

PROPOSED METEOROLOGICAL MAST AND REMOTE SENSING CAMPAIGN IN THE TSAU//KHAEB NATIONAL PARK: ENVIRONMENTAL MANAGEMENT PLAN

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

Prepared for: Hyphen Hydrogen Energy (Pty) Ltd



DOCUMENT INFORMATION

Title	PROPOSED METEOROLOGICAL MAST AND REMOTE SENSING CAMPAIGN IN THE TSAU//KHAEB NATIONAL PARK: ENVIRONMENTAL MANAGEMENT PLAN
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Keywords	met masts, TKNP, LIDAR, renewable energy
Status	Draft
Report No.	02
SLR Company	SLR Environmental Consulting (Namibia) (Pty) Ltd

DOCUMENT REVISION RECORD

Rev No.	Issue Date	Description	Issued By
0	August 2022	Draft EMP issued for client review and comment	J Blood
1	September 2022	Draft EMP issued for I&AP review and comment	J Blood
2	October 2022	Final EMP issued to MME and MEFT	R Christians

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EO	Environmental Officer
H ₂	Hydrogen
Hyphen	HYPHEN Hydrogen Energy (Pty) Ltd
LIDAR	Light Detection and Ranging
MEFT	Ministry of Environment, Forestry and Tourism
PCC	Police Clearance Certificate
TKNP	Tsau //Khaeb National Park

PROPOSED METEOROLOGICAL MAST AND REMOTE SENSING CAMPAIGN IN THE TSAU//KHAEB NATIONAL PARK: ENVIRONMENTAL MANAGEMENT PLAN

1. INTRODUCTION

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 export 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).

To better understand the suitability of the wind resource in the identified development area, Hyphen is proposing to install 10 meteorological (met) masts within the two concession areas. To further reduce the wind resource uncertainty in both the horizontal and vertical planes, Hyphen is also proposing to use Light Detection and Ranging (LIDAR) remote sensing in two locations as a means of secondary data collection. This wind measurement campaign is referred to as the 'Project'. The proposed 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) 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), which requires an Environmental Clearance Certificate (ECC) from the Ministry of Environment, Forestry and Tourism (MEFT) for to allow for the construction of met masts.

1.2 PURPOSE OF THIS ENVIRONMENTAL MANAGEMENT PLAN

This Environmental Management Programme (EMP) has been compiled as part of the EIA process in compliance with Regulation 8 of the EIA Regulations 2012 in terms of which an EMP must include:

- "(aa) information on any proposed management, mitigation, protection, or remedial measures to be undertaken to address the effects on the environment that have been identified, including objectives in respect of the rehabilitation of the environment and closure;*
- (bb) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and*
- (cc) a description of the way the applicant intends to modify, remedy, control or stop any action, activity or process that causes pollution or environmental degradation remedy the cause of pollution or degradation and migration of pollutants."*

The purpose of this EMP is to ensure that potential impacts associated with the proposed Project phases are avoided and, where they cannot be avoided, are kept to a minimum and rehabilitated. The EMP, which has as its basis the mitigation measures listed in the EIA Scoping Report, sets environmental targets for the Contractor (or selected sub-contractors) and reasonable standards against which the Contractor's performance can be measured during the Project phases.

This EMP will form the basis for the environmental specifications that the Contractor(s), in terms of the construction contract, will be obliged to adhere to during the various Project phases. This document will be included in the contract documentation and will thus form a binding agreement between the Contractor(s) and Hyphen.

Any conditions of authorisation contained in the ECC that contradict specifications included in this EMP, supersede the specifications in this document. Thus, this EMP should be read together with the ECC, and should be updated to contain all conditions of authorisation contained in the ECC that are relevant to environmental management.

1.3 STRUCTURE OF THE MANAGEMENT PLAN

This document has been structured as presented below.

Section	Contents
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	Project Overview Describes the technical aspects of the Project.
Chapter 3	Impact Assessment Summary and Key Mitigation Presents a summary of the potential impacts and key mitigation.
Chapter 4	Administration and Regulation of Environmental Obligations Presents the management structure for the EMP, including roles and responsibilities, notifications, method statements, environmental awareness, monitoring and reporting, non-compliance and penalties, permits and licences, and emergency procedures.
Chapter 5	Environmental Specifications: Construction and Decommissioning Includes specifications for the construction and decommissioning phases.
Chapter 6	Environmental Specifications: Operation Includes specifications for the operation (or maintenance) phase.

