indicated that colonial Germans had travelled through the area, rather than taken up any form of permanent residence or conducted any economic activity. Only the open site near Kaukausib Spring – by means of the amount of glass and tins - showed any sign of extensive use by colonials, even if the fountain itself would have been used at the time.

Of the eight sites containing glass, five contained bottles, two of which were solitary finds. Four of the sites with glass were associated with LSA material. In one case the glass had been reworked in the manner of a stone tool. This suggests that the glass “rubbish” of the colonials may well have been collected and reused by LSA people – both as containers and as raw materials for making cutting tools – thereby being spread to sites which may now contain historic material, but which only frequented by LSA people.

7.11.2.2 Early Stone Age Sites

Neither of the two sites identified containing ESA material were very convincing. The one contained only three crude ESA tools which included a hand axe, while the other contained only part of a hand axe. In both cases they could easily have been brought to the sites concerned by MSA or LSA people who merely intended to re-use them for raw material.

7.11.2.3 Middle Stone Age Sites

The 13 sites with MSA artefacts were associated with solitary finds, quartz outcrops, rock shelters, vantage points, LSA sites and a water source. They were mainly characterised by stone blades about 7 cm long. Some were also associated with ostrich eggshell fragments, but this may have been due to later layering by LSA people, who in many cases were attracted to the same sites.







	
<p>(a) Site 4. Artefacts from an open site on a quartz outcrop near D9, showing a perfect MSA blade on quartz. The site also contained various edged pieces, as well as some ostrich eggshell.</p>	<p>(b) Site 6. Artefacts from an open ESA site on a quartz outcrop South of S1, showing a crude discoid, a crude blade and a crude hand axe, all on quartz. This was the only ESA site found in the study area.</p>
	
<p>(c) Site 13: A perfect blade and a flake on translucent quartz from an open MSA site which forms a viewpoint to the west at Muenzenberg,</p>	<p>(d) Site 13: A set of MSA blades from a very dense open site at Muenzenberg, with a viewpoint to the West</p>
	
<p>(e) Site 14: A perfect LSA blade from a rock shelter at Muenzenberg, which also contained a lower grindstone, ostrich eggshell and burnt ostrich eggshell.</p>	<p>(f) Site 17: A perfect backed microlith on crystal quartz from an MSA/LSA cave site at Muenzenberg. which also contained ostrich eggshell and an MSA blade, chunks and flakes on quartz.</p>

FIGURE 7-21: PHOTOGRAPHS OF ARCHAEOLOGICAL FINDS IN THE STUDY AREA

Source: Noli 2022







	
<p>(g) Site 21: Part of a large open site 1.2 km south-east of Kaukausib Spring. An LSA core, two flakes and two formal microliths (one bladelet and one scraper) on CCS.</p>	<p>(h) Site 22. Part of a large open site 1. 2 km south-east of Kaukausib Spring. Five MSA flakes on a quartzite river cobble.</p>
	
<p>(i) Site 24. Part of a large open site 1.2 km south-east of Kaukausib Spring. This is an LSA open site with pottery, worked old glass and an upper grindstone.</p>	<p>(j) Site 25. Part of a large open site 1.2 km south-east of Kaukausib Spring. This is an LSA site with a hammer stone which clearly shows impact marks. It also contained an old German bottle.</p>
	
<p>(k) Site 29. This a view out cave at Paviansberg looking in an Easterly direction towards Kaukausib spring, some 9.46 km away. The cave is 5m deep, 7m wide and high enough so that one can stand in the entrance and kneel in the interior.</p>	<p>(l) Site 29. This is a collection of artefacts from the surface inside the cave at Paviansberg. It includes an MSA blade on translucent quartz, flakes on quartz, chert and CCS, an LSA microlith on crystal quartz, charcoal, both decorated and undecorated burnt and unburnt ostrich eggshell, as well as a finished ostrich eggshell bead.</p>

FIGURE 7-22: PHOTOGRAPHS OF ARCHAEOLOGICAL FINDS IN THE STUDY AREA

Source: Noli 2022

7.11.2.4 Late Stone Age Sites

The 12 sites with LSA material were largely associated with rock shelters, MSA material, historic material and a water source. Being of a more recent nature, the LSA material was generally in a better state of preservation than that from the ESA or the MSA. This was why, in addition to roughly 5 cm long stone tools (mainly flakes), 10 cm long upper grindstones and about 30 cm long lower grindstones, LSA sites also contained ostrich eggshell fragments and in one case decorated ostrich eggshell and ostrich eggshell beads. In addition, a more recent LSA site contained pottery, while those from the colonial period also contained glass and metal.

7.11.2.5 Rock Shelters and Rock Art

Nine rock shelters were identified during the site visit, including: one at Jagdkuppen, three at Muenzenberg, three at Teufelskuppe, one south-east of Teufelskuppe and one at Paviansberg. The shelter at Paviansberg is the most spectacular, possibly due to its location in the drainage basin of the Kaukausib River, with access to both the permanent water source at Kaukausib Spring and the access route along the river from the interior to the coast. It had a wealth of MSA and LSA material located both inside and on the slope below it. The artefacts included decorated and burnt ostrich eggshell, ostrich eggshell beads, lower and upper grindstones, blades, flakes and charcoal.

No rock art was found in the Project area during the site visit.

7.11.2.6 Historic and Indigenous Graves

No historic or indigenous graves were found in the Project area during the site visit.

7.11.3 Regional Archaeological Implications

In general, the archaeological discoveries made during the site visit fit into the general pattern, which has to date been established for the region. Previous research confirmed that the ESA, MSA and LSA inhabitants used the Orange River valley as a linear oasis to get to the coast, from where they roamed northwards to varying degrees, exploiting coastal resources such as shellfish, seals and beached whales.

The indications are, however, that, with the possible exception of a part of the MSA, the interior of the Sperrgebiet was travelled through, rather than lived in. This certainly seems to have been confirmed by the current survey, which revealed what can only be described as a profound dearth of archaeological sites in the open terrain of the research area – the occasional find of MSA artefacts notwithstanding.

It was also confirmed that the ESA is generally represented by stone tools such as hand-axes, the MSA by stone tools such as blades and points, and the LSA by stone tools such as flakes and grindstones. In addition, it was confirmed that the LSA is also at times represented by ostrich eggshell fragments, ostrich eggshell beads, pottery, metal and glass. It was furthermore confirmed that the location of sites is generally determined by the availability of strategic resources such as permanent water, by shelter such as caves, and by the proximity of good routes through challenging terrain.

7.11.4 Specific Archaeological Implications

While the dearth of archaeological sites has been established, it has also been established that such material is largely limited to Inselbergs and caves. While the archaeological sites within the study area may be few, several of those which do exist are of special scientific interest due to the unique setting in which they find themselves.

8 IDENTIFICATION AND DESCRIPTION OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

This chapter provides a high-level screening of the interaction between the Project activities and the receiving environment. It also presents a Project-specific Aspects and Impacts Register, which was developed, and subject to stakeholder review, to ensure that all environmental and social aspects of the proposed Project and the associated impacts were identified.

Lastly, this chapter presents the key impacts identified by the EIA project team and the associated specialist studies identified to assess these impacts and their associated terms of reference.

8.1 ENVIRONMENTAL AND SOCIAL INTERACTION MATRIX

Project activities listed in Chapter 6 have been grouped into sub-groups where impacts are similar and expected to affect the same environmental features as a basis for assessing their potential interactions with biophysical, ecological and social receptors. The environmental and social interaction matrix prepared for the proposed Project is presented in Table 8-1.

The Matrix provides a list of the Project activities and allows for easy checking of interaction against components of the receiving environment. Each box denotes whether or not a proposed Project activity will interact with the corresponding environmental or socio-economic receptor. Interactions are screened to have a “*minor negative interaction*”, “*moderate / major negative interaction*” or “*positive interaction*” on the receptor.

Section 8.4 screens out of impacts of little magnitude (consequence), or are already covered by Project controls, or where an issue does not warrant a full description and assessment of significance.

8.2 ASPECTS AND IMPACTS REGISTER

The Project-specific Aspects and Impacts Register developed for the proposed Project is presented in Table 8-2. It is prepared to further elaborate the impacts identified through the initial screening for potential interactions described above. For each of the Project activities, different aspects² associated with the activity and their potential impacts³ are tabulated. This systematic approach allowed for the planning of the scope of the specialist studies.

It is evident from the Aspects and Impact Register prepared that the majority of the potential impacts for this Project are related to the construction phase.

² An “aspect” is the element of an organisation’s activities, products or services that can interact with the environment.

³ An “impact” is any change to the environment, whether adverse or beneficial, wholly or partially resulting from the organisation’s activities, products or services.