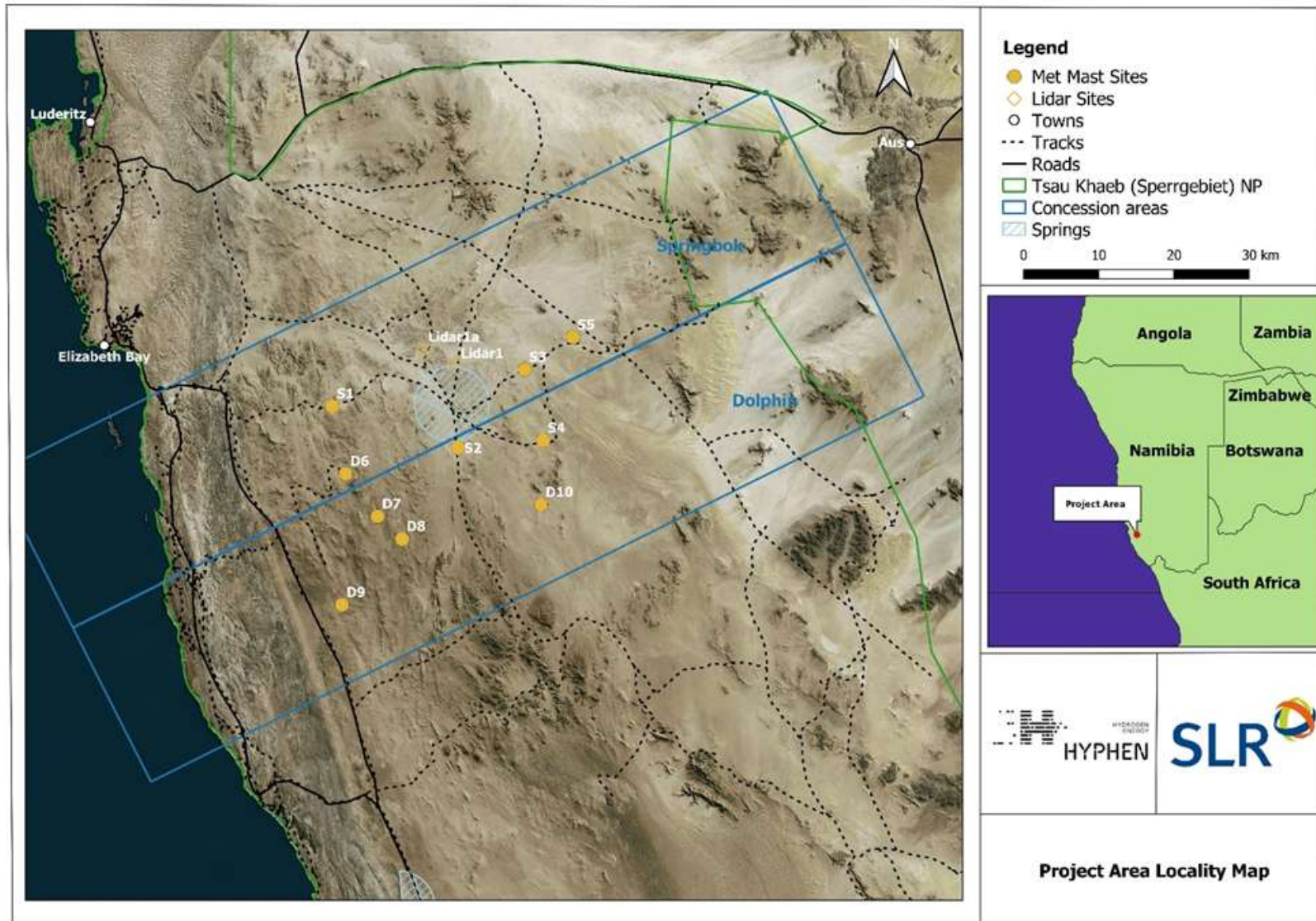


FIGURE 1-1: LOCALITY MAP SHOWING HYPHEN CONCESSION AREAS AND PROPOSED SITE LOCATIONS IN THE TSAU//KHAEB NATIONAL PARK

2. PROJECT OVERVIEW

2.1 MET MASTS

2.1.1 Number and Location

The met masts will be located within the two land concession areas (namely Springbok and Dolphin) that were awarded to Hyphen and of which are located within 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 1-1). Co-ordinates for the met mast sites are presented in Table 2-1.

NOTE: any amendments required to the final met mast locations (excluding any micro-siting to accommodate avoiding any identified *Zygophyllum applanatum* and *Polemanniopsis namibensis*) must be verified by undertaking a ground survey of the new site and obtain formal agreement from MEFT (refer to Section 5.1).

TABLE 2-1: MET MAST CO-ORDIINATES

No.	Site	Latitude	Longitude
1	S1	26°58'58.80"S	15°29'16.80"E
2	S2	27° 1'58.80"S	15°39'25.20"E
3	S3	26°56'20.40"S	15°44'49.20"E
4	S4	27° 1'26.40"S	15°46'19.20"E
5	S5	26°54'0.00"S	15°48'43.20"E
6	D6	27° 3'50.40"S	15°30'21.60"E
7	D7	27° 6'54.00"S	15°32'56.40"E
8	D8	27° 8'31.20"S	15°34'55.20"E
9	D9	27°13'15.60"S	15°30'3.60"E
10	D10	27° 6'3.60"S	15°46'8.40"E

2.1.2 Structure

Met masts are typically tall lattice structures with measuring instrumentation installed at various heights (Figure 2-1a). 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 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.

2.1.3 Foundation

Each met mast foundation occupies an area of approximately 1.5 m² but maybe larger depending on the site geotechnical conditions (Figure 2-1b). 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. Only the top of the foundation will be visible.

2.1.4 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.

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

- Rock anchors (Figure 2-1c): 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. 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.
- Steel anchors (Figure 2-1d): 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. A steel rod and plate are then placed at the bottom of the excavation and the excavated material is placed back into the hole.

2.1.5 Instruments

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, and temperature and humidity sensors.

2.2 LIDAR REMOTE SENSING

2.2.1 Number and Location

The LIDAR sensor will be located at two sites within the identified development area each representing a specific coverage area (Figure 1-1). Co-ordinates for the LIDAR sites are presented in Table 2-2.

NOTE: any amendments required to the final LIDAR locations (excluding any micro-siting to accommodate avoiding any identified *Zygophyllum appplanatum* and *Polemanniopsis namibensis*) must be verified by undertaking a ground survey of the new site and obtain formal agreement from MEFT (refer to Section 5.1).

TABLE 2-2: LIDAR CO-ORDIINATES

No.	Site	Latitude	Longitude
1	Lidar 1	26°55'55.32"S	15°39'10.51"E
2	Lidar 1a	26°54'53.90"S	15°36'39.47"E

2.2.2 Method

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 2-2) and will moved from one site to another to further reduce wind resource uncertainty.

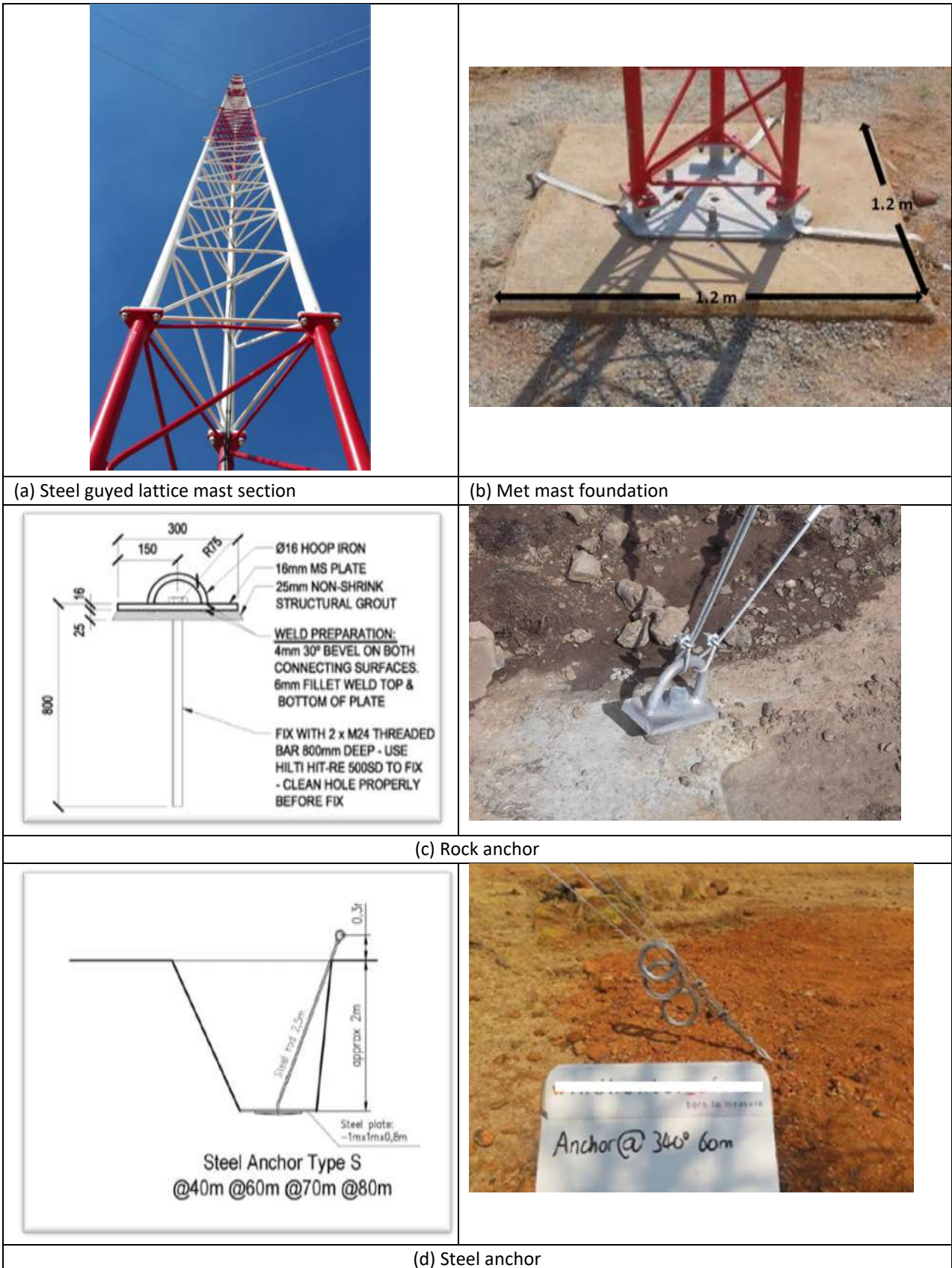


FIGURE 2-1: MET MAST STRUCTURE AND FOUNDATION



FIGURE 2-2: EXAMPLES OF MOBILE LIDAR SENSORS

2.3 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 5-1.

NOTE: any amendments required to the final agreed access routes must be verified by undertaking a ground survey of the new routes(s) and obtain formal agreement from MEFT (refer to Section 5.1).

2.4 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.

LIDAR sensors are typically located at a position for a minimum of 6 months before being moved to another location or being removed from site.

3. 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 that were undertaken is provided in Table 3-1.

- 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 impact on the archaeology of the area. This said, it is recommended that a Chance Finds Procedure be compiled and implemented on site.

The recommended management and mitigation measures are included in this EMP.

TABLE 3-1: 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"> Conduct routine checks for alien invasive plants. 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. 	LOW **

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. 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 **
2.4			Disturbance of avifauna	LOW		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.

4. ADMINISTRATION AND REGULATION OF ENVIRONMENTAL OBLIGATIONS

4.1 ORGANISATIONAL STRUCTURE

Details of the management structure for implementation of this EMP are presented below. All official communication and reporting lines including instructions, directives and information shall be channelled according to the management structure presented below.

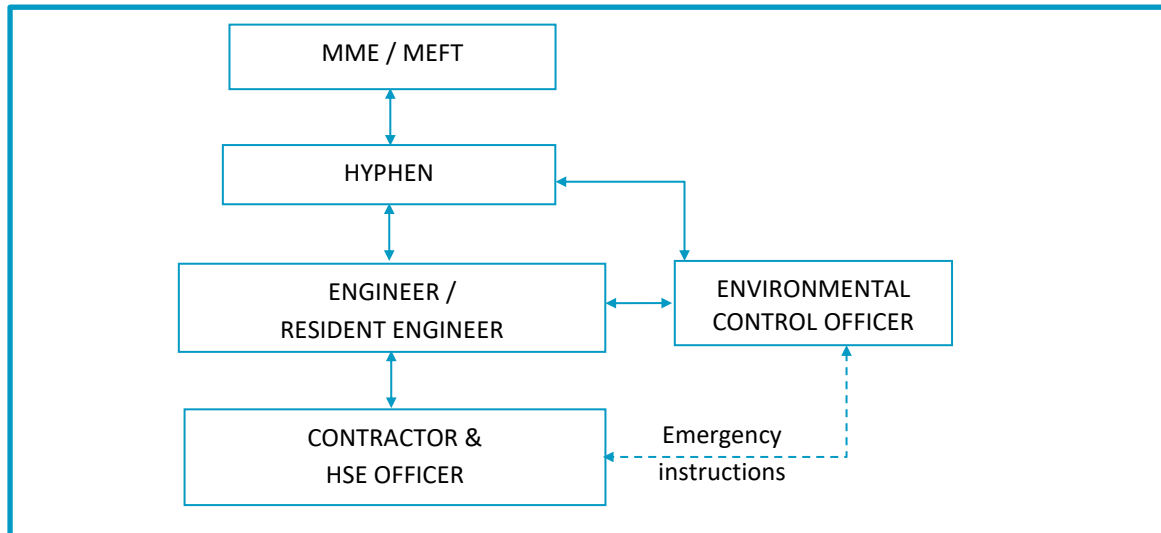


FIGURE 4-1: MANAGEMENT STRUCTURE FOR THIS EMP

4.2 ROLES AND RESPONSIBILITIES

The implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the various Project phases.