TABLE 8-1: ENVIRONMENTAL AND SOCIAL INTERACTION MATRIX

Project Phase	Project activity	Sensitive receptors in the receiving environment																
		Physical						Biological			Socio-economic							
		Topography	Soils	Land capability	Surface Water	Groundwater	Air Quality and Noise	Vegetation	Terrestrial fauna	Avifauna	Land use	Heritage / Palaeontology Resources	Visual	Traffic	Public Health and Safety	Infrastructure and Services	Settlements, Tourism and	Employment and Income
1. Construction Phase	Establishment of new tracks and transport of materials to site																	
	Establishment of site camp, including possible fencing																	
	Site preparation, clearing and earthworks																	
	Interaction with the local economy, including economic opportunities, use of local services, construction staff, etc.																	
2. Operation Phase	Presence of met masts and support wires																	
	Maintenance activities																	
3. Decommissioning Phase	Removal of site camp and infrastructure																	

TABLE 8-2: ASPECTS AND IMPACTS REGISTER

Activity Phase	Activity	Aspect	Potential Impact	
1. Construction Phase	Establishment of new tracks and transport of materials to site	Removal and disturbance of vegetation and soil	Loss floral habitat and diversity due to clearing and disturbance	
			Loss or alteration faunal / avifauna habitat	
			Disturbance and / or mortality of fauna and avifauna	
			Disturbance, damage and / or loss of cultural resources, artefacts, graves, burial sites, etc.	
			Introduction of invasive alien plants	
			Disturbance, damage and / or loss of palaeontological resources	
			Increased traffic volume	Local reduction in air quality (atmospheric pollution) due to wind erosion and dust
			Waste generation / management and hydrocarbon spills due to storage of hazardous substances, refuelling and maintenance activities	Pollution of ground and surface water
			Alter visual, cultural, social and environmental qualities and characteristics of the site	Soil contamination
	Establishment of site camp, including possible fencing	Removal and disturbance of vegetation and soil	Altered sense of place / cultural landscape - visual (presence of contractors, tracks, etc.)	
			Loss floral habitat and diversity due to clearing and disturbance	
			Loss or alteration faunal / avifauna habitat	
			Disturbance and / or mortality of fauna and avifauna	
			Introduction of invasive alien plants	
			Disturbance, damage and / or loss of cultural resources, artefacts, graves, burial sites, etc.	
			Disturbance, damage and / or loss of palaeontological resources	
			Waste generation / management and hydrocarbon spills due to storage of hazardous substances, refuelling and maintenance activities	Pollution of ground and surface water
			Alter visual, cultural, social and environmental qualities and characteristics of the site	Soil contamination
Site preparation, clearing and earthworks	Removal and disturbance of vegetation and soil	Increased food source for fauna and avifauna		
		Altered sense of place / cultural landscape - noise, lighting, visual, etc.		
		Loss floral habitat and diversity due to clearing and disturbance		
		Loss or alteration faunal / avifauna habitat		
		Disturbance and / or mortality of fauna and avifauna		
		Introduction of invasive alien plants		
		Disturbance, damage and / or loss of cultural resources, artefacts, graves, burial sites, etc.		
		Disturbance, damage and / or loss of palaeontological resources		
		Alter visual, cultural, social and environmental qualities and characteristics of the site	Altered sense of place / cultural landscape - visual	
Concrete pours and batching	Soil contamination and effect on faunal health or mortality			
Interaction with local economy	Jobs and business opportunities	Income and employment of local service providers and suppliers		
2. Operation Phase	Presence of met masts and support wires	Alter visual, cultural, social and environmental qualities and characteristics of the site	Avifauna mortality due to collisions with met masts and support wires	
			Altered sense of place / cultural landscape - visual	
			Reduced civil aviation safety due to the obstruction met masts create on the landscape	
			Exclusion of mining activities	
	Operation of LIDAR	Alter visual, cultural, social and environmental qualities and characteristics of the site	Injuries to traversing birds due to laser light pulses	
	Maintenance activities	Waste generation / management and hydrocarbon spills due to storage of hazardous substances, refuelling and maintenance activities	Pollution of ground and surface water	
Soil contamination				
3. Demobilisation Phase	Removal of infrastructure	Alter visual, cultural, social and environmental qualities and characteristics of the site, and increased traffic	Increased food source for fauna and avifauna	
			Disturbance and / or mortality of fauna and avifauna	
			Local reduction in air quality (atmospheric pollution) due to wind erosion and dust	
			Altered sense of place / cultural landscape - visual (presence of contractors, etc.)	
	Jobs and business opportunities	Income and employment of local service providers and suppliers		

8.3 KEY POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS AND ASSOCIATED SPECIALIST STUDIES

The key potential impacts related to the proposed Project, and associated specialist studies, are listed below. Other minor impacts are screen in Section 8.4.

8.3.1 Potential Impact on Terrestrial Ecology

The proposed activities could result in the following potential avifaunal impacts:

- Loss of vegetation and associated biota due to construction of met mast and access tracks, and associated work force.
- Disturbance of wildlife due to traffic near Kaukausib spring during construction and maintenance activities.
- Introduction of invasive alien plants associated with construction activities.

How this issue has been addressed in the EIA:

A terrestrial ecology assessment was commissioned to assess the potential impacts on flora and terrestrial fauna. The terms of reference for this assessment were as follows:

- Provide a general description of the flora for the Tsau//Khaeb National Park (Sperrgebiet) (as applicable), based on current available literature and expert knowledge.
- Describe the terrestrial habitats and species that are likely to be affected by the proposed remote sensing activities and met mast infrastructure.
- Identify sensitive habitats and species that may be potentially affected by the remote sensing activities and met mast infrastructure. This shall include species/habitat global and national status.
- Identify, describe, and assess the significance of potential impacts of the proposed activities on the local terrestrial flora and associated habitats.
- Identify practicable mitigation measures to reduce the significance of any negative impacts and indicate how these can be implemented during the execution of the activities.

Impacts on vegetation and terrestrial fauna are assessed in Sections 9.2 and 9.3.

8.3.2 Potential Impact on Avifauna

The proposed activities could result in the following potential avifaunal impacts:

- Bird habitat alteration / loss due to (a) establishment of new tracks to met mast / LIDAR sites, and (b) erection of met masts and placement of LIDAR infrastructure
- Changes in bird behaviour (disturbance) due to (a) vehicle use of access track network, (b) site clearance, erection of met masts and placement of LIDAR equipment activities, (c) establishment and removal of temporary site camps and (d) maintenance activities.
- Bird injury / mortality due to soil contamination and waste pollution during construction.
- Bird collision mortality, injury and changes in behaviour (e.g., flight path choice) due to the presence of met masts and guy wires.
- Injuries to traversing birds due to laser light pulses being emitted by LIDAR sensors.

How this issue has been addressed in the EIA:

An avifaunal assessment was commissioned to assess the potential impacts on avifauna. The terms of reference for this assessment are presented below:

- Provide a general description of the avifaunal diversity, abundance, and distribution for the TKNP (as applicable), based on current available literature.
- Describe the avifaunal habitats that are likely to be affected by the proposed remote sensing activities and met mast infrastructure.
- Identify sensitive habitats and priority species in the broader Project area that may be potentially affected by met mast infrastructure, its erection and management and the proposed remote sensing activities.
- Describe seasonal and migratory occurrences of key avifauna. Where applicable.
- Identify, describe, and assess the significance of potential impacts of the proposed met mast and LIDAR infrastructure and related activities on the known and suspected avifauna and associated habitats in the Project area.
- Identify practicable mitigation measures to reduce the significance of any negative impacts and indicate how these can be implemented during the execution of the activities.

Impacts on avifauna are assessed in Sections 9.2 and 9.3.

8.3.3 Potential Impact on Archaeological Resources

Construction activities, including the establishment of new access tracks and the erection of met masts could result in the disturbance, damage or loss of cultural / archaeological resources, artefacts, graves, burial sites, etc.

How this issue has been addressed in the EIA:

An archaeological assessment was commissioned to assess the potential impacts on archaeological/heritage sites. The terms of reference for this assessment were as follows:

- Provide a general description of the archaeological/heritage sites reported in the TKNP (as applicable), based on current available literature.
- Provide predictions on the distribution, density, and potential significance of archaeological sites within the Project area.
- Determine and assess potential impacts posed by the Project on archaeological/heritage and palaeontological sites.
- Identify practicable mitigation measures to reduce the significance of any negative impacts and indicate how these can be implemented during the execution of the activities.

Impacts on archaeology are assessed in Section 9.2.1.3.

8.4 SCREENING OUT OF INSIGNIFICANT IMPACTS

Table 8-3 provides for the screening out of impacts of little magnitude (consequence) where a linkage was identified in the interaction matrix, or are already covered by Project controls, or where an issue does not warrant a full description and assessment of significance.