4.2.1 Developer

The Developer is the holder of the ECC and is ultimately responsible for the following tasks, amongst others:

- Implementation of the EMP and the financial cost of all environmental control measures.
- Ensuring that any person acting on its behalf complies with the conditions / specifications contained in this EMP and conditions of the ECC.
- Provide all Contractors with a copy of this EMP as part of tender contract documentation to allow the contractors to cost for its requirements within their respective contracts.
- Addressing any site problems pertaining to the environment at the request of the Ministry of Mines and Energy (MME), Ministry of Environment, Forestry and Tourism (MEFT), Engineer and/or the ECO.

The Developer will also be responsible for contracting the (1) Engineer, (2) Contractor and (3) Environmental Control Officer (ECO).

4.2.2 Engineer

The Engineer shall oversee the planning, design and construction phases of the Project. The Engineer shall appoint a Resident Engineer (RE) to act as the Developer's on-site implementing agent. The Engineer shall

address any site problems pertaining to the environment at the request of the RE and / or the ECO. The Engineer shall also be responsible for issuing penalties for contravention of the EMP.

4.2.2.1 Resident Engineer

The RE shall act as the Developer's on-site implementing agent and has the responsibility to ensure that their obligations are executed in compliance with the EMP. Any on-site decisions regarding environmental management are ultimately the responsibility of the RE. The RE shall assist the ECO where necessary and shall have the following responsibilities in terms of the implementation of this EMP:

- Reviewing and approving the Contractor's Method Statements with input from the ECO where necessary;
- The day-to-day monitoring and verifying that the EMP and Method Statements are adhered to at all times and taking action if specifications are not followed;
- Keeping a photographic record of construction activities on site;
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO where necessary;
- Ordering the removal of person(s) and/or equipment not complying with the EMP specifications;
- Issuing fines for transgressions of site rules and penalties for contravention of the EMP;
- Delaying any construction activity if he/she believes the environment has been or is likely to be seriously harmed / impacted;
- Providing input into the ECO's ongoing review of the EMP; and
- Communicating environmental issues to the Environmental Officer.

4.2.3 Contractor

The Contractor shall have the following responsibilities:

- To implement all provisions of the EMP. If the Contractor encounters difficulties with specifications, he / she must discuss alternative approaches with the RE and / or the ECO prior to proceeding.
- To ensure that all staff, including sub-contractors, are familiar with the EMP.
- Monitoring and verifying that the environmental impacts are kept to a minimum.
- To make personnel aware of environmental issues and to ensure they show adequate consideration of the environmental aspects of the Project.
- To prepare the required Method Statements (Section 4.5).
- To report any incidents of non-compliance with the EMP to the RE and / or the ECO.
- To rehabilitate any sensitive environments damaged due to his / her negligence. This shall be done in accordance with the RE's specifications.

Failure to comply with the EMP may result in fines (Section 4.8) and reported non-compliance may result in the suspension of work or termination of the contract by the Engineer.

The Contractor shall appoint, at his / her own cost, a competent individual as the on-site Health, Safety and Environment (HSE) Officer to act as the Contractor's on-site implementing agent. The HSE Officer must be appropriately trained in environmental management and must possess the skills necessary to impart

environmental management and environmental training (including induction and toolbox talks) to all personnel involved in the contract.

4.2.3.1 Health, Safety and Environment Officer

HSE Officer shall be responsible for monitoring, reviewing and verifying the Contractor's compliance with the EMP during the construction phase. The HSE Officer's duties in this regard shall include, *inter alia*, the following:

- Monitoring and verifying that the EMP and Method Statements are adhered to at all times and taking action if specifications are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum;
- Inspecting the site on a daily basis with regard to compliance with the EMP;
- Keeping accurate and detailed records of these inspections;
- Completing weekly checklists;
- Assisting the RE and ECO in finding environmentally responsible solutions to problems;
- Supervision of work where environmental management is a key aspect (e.g., in sensitive areas, with high environmental risk, etc.);
- Keeping a record of on-site incidents and accidents and how these were dealt with; and
- Reporting any incidents of non-compliance with the EMP to the RE and / or the ECO.

4.2.4 Environmental Control Officer

An independent ECO shall be appointed by the Developer. The ECO's duties shall include, *inter alia*, the following:

- Updating the EMP to include relevant ECC conditions or other significant EMP changes.
- Reviewing Method Statements.
- Presenting the initial environmental awareness training course to the Contractor's site staff.
- Advising the Contractor and / or the RE on environmental issues within defined construction areas.
- Undertaking regular site visits to ensure compliance with the EMP and verifying that environmental impacts are kept to a minimum throughout the contract. For the proposed Project, it is likely that, as a minimum, four site inspections will be sufficient: (1) prior to construction during site demarcation; (2) during construction activities (site clearance activities in particular); (3) upon completion of construction; and (4) post-decommissioning.
- Completing environmental checklists / reports during site visits.
- Keeping a photographic record of progress on site from an environmental perspective.
- Attending site meetings.
- Assisting the Contractor and / or HSE Officer in finding environmentally acceptable solutions to construction problems.
- Recommending additional environmental protection measures should this be necessary.
- Assisting the RE in ensuring that the necessary environmental authorisations and permits have been obtained.
- Ensuring that MEFT is informed of work progress on site and ensuring that MEFT approve any deviations to the approved site layout.

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- Reporting any incidents that may or have caused damage to the environment or breaches of the EMP to MEFT.
 - Recommending the issuing of fines for transgressions of site rules and penalties for contraventions of the EMP (via the RE).
 - Advising on the removal of person(s) and/or equipment not complying with the specifications (via the RE).
 - Compiling a final environmental audit report at the conclusion of the construction phase for submission to MEFT, and any other reports as specified by MEFT.