TABLE 8-3: SCREENING OUT OF INSIGNIFICANT IMPACTS

No.	Potential Impact	Reason Screened Out	Management/Mitigation
1	Construction and Decommissioning Phases		
1.1	Exclusion of mining activities	Only Site D9 overlaps with a mining right area (namely ML 44), which is held by Namdeb. Namdeb has been consulted during the EIA process and it has not indicated that there will be any disturbance or disruption to any current or future mining activities. NO IMPACT is anticipated.	Notify Namdeb prior to accessing Site D9 and indicate location and duration of construction in that area
1.2	Impact on sense of place and tourism	Construction activities for met mast erection is likely to take in the order of three weeks per site. Since the met mast and LIDAR sites and access roads are generally located away from any tourist areas and there are very restricted numbers of tourists entering the TKNP, this impact is not assessed further. Any potential impact is considered to be INSIGNIFICANT.	None required
1.3	Income and employment of local service providers and suppliers	The proposed Project will result in limited short-term employment opportunities. No new jobs will be created.	Stakeholder engagement to manage community expectations
2	Operation Phase		
2.1	Impact on aviation operations	The met masts will be up to 122 m high and will be equipped with an aviation (obstacle) lighting and visibility markers. Since they are located in an isolated area well away from any aviation activities this impact is not considered further. In addition, the Namibian Civil Aviation Authority has confirmed that apart from the Lüderitz aerodrome, there are no private airstrips or other aerodromes within the vicinity of the proposed met masts. NO IMPACT is anticipated. SLR has submitted an application form to NCAA for the erection of a temporary structure (FSS AGA FORM 33). Hyphen will comply with any recommendations made by the NCAA. A copy of the NCAA decision will be provided to MEFT.	Comply with any measures specified by NCAA
2.2	Exclusion of mining activities	Only Site D9 overlaps with a mining right area (namely ML 44), which is held by Namdeb. Namdeb has been consulted during the EIA process and it has not indicated that there will be any disturbance or disruption to any current or future mining activities. NO IMPACT is anticipated.	Notify MEFT (DWNP) and relative mining companies prior to accessing the TKNP and indicate location and duration of visit
2.3	Income and employment of local service providers and suppliers	The proposed Project will result in limited medium-term employment opportunities during maintenance. No new jobs will be created.	Stakeholder engagement to manage community expectations

9 IMPACT ASSESSMENT

9.1 INTRODUCTION

This chapter describes and assesses the significance of potential impacts related to the proposed met mast and remote sensing project and provides a description of the identified interactions between the Project activities and the receiving environment. This chapter only assesses those potential impacts that required further assessment (as identified in Chapter 8). The assessment of impacts is structured as follows:

- Section 9.2: Construction Phase:
 - Establishment of new tracks and erection of met masts and LIDAR.
 - Increased traffic volume and construction workforce and activities.
 - Generation of waste and hydrocarbon spills.
- Section 9.3: Operation Phase:
 - Presence and operation of met masts and LIDAR.
 - Increased traffic volume and presence of staff.
 - Generation of waste and hydrocarbon spills.
- Section 9.4: Cumulative Impact
- Section 9.5: No-Go Alternative

The methodology used to determine the significance of potential impacts is presented in Appendix 4. This method complies with the EIA Regulations 2012.

The application of the Mitigation Hierarchy is central to the impact assessment that was used. The identification of enhancement measures was considered in parallel to the identification of mitigation measures. Management and mitigation measures to address the potential impacts are discussed in this section and are included in more detail in the EMP (refer to Appendix 4).

9.2 CONSTRUCTION PHASE

9.2.1 Establishment of New Tracks and Erection of Met Masts and LIDAR

9.2.1.1 Loss of vegetation and associated fauna due to the clearance and disturbance of vegetation and soil

Potential Impact Description

New tracks were created in the Project area during the May and July 2022 field surveys. Minor clearing or grading is, however, still required along certain sections where the sand will be pushed to the side of the track. In addition, the met masts and LIDAR sites will need to be cleared and levelled and temporary lay-down areas are required for interim storage of the mast components during construction. This will result in the loss of vegetation, particularly of perennial vegetation, which provides an important habitat and food source for animals (**direct negative** impact). In addition, construction vehicles and activities will compact soils and alter the surface water flow and vegetation characteristics, as well as generate dust, which could lead to increased dust on plants in adjacent habitats and possible effects on metabolic processes (**indirect negative** impact).

Project Controls

The potential impact vegetation and terrestrial fauna as a result of vegetation removal and disturbance has been mitigated by the careful siting of met mast sites and access routes to avoid sensitive areas. All met mast sites were selected so as to avoid areas of very high biodiversity (as defined by the TKNP Management Plan), as well

as avoiding highly sensitive habitats such as on ridges, inselbergs and springs. The access tracks were also amended, in consultation with the specialists and MEFT, to avoid various sensitive areas, including the Kaukausib spring area. The final proposed access route network is presented in Figure 6-10.

Sensitivity of Receptors

The vegetation of the TKNP forms the northernmost portion of the Succulent Karoo Biome, which is of international conservation importance. The Project area is currently in a largely undisturbed and pristine state, which provides a sanctuary for a host of plant and animal species, including those that are adapted to the harsh arid and windy conditions that prevail. Some of these plant and animal species are restricted to these desert habitats and, therefore, have a narrow distribution range, and are thus sensitive to disturbance (e.g., gravel plains). The overall sensitivity of the vegetation and faunal habitat is considered to be **high**.

Impact Assessment

Approximately 93 km (62%) of the access track network (~150 km) consists of new tracks that were created during the May 2022 field survey and a subsequent survey in July 2022. Gravel plains, which are more prevalent in the northern half of the broader Project area, are particularly sensitive to long-term access track damage, and track scars (and associated microhabitat changes) are likely to persist for several years if not for decades. Sandy terrain is able to recover more readily, with wind-blown sand covering track scars relatively quickly and thus aiding a natural rehabilitation process. Access tracks between sites S1, L1a, L1 and S3 are therefore more likely to have more long-term impacts.

In addition, an estimated total of 0.63 ha of land will be impacted at each met mast site from clearance of vegetation or disturbance:

- Laydown area: A laydown area (20 m x 40 m) for the mast structure will be required at each site, resulting in a disturbance footprint of 800 m² per mast site.
- Foundation excavation: The total disturbed area during met mast construction is 6.26 m² (2.5 m x 2.5 m).
- Ground anchor excavation: Twelve holes will be excavated for ground anchors with a surface disturbance footprint of approximately 4 m² at each met mast site.
- Guy wire spread: In addition to physical site clearance described above, there may be additional disturbance within the footprint of each guy wire spread from vehicle movement and from trampling by workforce activities contributing another approximately 0.55 ha of disturbance (although this does not necessarily mean that the habitat within the guy wire spread is damaged or lost and may well continue to be used by most bird species).

The disturbance footprint at each LIDAR site is less than that for the met masts with the equipment occupying an area of only approximately 1 m² per site.

Met mast sites D6-D10, S4 and S5 in sandy habitats, while sites S1-S3, LIDAR1 and LIDAR1a are located in gravel plain habitats. Of the sandy habitat sites, only S5 was confirmed to have a plant species of conservation concern, the near-threatened *Zygophyllum applanatum*, which is not endemic to the Sperrgebiet. Of the gravel plain sites, the restricted range and threatened *Polemmaniopsis namibiensis* was confirmed in close proximity to sites S1-S3, LIDAR1 and LIDAR1a, where they could be affected by construction activities if they extend beyond the areas assessed during fieldwork. Construction activities in sandy sites are likely to recover more quickly due to windblow sand, while activities in gravel plains have longer lasting impacts, primarily through creation of access tracks which compact soils and alter the surface water flow and vegetation characteristics.

The **intensity** of the potential impact on vegetation due to construction activities is expected to be **medium**. The extent of impact is **local**, while the duration will be **long-term** (as any disturbance to gravel plains are likely to persist for several years if not for decades). Thus, the **magnitude** is considered to be **medium**. Based on the **high sensitivity** of receptors and the **medium magnitude**, the potential impact on vegetation and terrestrial fauna is considered to be of **medium significance** without mitigation (Table 9-1).

Mitigation Measures

In addition to the siting of sites and changes made to the access route network, the following measures will be implemented:

No.	Mitigation measure	Classification
1	Avoid the creation of additional new tracks by ensuring the final agreed access routes are adhered to all times.	Avoid
2	If any amendments are required to the final met mast locations or access routes, undertake a ground survey (by a terrestrial ecologist or MEFT: TKNP official) of the new site / route and obtain formal agreement with MEFT (TKNP official). This excludes any micro-siting to accommodate avoiding any identified <i>Zygophyllum applanatum</i> and <i>Polemanniopsis namibensis</i> (see Bullet 6 and 7 below).	Avoid / Abate at source
3	Minimise clearing and levelling of vegetation during track 'upgrading' – i.e. clearly demarcate areas where machinery can move, turn-around, overtake and park.	Abate on site
4	Minimise construction footprint within the final guy wire spread. Where this is not possible, demarcate (with stakes) the working footprint, including laydown area, turning circle, etc., in consultation with an Environmental Control Officer (ECO) or terrestrial ecologist.	Avoid / Abate at source
5	Minimise clearing and levelling of areas (e.g., where possible leave vegetation in place at lay-down areas and store components temporarily on top of vegetation in this way the vegetation will be damaged above-ground but has a chance to recover from below-ground root stocks).	Abate on site
6	Position the mast and anchors and lay-down areas to avoid <i>Zygophyllum applanatum</i> dwarf shrubs at S5. Mark plant locations to ensure construction activities avoid these plants.	Avoid / Abate on site
7	Position the mast and anchors and lay-down areas to avoid <i>Polemanniopsis namibensis</i> at S1, S2, S3, LIDAR1 and LIDAR1a (note: although no plants were encountered at the sites assessed, any changes in position (or necessary deviations from access tracks) need to avoid impacting these plants). Mark plant locations to ensure construction activities avoid these plants.	Avoid / Abate on site
8	Rehabilitate disturbed areas and remove tracks using, as a minimum, the roller paint brush "brooming" method after decommissioning, especially on terrain where tracks are unlikely to naturally restore, e.g., gravel plains. This applies to any accidental disturbance (e.g., from two-way traffic along an access route or during infrastructure assembly / installation).	Repair / Restore

Residual Impact Assessment

This potential impact cannot be eliminated as tracks will need to be created and masts erected, which will result in vegetation clearance and disturbance. The implementation of the mitigation measures and if all construction activities are within defined footprints and do not extend into areas with *Polemanniopsis namibiensis* would lower the intensity and magnitude of the impact. Thus, the residual impact would reduce to **LOW significance** (Table 9-1).

TABLE 9-1: IMPACT ON VEGETATION AND ASSOCIATE BIOTA DUE TO MET MAST CONSTRUCTION IN SANDY AND GRAVEL PLAIN HABITATS

Project Phase:	Construction	
Type of Impact	Direct	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	MEDIUM	LOW
Intensity	Medium	Low
Extent	Local	Local
Duration	Long-Term	Long-Term
Significance	MEDIUM	LOW
Probability	DEFINITE	DEFINITE
Confidence	HIGH	HIGH

9.2.1.2 Loss of or disturbance to avifauna habitat due to the clearance and disturbance of vegetation and associated work force

Potential Impact Description

The construction of new access tracks and erection of met masts and LIDAR equipment will result in the loss of or disturbance to avifauna habitat and may cause the loss of roosting, foraging and/or breeding habitat to priority bird species (**direct negative** impact).

Project Controls

The access track network was amended based in order to avoid various sensitive areas, including the Kaukausib spring area (Figure 6-13). The final proposed access route network is presented in Figure 6-10.

Sensitivity of Receptors

Due to the harsh climatic conditions, avian abundance and diversity are expected to be extremely poor in the broader Project area. This said, five of the 49 listed bird species known (or suspected) to occur in the broader Project area (Table 7-6) were identified as priority species, including Ludwig’s Bustard (near-endemic; Endangered), Barlow’s Lark (near-endemic; range restricted; Least Concern), Gray’s Lark (near-endemic; Least Concern), Greater Flamingo (Vulnerable) and Lesser Flamingo (Vulnerable). Although numbers are likely to be low, the overall sensitivity of avifauna is considered to be **high**.

Impact Assessment

As noted in Section 9.2.1.1, approximately 93 km of the access track network consists of new tracks that were created during the May 2022 field survey and a subsequent survey in July 2022. In addition, an estimated total of 0.63 ha of land will be impacted at each met mast site from clearance of vegetation or disturbance. The disturbance footprint at each LIDAR site is less than that for the met masts with the equipment occupying an area of only approximately 1 m² per site.

Habitat loss and/or alteration may temporarily or permanently displace birds. Of particular concern are impacts to the breeding habitat of range-restricted, resident Barlow's Larks and endemic Gray's Larks (that nest cryptically in shallow holes they dig into the ground), and to a lesser degree to the breeding habitat of Ludwig's Bustards which favour rocky / broken rock slopes that do not feature too close to any of the sites.

The **intensity** of the potential impact on avifauna due to habitat loss or disturbance is expected to be **medium** considering all Project related activities. The extent of impact is **local**, while the duration will be **long-term** (as any disturbance to gravel plains are likely to persist for several years if not for decades). Thus, the **magnitude** is considered to be **medium**. Based on the **high sensitivity** of receptors and the **medium magnitude**, the potential impact on avifauna is considered to be of **medium significance** without mitigation (Table 9-2).

Mitigation Measures

In addition to the changes made to the access route network, the following measures will be implemented:

No.	Mitigation measure	Classification
1	Avoid the creation of additional new tracks by ensuring the final agreed access routes are adhered to all times.	Avoid
2	If any amendments are required to the final met mast locations or access routes, undertake a ground survey (by a terrestrial ecologist or MEFT: TKNP official) and obtain formal agreement with MEFT (TKNP official). This excludes any micro-siting to accommodate avoiding any identified <i>Zygophyllum applanatum</i> and <i>Polemanniopsis namibensis</i> .	Avoid / Abate at source
3	Minimise construction footprint within the final guy wire spread. Where this is not possible, demarcate (with stakes) the working footprint, including laydown area, turning circle, etc., in consultation with an ECO or terrestrial ecologist.	Avoid / Abate at source
4	<p>Before commencing construction (and particularly excavation) activities, scan the construction footprint for bird nests.</p> <ul style="list-style-type: none"> • If any nesting birds are found within 100 m of the construction site, identify the species either by sending photos to an ornithologist or requesting one to visit the site. Suspend all construction around the specific site until a course of action has been agreed with the ornithologist. • Should an Endangered Ludwig's Bustard be found breeding near the construction area, the following will be undertaken: <ul style="list-style-type: none"> ○ Suspend all work around the specific site and ensure construction crew retreat immediately. ○ Instruct an ornithologist to visit the site and advise on whether the work can proceed in the approved location. ○ If eggs are being incubated, delay construction until any chicks have fledged and left the nest or relocate the mast position in consultation with the ornithologist and MEFT (TKNP Park official). 	Abate on site
5	Rehabilitate disturbed areas and remove tracks using, as a minimum, the roller paint brush "brooming" method after decommissioning, especially on terrain where tracks are unlikely to naturally restore, e.g., gravel plains. This applies to any accidental disturbance (e.g., from two-way traffic along an access route or during infrastructure assembly / installation).	Repair / Restore

Residual Impact Assessment

This potential impact cannot be eliminated as tracks will need to be created and masts erected, which will result in habitat disturbance. The implementation of the mitigation measures would lower the intensity and duration of the impact. Thus, the residual impact would reduce to **LOW significance** (Table 9-2).

TABLE 9-2: IMPACT ON AVIFAUNA AS A RESULT OF HABITAT LOSS OR DISTRUBANCE

Project Phase:	Construction	
Type of Impact	Direct	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	MEDIUM	VERY LOW
Intensity	Medium	Low
Extent	Local	Local
Duration	Long-Term	Medium-Term
Significance	MEDIUM	LOW
Probability	DEFINITE	DEFINITE
Confidence	HIGH	HIGH

9.2.1.3 Disturbance, damage or loss of archaeological or historical sites due to site clearance

Potential Impact Description

The construction of new access tracks and erection of met masts and LIDAR equipment may disturb archaeological or historical sites (**direct negative** impact).

Project Controls

The access track network was amended based in order to avoid various sensitive areas, including the Kaukausib spring area (Figure 6-13). The final proposed access route network is presented in Figure 6-10.

Sensitivity of Receptors

On the whole, the discoveries fitted into the known regional patterns of prehistoric and historic activity within the TKNP. The sites were, however, very sparse in the open terrain, being largely limited to solitary finds, while being more substantial in drainage basins, on rocky outcrops and on Inselbergs. Two significant discoveries in the Project area included an Inselberg cave and a large open site on a hillock, both in the vicinity of the Kaukausib Spring. The overall archaeological sensitivity is considered to be **high**.

Impact Assessment

None of the twelve measure sites nor the access routes leading to these sites impacted on any archaeological or historical sites. Thus, the proposed Project layout is unlikely to impact the archaeology of the area.

Mitigation Measures

In addition to the changes made to the access route network, the following measures will be implemented:

No.	Mitigation measure	Classification
1	Avoid the creation of additional new tracks by ensuring the final agreed access routes are adhered to all times.	Avoid
2	Appoint an ECO to monitor construction activities.	Abate on site

No.	Mitigation measure	Classification
3	Appoint an archaeologist to brief the ECO in basic archaeology recognition and the procedure to be adopted if any material is exposed. ECO to conduct environmental awareness training with the contractor(s).	Abate on site
4	If necessary, discuss any amendments to the final met mast locations or access routes with an archaeologist or ECO (who has been briefed by an archaeologist) prior to any amendments being implemented on site.	Avoid / Abate at source
5	Demarcate (with stakes) the working footprint, including laydown area, turning circle, sections of track where clearing / earthworks is required, etc., in consultation with an ECO or terrestrial ecologist.	Avoid / Abate at source
6	Avoid any pile of stones or mound of earth that may resemble a possible grave.	Avoid
7	When a suspected cultural heritage object is discovered, implement a Chance Finds Procedure: <ul style="list-style-type: none"> • Cease construction activity in the area immediately and report the potential find to the ECO. • Cordon off the area concerned, where applicable. • Conduct a preliminary investigation of the site (by ECO) and, if necessary, inform a professional archaeologist. • Comply with any permitting requirements and recommendations from the archaeologist and / or National Heritage Council, e.g., in-depth study or excavation (by professional archaeologist), permit requirements, etc. Alternatively, relocate the activity to avoid the archaeological site/artefact. • Keep records of the any chance find, including mapping of the site. 	Abate on site

Residual Impact Assessment

Not applicable.

9.2.1.4 Introduction of invasive alien plants

Potential Impact Description

Construction vehicles and equipment can transfer and introduce alien invasive plants through spreading seeds that adhere to machinery. It is possible that construction vehicles that have worked in areas with alien plants may inadvertently introduce alien species, such as *Datura sp.*, *Nicotiana glauca*, *Prosopis sp* and others, to the Project area. Currently the Project area is devoid of alien plants due to the low incidence of vehicular traffic and lack of access by construction vehicles. While it is not easy for many alien species to establish in the desert environment, it is possible that seed from some species could spread and grow after rainfall. Invasive alien plants can transform ecosystems by changing species composition, ecosystem structure and ecosystem functioning, and by fragmenting natural areas, driving degradation and negatively impacting biodiversity (**indirect negative impact**).

Project Controls

None.

Sensitivity of Receptors

The vegetation of the TKNP forms the northernmost portion of the Succulent Karoo Biome, which is of international conservation importance. The Project area is currently in a largely undisturbed and pristine state, which provides a sanctuary for a host of life forms, including those that are adapted to the harsh arid and windy conditions that prevail. Some of these life forms are restricted to these desert habitats and, therefore, have a

narrow distribution range, and are thus sensitive to disturbance. The overall sensitivity of the vegetation is considered to be **high**.