4.3 EMP ADMINISTRATION

Copies of the EMP shall be made available to the Engineer, RE, Contractor, HSE Officer and the ECO.

Hard copies of this EMP shall be kept at the construction camp / site office(s) and copies shall be distributed to all senior contract personnel. All senior personnel shall be required to familiarise themselves with the contents of this document.

Any significant revisions to the EMP document, as determined by the RE or ECO, must be approved by MEFT before the revised EMP is implemented (see table below). A significant change is where the change will lead to a significant departure from the base-case or the mitigation, as specified in the EMP, affects the Project's ability to meet environmental and social performance requirements and does not adequately address the assessed impact (s).

The ECO shall be responsible for the implementation and distribution of any "approved" revisions to the EMP.

4.4 NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION

Hyphen shall give MEFT (both the Directorate of Environmental Affairs and Directorate of Wildlife and National Parks) at least one week's written notice prior to the commencement of construction.

Hyphen or the Contractor shall also notify Namdeb prior to accessing Site D9, which is located within ML 44, and indicate the location and duration of construction in that area.

4.5 METHOD STATEMENTS

The Contractor shall submit written Method Statements to the Developer / Engineer / RE and ECO for all environmentally sensitive aspects of the work. Method Statements shall cover applicable details with regard to:

- Construction procedures;
- Materials and equipment to be used;
- Getting equipment to and from site;
- How the equipment/material will be moved while on site;
- How and where material will be stored;

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- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
 - Timing and location of activities;
 - Compliance/non-compliance with the Specifications; and
 - Any other information deemed necessary by the Engineer / RE or ECO.

Method Statements shall be submitted to the Developer / Engineer / RE and ECO **at least fourteen (14) days prior** to the commencement of operations. It should be noted that Method Statements must contain sufficient information and detail to enable the Engineer / RE and ECO to apply their minds to the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him / her in order to undertake the works. The Contractor shall keep the approved Method Statements on file.

Work shall not commence until Method Statements have been approved by the Developer / Engineer / RE. Failure to submit Method Statements may cause the RE to order the Contractor to suspend part or all of the works concerned until a Method Statement has been submitted and approved. Any damage caused to the surrounding environment by work done without prior approval shall be rehabilitated at the Contractor's cost.

Based on the specifications in this EMP, the following Method Statements are required as a minimum:

MS1: Site demarcation (Section 5.3)

MS2: Site clearing (Section 5.4). This may be combined with the site demarcation method statement.

MS3: Cement and Concrete Batching (Section 5.12).

The Engineer / RE or the ECO shall specify any additional Method Statements that may be required. Where relevant the Method Statements indicated above can be combined on agreement with the Engineer / RE or ECO.

4.6 ENVIRONMENTAL INDUCTION AND AWARENESS TRAINING

4.6.1 Construction Staff

Before the commencement of any work on site, the Contractor's site management staff shall attend an environmental awareness-training course presented by the ECO. The Contractor shall liaise with the ECO prior to the commencement date of construction to fix a date and venue for the training.

The information presented at the course shall be communicated by the Contractor to all employees on the site through regular toolbox talks, to any new employees coming onto site after the initial training course and to any suppliers that are required to enter the site. The presentation shall be conducted, as far as is possible, in the employees' language of choice (at minimum, English and Afrikaans). As a minimum, training shall include:

- Explanation of the importance of complying with the EMP.
- Discussion of sensitive environmental features and the potential impacts of construction activities.
- Explanation of the management structure of individuals responsible for EMP implementation.
- Employees' roles and responsibilities, including emergency preparedness.

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- Description of the mitigation measures that must be implemented when carrying out different activities.
 - Explanation of the specifics of the EMP and its specifications.

The Contractor shall keep records of all environmental training sessions, including names, contact and signatures of attendees, dates of their attendance and the information presented to them.

In addition, all site staff will be required to sign a Code of Conduct to ensure staff are well informed and commit to abiding by park restrictions and relevant environmental controls relating to work force behaviour.

4.6.2 ECO and HSE Officer

Prior to the commencement of construction, the ECO and HSE Officer shall attend a briefing session by an archaeologist. The briefing should provide for the following:

- Site / artefact identification;
- Sampling / data collection and management; and
- Permit requirements and application process.

4.7 MONITORING AND REPORTING

4.7.1 Construction Phase

The day-to-day monitoring and verification that the EMP is being adhered to shall be undertaken by the HSE Officer. Monitoring prior to construction must include a full photographic record of all mast and LIDAR sites, including demarcated laydown and work areas, as well as any nearby sensitive areas (e.g., sensitive ecological features and archaeological sites), and access track sections where earthworks / clearing is required (at 500m intervals along these sections of track). HSE Officer shall prepare weekly monitoring reports / checklists for submission to Developer / Engineer / RE / ECO.

The ECO shall undertake ad hoc inspections to ensure that correct operational procedures are being implemented and that the Contractor is complying with the environmental specifications in the EMP. For the proposed Project, it is likely that, as a minimum, four site inspections will be sufficient: (1) prior to construction during site demarcation; (2) during construction activities (site clearance activities in particular); (3) upon completion of construction; and (4) post-decommissioning. Additional site inspections by the ECO may be needed during the initial and final stages of the Project. ECO shall prepare monitoring reports / checklists per site visit for submission to Developer / Engineer / RE / HSE Officer.

At the conclusion of the construction phase, an environmental audit report shall be compiled and submitted to MEFT (both the Directorate of Environmental Affairs and Directorate of Wildlife and National Parks). This report shall be compiled by the ECO, in collaboration with the Engineer / RE and Contractor / HSE Officer. It shall, as a minimum, outline the implementation of the EMP, and highlight any problems and issues that arose during the construction period and to report the lessons learned from this Project.

4.7.2 Operation / Maintenance Phase

The monitoring and verification that the EMP is being adhered to shall be undertaken by the maintenance staff themselves. A monitoring report / checklist shall be prepared after each maintenance visit highlighting any problems and issues that arose and kept on file.