Impact Assessment

Given the natural habitat condition of the Project area and location in a national park, it is considered to be highly sensitive to alien plant spread, although the risk is low. The **intensity** of the potential impact on avifauna due to habitat loss or disturbance is expected to be **low** considering the low risk of spread. The extent of impact is **local**, while the duration will be **medium-term**. Thus, the **magnitude** is considered to be **very low**.

Based on the **high sensitivity** of receptors and the **very low magnitude**, the potential impact on avifauna is considered to be of **low significance** without mitigation (Table 9-3).

Mitigation Measures

The following measures will be implemented:

No.	Mitigation measure	Classification
1	Spray (with water) all construction vehicles at a designated facility outside the park prior to first entry.	Avoid / Abate at source
2	Conduct routine checks for alien invasive plants in construction areas (by ECO as part of day-to-day activities).	Abate on site
3	Remove, bag and incinerate (in designated area outside the TKNP) any alien invasive plants found in areas disturbed by the Project.	Abate on site

Residual Impact Assessment

This potential impact could be eliminated with the implementation of the proposed mitigation. The implementation of the mitigation measures would lower the intensity and duration of the impact. Thus, the residual impact would reduce to **LOW significance** (Table 9-3).

TABLE 9-3: IMPACT ON TERRESTRIAL ECOLOGY DUE TO ALIEN INVASIVE PLANTS

Project Phase:	Construction	
Type of Impact	Indirect	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	VERY LOW	VERY LOW
Intensity	Low	Very Low
Extent	Local	Local
Duration	Medium-Term	Short-Term
Significance	LOW	LOW
Probability	POSSIBLE	UNLIKELY
Confidence	HIGH	HIGH

9.2.2 Increased Traffic Volume and Construction Workforce and Activities

9.2.2.1 Loss and disturbance of vegetation and terrestrial fauna

Potential Impact Description

The presence of a construction workforce may lead to further destruction of vegetation either through collection of shrubs for fire-making; illegal harvesting of succulent shrubs for trade or personal use; trampling; or disturbance of wildlife speed (**direct negative** impact). Construction vehicles may also result in mortality or injury of animals such as snakes and lizards particularly in cold/cool conditions when they are slower moving, and if vehicles travel at speed.

Project Controls

The access track network was amended based in order to avoid various sensitive areas, including the Kaukausib spring area (Figure 6-13). The final proposed access route network is presented in Figure 6-10.

Sensitivity of Receptors

The vegetation of the TKNP forms the northernmost portion of the Succulent Karoo Biome, which is of international conservation importance. The Project area is currently in a largely undisturbed and pristine state, which provides a sanctuary for a host of life forms, including those that are adapted to the harsh arid and windy conditions that prevail. Some of these life forms are restricted to these desert habitats and, therefore, have a narrow distribution range, and are thus sensitive to disturbance. The overall sensitivity of the vegetation and terrestrial fauna is considered to be **high**.

Impact Assessment

It is envisaged that construction activities will take place simultaneously at several sites, with activities at each site lasting for a total period of two to three weeks, but not necessarily continuously. Given that the construction phase requires only a small workforce of a maximum of 18 people and that all workers will be accommodated in Lüderitz or Aus, the risk of plant harvesting and disturbance to wildlife is low. However, illegal harvesting of succulent plants is a growing concern in the region and can have significant consequences for plant diversity and abundance especially of restricted range species. This impact is assessed as having a **medium intensity** considering all Project related activities. The extent of impact is **local**, while the duration will be **long-term**. Thus, the **magnitude** is considered to be **medium**.

The Kaukausib Spring is an important permanent water supply for wildlife for 50 km radius and is regularly used and visited by a range of animals such as oryx, brown hyena, jackals, Cape fox amongst others, including birds. This is indicated by the network of trails around the spring. Animals are unaccustomed to vehicles and people in remote parts of the park and will be disturbed by construction vehicles or staff that may try and visit the spring or use the existing tracks to it. Disturbance of wildlife at the spring from construction traffic and work force, if uncontrolled, would be a **short-term** impact of **high intensity**, but could have a **regional** extent as it is used by wildlife from a wide area. Thus, the **magnitude** is considered to be **medium**.

Based on the **high sensitivity** of receptors and the **medium magnitude**, the potential impacts on vegetation and terrestrial fauna are considered to be of **medium significance** without mitigation (Table 9-4).

Mitigation Measures

In addition to the changes made to the access route network, the following measures will be implemented:

No.	Mitigation measure	Classification
1	Avoid the creation of additional new tracks by ensuring the final agreed access routes are adhered to all times.	Avoid
2	Accommodate workforce off site (e.g., in Lüderitz / Aus)	Avoid / Abate at source
3	Employ a suitably qualified ECO to oversee implementation of the EMP during the construction phase.	Abate on site
4	Include environmental specifications in the EMP to control the impacts of construction. These specifications must include measures to prevent: <ul style="list-style-type: none"> • Firewood collection. • Plant harvesting. • Hunting or trapping of wildlife. • Introduction and spread of alien invasive plants. • Additional access tracks. • Uncontrolled sanitation. • Any other pollution such as domestic and industrial waste. • Traffic speeds for construction vehicles. 	Avoid / Abate on site
5	Minimise construction footprint within the final guy wire spread. Where this is not possible, demarcate (with stakes) the working footprint, including laydown area, turning circle, etc., in consultation with an ECO or terrestrial ecologist.	Avoid / Abate at source
6	Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas.	Avoid
7	Limit the movements of the construction crew to the demarcated construction area.	Abate on site
8	Develop and implement an Environmental Code of Conduct for all construction staff and ensure staff are well informed of environmental controls through induction / environmental awareness and regular toolbox talks	Abate on site
9	Enforce TKNP regulations especially with respect to natural resource use; waste management; traffic; water use; traffic speeds; etc.	Abate at source / Abate on site
10	Store construction equipment and waste that is susceptible to hyena damage appropriately (e.g., on vehicles or storage container) or implement some form of protection (e.g., ready fence panels).	Abate on site

In addition to the above, it is recommended that MEFT conduct routine searches of construction vehicles to check for removal of park natural resources including plants, fossils, animal bones and driftwood.

Residual Impact Assessment

This potential impact cannot be eliminated as there will be a presence of construction staff and activity associated with construction. With the implementation of the mitigation measures, which would reduce the intensity of the impact to very low and magnitude to very low, the residual impact reduces to **LOW significance** (Table 9-4).

TABLE 9-4: IMPACT ON VEGETATION AND TERRESTRAL FAUNA DUE TO CONSTRUCTION WORKFORCE

Project Phase:	Construction	
Type of Impact	Direct	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	MEDIUM	VERY LOW
Intensity	Medium (vegetation) - High (fauna)	Low
Extent	Local (vegetation) - Regional (fauna)	Local
Duration	Short-Term (fauna) - Long-Term (vegetation)	Short-Term (fauna) - Long-Term (vegetation)
Significance	MEDIUM	LOW
Probability	POSSIBLE	UNLIKELY
Confidence	HIGH	HIGH

9.2.2.2 Disturbance of avifauna (changes in bird behaviour)

Potential Impact Description

The presence of construction staff and related noise and activity associated with the use of access tracks and construction activities, may temporarily or permanently displace birds from the immediate area, and in the worst-case lead to the permanent abandonment of active nests (**direct negative** impact).

This impact is also applicable to maintenance and decommissioning activities and is not repeated below.

Project Controls

The access track network was amended based in order to avoid various sensitive areas, including the Kaukausib spring area (Figure 6-13). The final proposed access route network is presented in Figure 6-10.

Sensitivity of Receptors

Refer to Section 9.2.1.2 for a description of receptor sensitivity. Species of particular concern include the resident Barlow's Larks and endemic Gray's Larks (that nest cryptically in shallow holes they dig into the ground), and to a lesser degree to the breeding habitat of Ludwig's Bustards which favour rocky / broken rock slopes that do not feature too close to any of the sites. The overall sensitivity of avifauna is considered to be **high**.

Impact Assessment

It is envisaged that construction activities will take place simultaneously at several sites, with activities at each site lasting for a total period of two to three weeks, but not necessarily continuously. Thus, while any disturbance created from vehicle traffic and during construction activities may be considered relatively heavy in this otherwise undisturbed area, it will be of short duration.

The **intensity** of the potential impact on avifauna due to disturbance is expected to be **medium** considering all Project related activities. The extent of impact is **local**, while the duration will be **short-term**. Thus, the **magnitude** is considered to be **low**.

Based on the **high sensitivity** of receptors and the **low magnitude**, the potential impact on avifauna is considered to be of **low significance** without mitigation (Table 9-5).

Mitigation Measures

In addition to the changes made to the access route network, the following measures will be implemented:

No.	Mitigation measure	Classification
1	Minimise the upgrading and maintenance of access, as far as possible.	Abate on site
2	Traffic related mitigation: <ul style="list-style-type: none"> Adhere to the final agreed access routes to all times. Adhere to the speed limit set by the MEFT national park permit conditions and any additional speed limits for individual access tracks that may be determined by MEFT. Allow wildlife to get move out of the way. Avoid hooting, flashing lights and excessive noise by workers and construction vehicles (e.g., unnecessary revving of vehicles). Any collisions with wildlife, including with birds, need to be documented and reported to the TKNP official at MEFT. 	Abate on site
3	Avoid any construction activities, including driving, after dusk and before dawn	Avoid
4	Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas.	Avoid
5	Limit the movements of the construction crew to the demarcated construction area.	Abate on site
6	Avoid excessive use of light (including when no crew is on-site at night), and where necessary as a safety feature (e.g., to illuminate obstacles during construction) consider using a green light rather than a white light.	Avoid / Abate on site

Residual Impact Assessment

This potential impact cannot be eliminated as there will be a presence of construction staff and related noise and activity associated with construction, which could result in avifaunal disturbance. With the implementation of the mitigation measures, which would reduce the intensity of the impact to very low, the residual impact remains of **LOW significance** (Table 9-5).

TABLE 9-5: IMPACT ON AVIFAUNA AS A RESULT OF DISTRUBANCE

Project Phase:	Construction, Operation and Decommissioning	
Type of Impact	Direct	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	VERY LOW	VERY LOW
Intensity	Low	Very Low
Extent	Local	Local
Duration	Short-Term	Short-Term
Significance	LOW	LOW
Probability	LIKELY	LIKELY
Confidence	HIGH	HIGH

9.2.3 Generation of Waste and Hydrocarbon Spills

9.2.3.1 Faunal injury / mortality due to construction waste and soil contamination

Potential Impact Description

Spills of hazardous substances (e.g., diesel, hydraulic oil, etc.) or presence of rubbish / waste that may cause harm to local fauna and avifauna, e.g., entanglement (e.g., cable ties) or ingestion (e.g., plastic particles). Wind-blown waste (e.g., plastic wrapping) may also disturb avifauna, especially breeding birds (**direct negative** impact).

This impact is also applicable to decommissioning activities and is not repeated below.

Project Controls

Contractors will be required to comply with the generic waste management specifications as included in the EMP.

Sensitivity of Receptors

Refer to Section 9.2.1.2 for a description of receptor sensitivity. The overall sensitivity of fauna and avifauna is considered to be **high**.

Impact Assessment

The **intensity** of the potential impact on avifauna due to disturbance is expected to be **medium** considering all Project related activities. The extent of impact is **local**, while the duration will be **short-term**. Thus, the **magnitude** is considered to be **very low**.

Based on the **high sensitivity** of receptors and the **very low magnitude**, the potential impact on avifauna is considered to be of **low significance** without mitigation (Table 9-6).

Mitigation Measures

The following measures will be implemented:

No.	Mitigation measure	Classification
1	Waste related mitigation: <ul style="list-style-type: none"> • Ensure all sites are kept free of litter. • Ensure that no solid waste is temporarily stored on site. • Ensure no waste material or litter is burnt or buried on site. • Ensure all sites are free of waste at the end of construction. • Ensure all solid waste is disposed of offsite at an approved landfill site in Lüderitz. 	Abate on site
2	Ensure there is a supply of absorbent material readily available at each site to absorb / breakdown spills. The quantity of such materials shall be able to handle the total volume of the hydrocarbon / hazardous substance stored on site.	Abate on site

Residual Impact Assessment

This potential impact can be eliminated with a good waste management system. With the implementation of the mitigation measures, which would reduce the intensity of the impact to very low, the residual impact remains of **LOW significance** (Table 9-6).

TABLE 9-6: IMPACT ON AVIFAUNA AS A RESULT OF WASTE AND HYDROCARBON SPILLS

Project Phase:	Construction and Operation	
Type of Impact	Direct	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	VERY LOW	VERY LOW
Intensity	Medium	Low
Extent	Local	Local
Duration	Short-Term	Short-Term
Significance	LOW	LOW
Probability	POSSIBLE	POSSIBLE
Confidence	HIGH	HIGH

9.3 OPERATION PHASE

9.3.1 Presence and Operation of Met Masts and LIDAR

9.3.1.1 Bird collision mortality, injury and changes in behaviour due to the presence of met masts and guy wires

Potential Impact Description

Met masts, as well as supporting guy wires, present an unnatural obstacle that may be poorly visible to birds, especially at night or during adverse weather conditions, such as dense fog or sandstorms. Bird strikes with the met masts or guy wires could result in mortality and / or injury (**direct negative** impact).

The presence of wind masts may also cause travelling birds, including resident, migratory and nomadic birds, to divert their flight paths in order to avoid a collision. This may cause birds to circumnavigate otherwise suitable foraging or breeding habitat and lead to higher energy costs to the birds (**indirect negative** impact).

Project Controls

The access track network was amended based in order to avoid various sensitive areas, including the Kaukausib spring area (Figure 6-13). The final proposed access route network is presented in Figure 6-10

No masts have been sited in highly sensitive avian habitats such as on prominent ridges, inselbergs and springs. Mast structures will be painted red and white, and will be fitted with aviation lighting and visibility markers, in accordance with NCAA regulations and requirements, which will improve visibility.

Sensitivity of Receptors

Due to the harsh climatic conditions, avian abundance and diversity are expected to be extremely poor in the broader Project area. This said, five of the 49 listed bird species known (or suspected) to occur in the broader Project area (Table 7-6) were identified as priority species, including Ludwig’s Bustard (near-endemic; Endangered), Barlow’s Lark (near-endemic; range restricted; Least Concern), Gray’s Lark (near-endemic; Least Concern), Greater Flamingo (Vulnerable) and Lesser Flamingo (Vulnerable).

Some bird species or species groups are more prone to collision with such infrastructure, such as the Ludwig's Bustards, Greater Flamingos and Lesser Flamingo that may be traversing the Project area between the coast and habitats inland, which are known to be prone to collisions with similar objects such as transmission lines. Although numbers are likely to be low, the overall sensitivity of avifauna is considered to be **high**.

Impact Assessment

The met masts, each with a height of 122 m, are spread over an area covering roughly 670 km² (**regional**). The proposed siting and spacing of met masts, which the distance between neighbouring masts varying between 4.5 km and 11.5 km, should avoid the creation of a barrier effect and, therefore, should not lead to substantially changed (longer) flight paths or noteworthy exclusion from suitable habitats.

Although it is unclear whether collision-prone flamingos from the region traverse the Project area and at what altitude, these ratings are based on a precautionary basis. The **intensity** of the potential impacts on avifauna due to bird strikes and changes in behaviour is expected to be **medium**. The extent of impact is **regional**, while the duration will be **medium-term** (for the duration of the met masts). Thus, the **magnitude** is considered to be **medium**.

Based on the **high sensitivity** of receptors and the **medium magnitude**, the potential impact on avifauna is considered to be of **medium significance** without mitigation (Table 9-7).

Mitigation Measures

In addition to the Project controls listed above, the following measures will be implemented:

No.	Mitigation measure	Classification
1	If any amendments are required to the final met mast locations, undertake a ground survey (by a terrestrial ecologist or MEFT: TKNP official) and obtain formal agreement with MEFT (TKNP official). This excludes any micro-siting to accommodate avoiding any identified <i>Zygophyllum applanatum</i> and <i>Polemanniopsis namibensis</i> .	Avoid / Abate at source
2	<ul style="list-style-type: none"> Equip each upper guy wire with bird flight diverters, specifically to alert low-flying collision prone birds such as Ludwig's Bustards. The first marker is to be placed within the first 5 m of the top of the guy wire; the last marker should be placed at a maximum height of 5 m above the ground. Markers should be a contrasting colour to the guy wire. If spiral-design flight diverters are used, they should be spaced no more than 5 m apart. If a flapper design is chosen, they should be spaced at least 10 m apart. 	Abate at source
3	NCAA mast lighting requirements are to be complied with. If acceptable, lighting should comprise, as far as possible, of red or green (rather than white), flashing (rather than steady burning) lights.	Abate at source / Abate on site
4	Record (by maintenance crews) any carcasses found at met mast sites. Record data in a spreadsheet and share with Hyphen's ecological consultants and MEFT (TKNP official) on a regular basis.	Monitoring

Residual Impact Assessment

This potential impact cannot be eliminated at the obstruction will still exist, but with the proposed mitigation the masts and guy wires will be more visible. The implementation of the mitigation measures, which would lower the intensity of the impact, the residual impact would reduce to **LOW significance** (Table 9-7).

TABLE 9-7: IMPACT ON AVIFAUNA AS A RESULT OF MAST COLLISIONS

Project Phase:	Operation	
Type of Impact	Direct and Indirect	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	MEDIUM	VERY LOW
Intensity	Medium	Low
Extent	Regional	Regional
Duration	Medium-Term	Medium-Term
Significance	MEDIUM	LOW
Probability	POSSIBLE	POSSIBLE
Confidence	MEDIUM	MEDIUM

9.3.1.2 Injuries to traversing birds due to laser light pulses from LIDAR sensor

Potential Impact Description

Pulses of infrared laser lights emitted by the LIDAR sensor could temporarily blind birds traversing directly through the range of the laser pulse being emitted, and could lead to temporary or permanent eye damage (**direct negative** impact).

Project Controls

No LIDAR sensors have been sited in highly sensitive avian habitats such as on prominent ridges, inselbergs and springs.

Sensitivity of Receptors

Refer to Section 9.2.1.2 for a description of receptor sensitivity. The overall sensitivity of avifauna is considered to be **high**.