A monitoring system for alien plant species shall be established for maintenance staff, paying particular attention to high-risk areas such as rivers, drainage lines and roadways.

4.7.3 Decommissioning Phase

After decommissioning, an environmental audit report shall be compiled and submitted to MEFT (both the Directorate of Environmental Affairs and Directorate of Wildlife and National Parks). This report shall be compiled by an independent Environmental Assessment Practitioner or terrestrial ecologist. It shall, as a minimum, outline the demobilisation of infrastructure and rehabilitation of disturbed areas, as well as to report the lessons learned from this Project.

4.8 NON-COMPLIANCE AND PENALTIES

Non-compliance with this EMP must be monitored by the Engineer / RE / HSE Officer and ECO. Any non-compliance must be reported to the competent authority.

A system of fines shall be implemented to ensure compliance with the EMP. Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications of the EMP this would constitute a breach of Contract for which the Contractor may be liable to pay a fine. The Contractor is deemed not to have complied with the EMP if:

- There is evidence of contravention of the EMP specifications, including any non-compliance with an approved Method Statement;
- Construction activities take place outside the defined boundaries of the site;
- Environmental damage ensues due to negligence;
- The Contractor fails to comply with corrective or other instructions issued by the ECO / Engineer / RE within a specific time period; and/or
- The Contractor fails to respond adequately to complaints from the competent authority.

If excessive infringement with regard to any of the above (as determined by the Engineer) is registered, then Hyphen reserves the right to terminate the Contractor's contract.

The system of fines shall be implemented in the following way:

- Fines shall be issued per incident at the discretion of the Engineer;
- Fines shall be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications;
- The Engineer shall inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from the Contractor's monthly Payment Certificates; and
- Fines shall be imposed by the Engineer on the Contractor for contravention of the environmental specifications.

Failure by any employee of the Contractor to show adequate consideration to the environmental aspects of the contract shall be considered sufficient cause for the Engineer / RE or ECO to recommend to the Engineer to have that employee removed from the site. The Engineer / RE or ECO through the Engineer / RE) may also order the removal of equipment that is causing unnecessary or irresponsible environmental damage.

NOTE:

Key to mitigating impacts is minimising the disturbance outside the designated construction footprint.

Disturbance outside the designated construction footprint and entry into no-go areas without permission WILL RESULT IN A PENALTY.

In addition, the contractor will be responsible for any CLEAN-UP AND/OR REHABILITATION of all areas impacted outside designated construction areas.

4.9 ENVIRONMENTAL PERMITS

4.9.1 Vegetation Clearing

Protected plants that may need to be removed as part of the Project development will require a permit from the MEFT (Forestry Directorate). A list of possible plant species that may be encountered in the vicinity of the Project footprint is presented in Appendix A.

Should protected plant need to be removed, the ECO shall apply to MEFT for a permit to clear this vegetation prior to construction commencement.

4.9.2 Archaeological Permit

Although no archaeological material was found in the immediate vicinity of the met mast and LIDAR sites, the disturbance to or destruction of any archaeological object that may be found during construction requires a permit. Refer to Chance Finds Procedure in Section 5.10.

4.10 COMMUNICATION

The TKNP has complete radio and network coverage, and the construction and maintenance teams will need to arrange for field radios from either MEFT (TKNP Park Warden) or mining companies (Namdeb or Sperrgebiet Diamond Mining), unless alternative communication protocols are agreed.

4.11 EMERGENCY PROCEDURES

All team members and staff entering the TKNP shall determine appropriate procedures in the event of an emergency (e.g., medical emergencies, runaway fires, environmental incidents, site evacuation and staff assembly). It is likely that Contractors conducting work within the TKNP will fall under the mining companies Emergency Response Plan procedures. However, this should be discussed and agreed with Namdeb and / or Sperrgebiet Diamond Mining during logistics planning.

Key safety precautions that shall be taken when out in the field include:

- Having an Emergency Response Plan procedures (including Emergency contact details) in place;
- Carrying a first aid kit and fire fighting equipment;
- Carrying a working handheld radio (to be checked prior to each departure);
- Carrying a fully charged mobile phone (with car charger and backup power bank);
- Installing emergency numbers on phone; and
- Ensuring all team members know the routes and whereabouts of other members at all times.

5. ENVIRONMENTAL SPECIFICATIONS: CONSTRUCTION AND DECOMMISSIONING

This section includes specifications for the construction and decommissioning phases. Refer to Section 6 for operational phase specifications.

5.1 FINAL DESIGN AND POSITIONING

- a) Verify any amendments required to the final met mast / LIDAR locations (Figure 1-1) or access routes (Figure 5-1) by undertaking a ground survey (by a terrestrial ecologist or MEFT: TKNP official, as well as an archaeologist or ECO who has been briefed by an archaeologist) of the new site / route and obtain formal agreement from MEFT (TKNP official).
- b) Equip each upper guy wire with bird flight diverters, specifically to alert low-flying collision prone birds such as Ludwig's Bustards.
 - i. 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.
 - ii. Markers should be a contrasting colour to the guy wire.
 - iii. 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.
- c) Comply with Namibia Civil Aviation Authority (NCAA) mast lighting requirements. If acceptable, lighting should comprise red or green (rather than white), flashing (rather than steady burning) lights.
- d) Position the mast and anchors and lay-down areas to avoid:
 - i. *Zygophyllum applanatum* dwarf shrubs at S5 (Figure 5-2). Mark plant locations to ensure construction activities avoid these plants.
 - ii. *Polemanniopsis namibensis* (Figure 5-3) 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.
 - iii. Any pile of stones or mound of earth that may resemble a possible grave. Mark locations to ensure construction activities avoid these "sites".
- e) Consider some form of protection for LIDAR and mast equipment, such as temporary fencing, to prevent hyena damage or place at a height it cannot be accessed by hyenas.