Impact Assessment

Resident bird densities in the area, and particularly at the two proposed sites (L1 and L1a), are generally considered to be extremely low, and the risk posed by this impact is thus likely to be low. The extent of migratory or nomadic birds, such as flamingos and bustards, passing through the area, including at night, is not known and the precautionary principle therefore applies.

The **intensity** of the potential impacts on avifauna due to bird strikes and changes in behaviour is expected to be **low**. The extent of impact is at the **site** level, while the duration will be **medium-term** (for the duration of the met masts). Thus, the **magnitude** is considered to be **low**.

Based on the **high sensitivity** of receptors and the **low magnitude**, the potential impact on avifauna is considered to be of **low significance** without mitigation (Table 9-8).

Mitigation Measures

There are no viable mitigation measures that would eliminate this impact.

Residual Impact Assessment

With no mitigation the impact would remain of **LOW significance** (Table 9-8).

TABLE 9-8: IMPACT ON AVIFAUNA AS A RESULT OF LASER LIGHT PULSES FROM LIDAR SENSOR

Project Phase:	Operation	
Type of Impact	Direct	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	LOW	LOW
Intensity	Low	Low
Extent	Site	Site
Duration	Medium-Term	Medium-Term
Significance	LOW	LOW
Probability	UNLIKELY	UNLIKELY
Confidence	MEDIUM	MEDIUM

9.3.2 Increased Traffic Volume and Presence of Staff

9.3.2.1 Disturbance of vegetation and terrestrial fauna

Potential Impact Description

The presence of a maintenance workforce may lead to destruction of vegetation either through collection of shrubs for fire-making; illegal harvesting of succulent shrubs for trade or personal use; trampling; or disturbance of wildlife speed (**direct negative** impact). Vehicles may also result in mortality or injury of animals such as snakes and lizards particularly in cold/cool conditions when they are slower moving, and if vehicles travel at. This impact is similar to the impact during construction, although of smaller extent and scale.

This impact is also applicable to decommissioning activities and is not repeated below.

Project Controls

The access track network was amended based in order to avoid various sensitive areas, including the Kaukausib spring area (Figure 6-13). The final proposed access route network is presented in Figure 6-10.

Sensitivity of Receptors

The vegetation of the TKNP forms the northernmost portion of the Succulent Karoo Biome, which is of international conservation importance. The Project area is currently in a largely undisturbed and pristine state, which provides a sanctuary for a host of life forms, including those that are adapted to the harsh arid and windy conditions that prevail. Some of these life forms are restricted to these desert habitats and, therefore, have a narrow distribution range, and are thus sensitive to disturbance. The overall sensitivity of the vegetation and terrestrial fauna is considered to be **high**.

Impact Assessment

Given that the maintenance activities require only a very small workforce (few people) and that all workers will be accommodated in Lüderitz or Aus, the risk of plant harvesting and disturbance to wildlife is low. This impact is assessed as having a **low intensity** considering all Project related activities. The extent of impact is **local**, while the duration will be **short-term**. Thus, the **magnitude** is considered to be **very low**.

Based on the **high sensitivity** of receptors and the **very low magnitude**, the potential impacts on vegetation and terrestrial fauna are considered to be of **low significance** without mitigation (Table 9-9).

Mitigation Measures

In addition to the changes made to the access route network, the following measures will be implemented:

No.	Mitigation measure	Classification
1	Adhere to the final agreed access routes to all times.	Avoid
2	Accommodate workforce off site (e.g., in Lüderitz / Aus).	Avoid / Abate at source
3	Include environmental specifications in the EMP to control the impacts of maintenance. These specifications must include measures to prevent: <ul style="list-style-type: none"> • Firewood collection. • Plant harvesting. • Hunting or trapping of wildlife. • Introduction and spread of alien invasive plants. • Additional access tracks. • Uncontrolled sanitation. • Any other pollution such as domestic and industrial waste. • Traffic speeds for construction vehicles. 	Avoid / Abate on site
4	Implement an Environmental Code of Conduct for all staff and ensure staff are well informed of environmental controls through induction / environmental awareness and regular toolbox talks.	Abate on site
5	Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas.	Avoid
6	Alien vegetation: <ul style="list-style-type: none"> • Conduct routine checks for alien invasive plants (by maintenance staff) along access routes and at each site during construction. • Remove, bag and incinerate (in designated area outside the TKNP) any alien invasive plants found on site. 	Abate on site
7	Enforce TKNP regulations especially with respect to natural resource use; waste management; traffic; water use; traffic speeds; etc.	Abate at source / Abate on site

Residual Impact Assessment

This potential impact cannot be eliminated as there will be a presence of maintenance staff and activity associated with the maintenance. With the implementation of the mitigation measures, which would reduce the intensity of the impact to very low, the residual impact remains of **LOW significance** (Table 9-9).

TABLE 9-9: IMPACT ON VEGETATION AND TERRESTRAL FAUNA DUE TO MAINTENACE WORKFORCE

Project Phase:	Operation and Decommissioning	
Type of Impact	Direct	
Nature of Impact	Negative	
Sensitivity of Receptor	HIGH	
	Pre-Mitigation Impact	Residual Impact
Magnitude (Consequence)	VERY LOW	VERY LOW
Intensity	Low	Very Low
Extent	Local	Local
Duration	Short-Term	Short-Term
Significance	LOW	LOW
Probability	POSSIBLE	UNLIKELY
Confidence	HIGH	HIGH

9.3.2.2 Disturbance of avifauna (changes in bird behaviour)

Potential Impact Description

The presence of construction staff and related noise and activity associated with the use of access tracks and construction activities, may temporarily or permanently displace birds from the immediate area, and in the worst-case lead to the permanent abandonment of active nests (**direct negative** impact).

Impact Assessment

This impact is the same as that assessed during construction (see Section 9.2.2.2), except that the duration is medium-term. The significance of the impact is **LOW** before and after mitigation.

9.3.3 Generation of Waste and Hydrocarbon Spills

9.3.3.1 Faunal injury / mortality due to construction waste and soil contamination

Potential Impact Description

Spills of hazardous substances (e.g., diesel, hydraulic oil, etc.) or presence of rubbish / waste that may cause harm to local avifauna, e.g., entanglement (e.g., cable ties) or ingestion (e.g., plastic particles). Wind-blown waste (e.g., plastic wrapping) may also disturb avifauna, especially breeding birds (**direct negative** impact).

Impact Assessment

This impact is the same as that assessed during construction (see Section 9.2.3.1), except that the duration is medium-term. The significance of the impact is **LOW** before and after mitigation.

9.4 CUMULATIVE IMPACT

The broader Project area is currently in a largely undisturbed and pristine state. The area provides a sanctuary for a host of life forms, including those that are adapted to the harsh arid and windy conditions that prevail. Some of these life forms, including bird species like the Barlow's Lark and the Gray's Lark, are restricted to these desert habitats and, therefore, have a narrow distribution range. The area is also used or traversed over by

migratory or nomadic birds that move between the coast and suitable habitats further inland. This includes the Greater Flamingo and Lesser Flamingo that breed at only a few sites inland localities, but may spend much of their non-breeding season along the West Coast of southern Africa, as well as Ludwig's Bustards that tend to move between inland habitats and the coast in response to food availability. These three species in particular are prone to collision mortality with obstacles such as power lines and wind turbines.

There are currently few other activities within the Project footprint or in the broader Project area. There is currently little traffic in the area, other than limited tourism and MEFT patrols. Historic and current mining activities have, however, modified large tracts of habitats (mostly coastal) west of the Project area. Recently, tourism concessions have been awarded to some areas bordering the broader Project area. Given Namibia's world-class renewable resources (wind and solar), abundant land availability, and proximity to the ocean, the Project area, as well as other areas north of Lüderitz along the entire Namibian coastline, lends itself to the potential development of additional renewable energy projects and the larger proposed green H₂ project. Other renewable energy projects that are planned in the wider project area are located between 5.5 and 23 km south of Lüderitz, at least 31 km from the closest met mast site S1. These are also located in different habitats to those in the met mast area and are not expected to have a significant cumulative impact with habitats or species that will be affected by the met mast infrastructure.

9.5 NO-GO ALTERNATIVE

The No-Go alternative represents the option not to proceed with the proposed met mast and remote sensing campaign, which leaves the Project areas of influence in their current state except for variation by natural causes and other human activities (e.g., tourism and mining). It thus represents the current status quo and the baseline against which all potential Project-related impacts are assessed. In opting for the No-Go alternative, none of the impacts anticipated from the proposed Project would occur. If the proposed Project does not proceed, the residual impacts (i.e., impacts after implementation of mitigation measures) of the activities will not occur.

The 'do nothing' or 'No-Go' option would limit data acquisition from the two concession areas. Without the data arising from the proposed campaign, Hyphen and the Namibian Government will not be able to improve its understanding of the renewable energy resource (wind and solar) within the development footprint and economic viability of large-scale renewable energy and green hydrogen projects. Namibia may lose the opportunity to establish the SCDI, one of the key actions detailed in the HPPII to achieve Goal Three (i.e., Developing complementary engines of Growth).

Even if the proposed Project does not proceed, environmental conditions are dynamic and activities within the TKNP may change (e.g., increased tourism and / or mining).

- A number of tourism concessions have been issued for parts of the TKNP; the only one relevant to the current Project is the Aus-Lüderitz Link TDA. Four of the proposed sites overlap with the Aus-Lüderitz Link TDA (see Figure 7-20).
- Five of the sites are located within existing EPL and ML areas (see Figure 7-18).

Associated with this increase in activities is an increase in disturbance to the biophysical environment.

10 CONCLUSIONS AND RECOMMENDATIONS

This chapter concludes on the key impact assessment findings and makes a recommendation and conclusion regarding the issuing of an Environmental Clearance Certificate for the proposed Project.

10.1 IMPACT ASSESSMENT AND KEY MITIGATION SUMMARY

A summary of the assessment of the potential environmental and social impacts and key mitigation associated with the three specialist studies is provided in Table 10-1.

The most significant impacts are related to the:

- Physical removal and disturbance of vegetation and soil, which would result in the direct loss of vegetation and faunal habitat, as well as the disturbance to terrestrial fauna (including avifauna): The vegetation of the TKNP forms the northernmost portion of the Succulent Karoo Biome, which is a biodiversity hotspot and of international conservation importance. The Project area is currently in a largely undisturbed and pristine state, which provides a sanctuary for a host of life forms, including those that are adapted to the harsh arid and windy conditions that prevail. Some of these life forms are restricted to these desert habitats and, therefore, have a narrow distribution range, and are thus sensitive to disturbance.

The potential impact terrestrial ecology and avifauna as a result of vegetation removal and disturbance have, however, been largely mitigated by the careful siting of met mast sites and access routes to avoid sensitive areas. All met mast sites were selected so as to avoid areas of very high biodiversity (as defined by the TKNP Management Plan), as well as avoiding highly sensitive habitats such as on ridges, inselbergs and springs. The access tracks were also amended, in consultation with the specialists and MEFT, to avoid various sensitive areas, including the Kaukausib spring area. The impact as a result of vegetation removal and disturbance is considered to be of **LOW significance** after mitigation. Thus, it is important to ensure that the demarcated construction footprint (at each met mast site) and final agreed access routes are adhered to all times.

- Bird collision mortality and injury due to the presence of the met masts and guy wires: Met masts and supporting guy wires present an unnatural obstacle that may be poorly visible to birds, especially at night or during adverse weather conditions, such as dense fog or sandstorms. This potential impact is considered to be of medium significance prior to mitigation. With the implementation of the proposed mitigation (which includes the installation of bird diverters), the impact is considered to be of **LOW significance**.

None of the twelve measurement sites nor the access routes leading to these sites impacted on any archaeological or historical sites. The proposed Project layout is thus unlikely to have an impact on the archaeology of the area. This said, it is recommended that when a suspected cultural heritage object is discovered, a Chance Finds Procedure be compiled and implemented on site.

The management and mitigation measures are included in more detail in the EMP (refer to Appendix 4). To ensure compliance with the EMP it is recommended that an ECO is appointed during construction.

10.2 CONCLUDING STATEMENT

The work undertaken in support of this ECC Application has been completed in line with the applicable regulatory framework. The assessment process followed included the undertaking of three specialist assessments deemed necessary to adequately identify and assess these potential impacts.

Following the impact assessment process, the identified residual impacts are assessed to be of **LOW** significance with the implementation of the recommended mitigation measures. The potential impacts can be adequately mitigated with the implementation of the proposed mitigation measures (as included in the EMP), which follows the principle of the mitigation hierarchy by firstly avoiding identified sensitive areas, and then reducing / minimising the impact, and lastly rehabilitating disturbed sites.

Based on the findings of the EIA and associated specialist studies, SLR is of the opinion that this EIA Scoping Report and EMP is sufficiently robust and provides sufficient information for MME and MEFT to make an informed decision on the proposed Project taking into consideration the significance of potential impacts. SLR recommends that the commitments presented in the EMP should be conditional to the ECC, should MEFT approve the application.

TABLE 10-1: SUMMARY OF THE SIGNIFICANCE OF THE IMPACTS ASSOCIATED WITH THE PROPOSED MET MAST AND REMOTE SENSING PROJECT IN THE TKNP

Note: (1) Neg = Negligible; VL = Very Low; L = Low; M = Medium; H = High; VH = Very High; +ve = Positive.
(2) * indicates that no mitigation is possible and/or considered necessary, thus significance rating remains.
(3) ** indicates that although the significance rating of the impact remains the same, the intensity of the impact decreases due to the proposed mitigation.

No.	Activities	Aspects	Impacts on Main Receptors	Pre-Mitigation Significance	Key Mitigation / Project Controls	Residual Significance
1	CONSTRUCTION PHASE					
1.1	Establishment of new tracks and erection of met masts and LIDAR	Removal and disturbance of vegetation and soil	Loss of vegetation and associated biota	MEDIUM	<ul style="list-style-type: none"> Avoid the creation of additional new tracks by ensuring the final agreed access routes are adhered to at all times. Appoint an ECO to oversee construction activities in accordance with the EMP. Minimise and demarcate construction footprint (with wooden stakes). Position the mast and anchors and lay-down areas to avoid plant species of concern such as <i>Zygophyllum applanatum</i> near site S5 and <i>Polemanniopsis namibensis</i> in the vicinity of sites S1, S2, S3, and LIDAR1 and LIDAR1a. Restore disturbed areas by, at minimum, 'brooming' disturbed surfaces to natural profile. 	LOW
1.2			Loss of or disturbance to avifauna habitat	MEDIUM		LOW
1.3			Disturbance, damage or loss of archaeological or historical sites	NO IMPACT		NO IMPACT
1.4			Introduction of invasive alien plants associated with construction activities	LOW		<ul style="list-style-type: none"> Spray (with water) all construction vehicles at a designated facility outside the park prior to first entry. Conduct routine checks for alien invasive plants.

No.	Activities	Aspects	Impacts on Main Receptors	Pre-Mitigation Significance	Key Mitigation / Project Controls	Residual Significance
					<ul style="list-style-type: none"> Remove any alien invasive plants found in areas disturbed by the Project and incinerate at a designated area outside the TKNP. 	
1.5		Increased traffic volume and construction activities	Loss and disturbance of vegetation and terrestrial fauna	MEDIUM	<ul style="list-style-type: none"> Adhere to final agreed access routes. Minimise the upgrading and maintenance of access, as far as possible. Minimise and demarcate construction footprint. Appoint ECO to oversee construction activities in accordance with the EMP. Adhere to TKNP regulations especially with respect to natural resource use; waste management; traffic; water use; traffic speeds; etc. Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas. Accommodate workforce off site. Develop and implement an Environmental Code of Conduct for all construction staff and ensure staff are well informed of environmental controls through induction and regular toolbox talks. Store construction equipment and waste that is susceptible to hyena damage appropriately (e.g., on vehicles or storage container) or implement some form of protection (e.g., ready fence panels). 	LOW
1.6			Disturbance of avifauna	LOW		LOW **
1.7						
1.8		Generation of waste and hydrocarbon spills	Soil, water and general environmental contamination	LOW		<ul style="list-style-type: none"> Adhere to waste management protocols. Ensure there is a supply of absorbent material readily available at each site to absorb / breakdown spills.

No.	Activities	Aspects	Impacts on Main Receptors	Pre-Mitigation Significance	Key Mitigation / Project Controls	Residual Significance
2	OPERATION PHASE					
2.1	Presence and operation of met masts and LIDAR	Alteration of site characteristics	Bird collision mortality, injury and changes in behaviour	MEDIUM	<ul style="list-style-type: none"> If necessary, discuss any amendments to the final met mast locations with a terrestrial ecologist. Equip all upper guy wires with bird flight diverters. If acceptable to NCAA, lighting should consist, as far as possible, of red or green (rather than white), flashing (rather than steady burning) lights. 	LOW
2.2			Injuries to traversing birds due to laser light pulses from LIDAR sensor	LOW	None.	LOW *
2.3		Increased traffic volume and presence of staff	Disturbance of vegetation and terrestrial fauna	LOW	<ul style="list-style-type: none"> Adhere to final agreed access routes. Adhere to TKNP regulations especially with respect to natural resource use; waste management; traffic; water use; traffic speeds; etc. 	LOW **
2.4			Disturbance of avifauna	LOW	<ul style="list-style-type: none"> Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas. Accommodate workforce off site. Conduct routine checks and remove alien invasive plants, and incinerate at a designated area outside the TKNP. 	LOW **
2.5		Generation of waste and hydrocarbon spills	Soil, water and general environmental contamination	LOW	<ul style="list-style-type: none"> Adhere to waste management protocols. Ensure there is a supply of absorbent material readily available at each site to absorb / breakdown spills. 	LOW **

No.	Activities	Aspects	Impacts on Main Receptors	Pre-Mitigation Significance	Key Mitigation / Project Controls	Residual Significance
3	DECOMMISSIONING PHASE					
3.1	Removal of infrastructure	Increased traffic volume and presence of staff	Disturbance of vegetation and terrestrial fauna	LOW	<ul style="list-style-type: none"> Adhere to final agreed access routes. Adhere to TKNP regulations especially with respect to natural resource use; waste management; traffic; water use; traffic speeds; etc. Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib spring) and treat as no-go areas. Accommodate workforce off site. Removal of alien invasive plants. 	LOW **
3.2			Disturbance of avifauna	LOW		LOW **
3.3		Generation of waste and hydrocarbon spills	Faunal injury / mortality due to construction waste and soil contamination	LOW		<ul style="list-style-type: none"> Adhere to waste management protocols. Ensure there is a supply of absorbent material readily available at each site to absorb / breakdown spills.

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