5.2 PARK ENTRY AND SITE ACCESS

- a) Ensure the necessary permits are in place to access the TKNP, including (1) MEFT Free Entry Permit (in terms of Section 78(l) of the Nature Conservation Ordinance, 1975 and (2) Restricted Area Permit (in terms of Section 27(K) of the Diamond Act).
- b) Contractor to provide a Logistic Plan to the Developer for their approval, detailing which Park entrance will be utilised, detailing any permission require to use this entrance.
- c) Avoid the creation of new tracks by ensuring the final agreed access routes are adhered to at all times.
- d) Agreed access routes shall be loaded to designated driver's phones / GPS to ensure incorrect routes are not used.

- e) Avoid the need for vehicle passing or overtaking, as far as possible, by ensuring there is clear communication between vehicles (radio communication) travelling to / from site.
- f) Refer to Section 5.11 for other traffic related specifications.

5.3 SITE DEMARCATION

The 'site' refers to the construction footprint and immediate area where execution of the contract will take place, as awarded to the Contractor, and any other area reasonably required by the Contractor to undertake the construction activities in order to fulfil the contract (including laydown areas).

Access tracks

- a) With respect to the approved track that require 'upgrading', these upgrades need to be clearly demarcated (e.g., with wooden or metal stakes) where machinery can move, turn-around, overtake and park.
- b) Approved upgrades need to be comply with the approved layout and the Contractor must adhere to the demarcations and minimise any clearing and levelling of vegetation.

Met masts and LIDAR sites

- c) Where feasible, minimise the construction footprint to within the final guy wire spread, including laydown area.
- d) Where this is not possible, demarcate (e.g., with wooden or metal stakes) the working footprint, including laydown area, turning circle, etc. Demarcation at each site is to be undertaken in consultation with the ECO or MEFT: TKNP official.
- e) Mark locations of *Zygophyllum applanatum* (at Site S5) and *Polemanniopsis namibensis* (at Sites S1, S2, S3, LIDAR1 and LIDAR1a) within the larger demarcated footprint so that the mast, anchors and lay-down areas can be avoid these species.
- f) Mark any pile of stones or mound of earth that may resemble a grave.

General

- g) The area located outside of the demarcated construction footprint shall be regarded as a 'no-go' area.
- h) Avoid hills, inselbergs, ridges and other prominent features (e.g., Kaukausib Spring) and treat as no-go areas.
- i) The Engineer / RE may declare additional no-go areas at any time during the construction phase as deemed necessary and/or at the request of the ECO.
- j) The Contractor shall maintain in good order all demarcation stakes for the duration of construction activities, or as otherwise instructed.
- k) The Contractor shall ensure that the crew's movements are limited to the demarcated construction footprint under all circumstances except on official business (as instructed by Engineer / RE or ECO).
- l) The Contractor shall be responsible for any clean-up and/or rehabilitation of all areas impacted outside designated construction areas.

MS1: The Contractor shall submit a Site Demarcation Method Statement, which shall indicate how the site (including site access, access earthworks, sites, laydown areas, turning circles, etc.) will be demarcated in order to minimise the construction footprint and impact on indigenous vegetation.

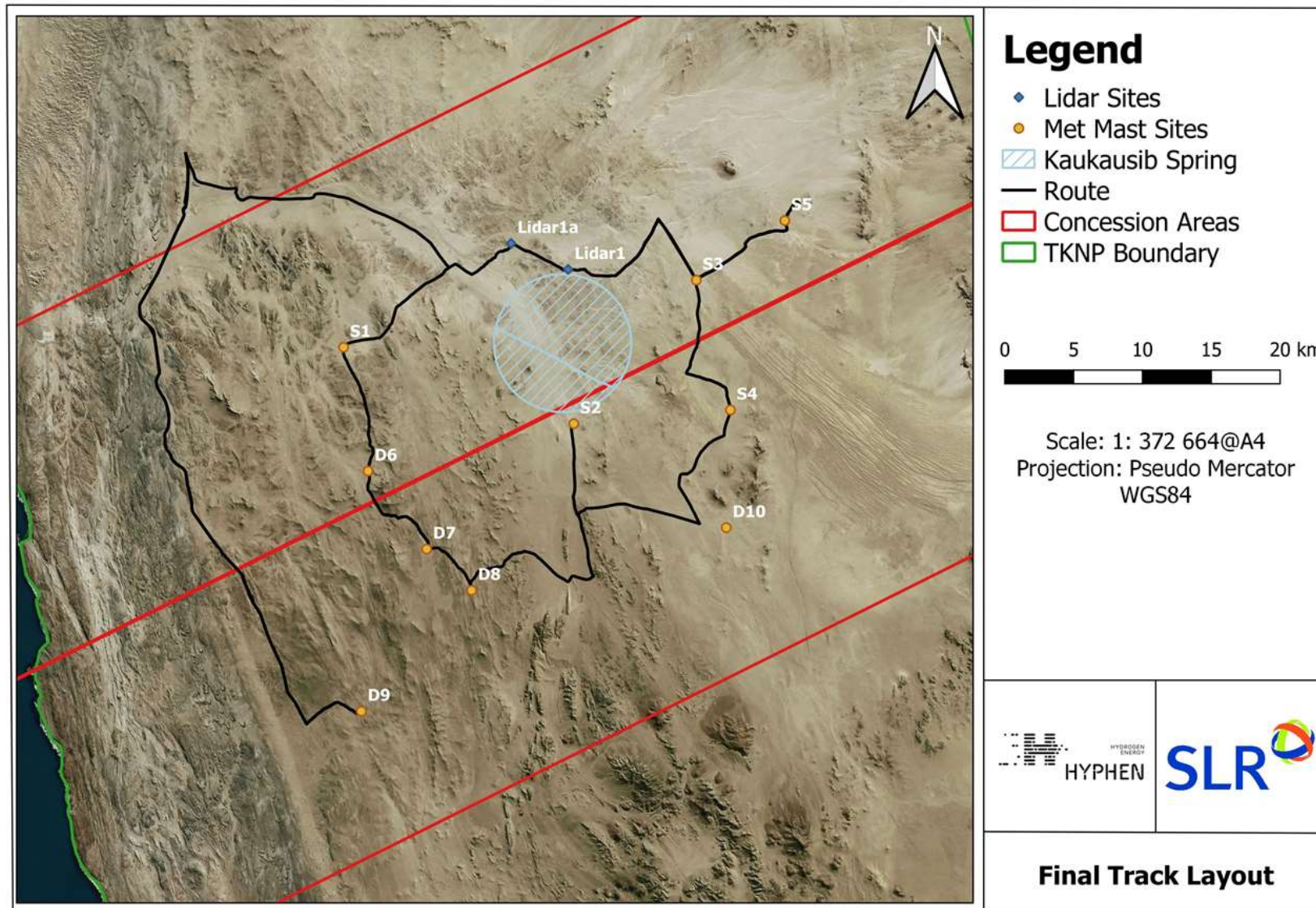


FIGURE 5-1: FINAL ACCESS ROUTE LAYOUT



FIGURE 5-2: RELATIVELY INCONSPICUOUS RED-LISTED SMALL SHRUB *ZYGOPHYLLUM APPLANATUM* OCCURS AT SITE S5

Source: Burke 2022



FIGURE 5-3: *POLEMANNIOPSIS NAMIBENSIS*, A SPECIES THAT 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

5.4 SITE CLEARING

- a) Engineer / RE or ECO must ensure a permit has been obtained from MEFT (Forestry Directorate) to clear any protected plants that may be found in the construction footprint (see Section 4.9.1).
- b) No clearing shall take place before the construction footprint has been demarcated (refer to Section 5.3).
- c) 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 so that any vegetation damaged above-ground has a chance to recover from below-ground root stocks. In the event vegetation needs to be cleared (e.g., section of access track), push the vegetation and topsoil to the side of the site to be cleared.
- d) Take before and after photographs of the upgrading works / site clearance and document these works in the HSE Officer reports.
- e) Ensure a MEFT: TKNP official is present during the approved track upgrading works to advise on the identification of protected species that could have been missed during the specialist walkdowns.
- f) Before commencing clearing activities, scan the construction footprint for bird nests.
 - i. 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.
 - ii. Should an Endangered Ludwig's Bustard be found breeding near the construction area, the following will be undertaken:
 - 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). When a suspected cultural heritage object is discovered, implement a Chance Finds Procedure (refer to Section 5.10) and obtain any archaeological permits that may be required.
- g) The disposal of vegetation by burying or burning is prohibited.

MS2: The Contractor shall submit a Site Clearing Method Statement for all areas where the Contractor is required to, or intends to, clear vegetation and remove topsoil. The Method Statement shall clearly indicate what is to be cleared and how this will be done, where and how cleared material would be stored or disposed of, how the contamination of topsoil with subsoil will be prevented, etc. This method statement can be combined with the Site Demarcation Method Statement.

5.5 MATERIALS HANDLING AND STORAGE

5.5.1 Storage of Equipment

- a) All construction equipment, vehicles or other items shall either be stored within the demarcated construction footprint or removed from site daily.
- b) Drip trays shall be provided for stationary equipment (such as compressors, pumps, generators, etc.) and for "parked" plant (e.g., mechanised equipment).
- c) Store construction equipment is susceptible to hyena damage appropriately (e.g., on vehicles or storage container) or implement some form of protection (e.g., ready fence panels).

5.5.2 Storage of Hazardous Substances

- a) Fuel shall be stored in suitable containers (with mobile bund) or fuel bowser.
- b) Suitable fire fighting equipment, to the approval of the Engineer / RE, shall be provided onsite.

5.6 REFUELLING AND MAINTENANCE

5.6.1 Refuelling

- a) Where reasonably practical, all equipment and vehicles shall only be refuelled in a demarcated refuelling/servicing area (as agreed to with the Engineer / RE and ECO) using suitable equipment (e.g., funnels).
- b) The surface under the refuelling/servicing area shall be protected against pollution (e.g., the use of drip trays) to the reasonable satisfaction of the Engineer /RE and ECO prior to any refuelling activities.
- c) The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown spills (spill kit). The quantity of such materials shall be able to handle the total volume of the hydrocarbon/ hazardous substance stored on site.

5.6.2 Maintenance

- a) All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment shall be repaired immediately or removed from the site.
- b) Where reasonably practical, maintenance activities shall only be undertaken in a demarcated maintenance area (as agreed to with the Engineer / RE and ECO).
- c) When servicing equipment, drip trays / mobile bund shall be used during the collection of waste oil and other lubricants. All hazardous waste from maintenance activities shall be disposed of as specified in Section 5.8.1.
- d) Broken infrastructure shall be disassembled and removed off-site as soon as reasonably possible after breakdown.

5.7 ACCIDENTAL LEAKS AND SPILLS

- a) The Contractor shall ensure that staff are aware of the procedure to be followed for dealing with spills and leaks.

- b) Any accidental leak and spill of fuel, oil or other hazardous substances is to be reported to the Engineer / RE or ECO immediately so that the best remediation method can be quickly implemented.
- c) The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown spills (spill kit). The quantity of such materials shall be able to handle the total volume of the hydrocarbon/ hazardous substance stored on site.
- d) Procedures detailed in the Material Safety Data Sheets shall be followed in the event of a spill or emergency situation.
- e) Hydrocarbon contaminated material and / or soil shall be collected and stored in a suitable container (e.g., drum) with mobile bund / drip tray and removed from site at the end of the day for disposal (Section 5.8.1).
- f) The Contractor shall be liable to arrange for professional service providers to clean up the area affected by the spill, if required.

5.8 WASTE MANAGEMENT

5.8.1 Hydrocarbon and Hazardous Waste

- a) All hydrocarbon (e.g., fuel, oils and contaminated soil / materials) and other hazardous waste resulting from spills, refuelling and maintenance activities shall be disposed of at an approved hazardous waste site or, where possible, sold to an approved used-oil recycling company.
- b) No hydrocarbon and hazardous waste shall be burnt or buried on site.
- c) The Contractor shall provide disposal certificates issued by the hazardous waste disposal facility to the Engineer / RE. In addition, disposal certificates shall be kept by the Contractor for inspection by the Engineer / RE or ECO.

5.8.2 Solid Waste

Solid waste includes all construction waste (rubble, cement bags, old cement, tags, wrapping materials, timber, cans, wire, nails, etc.) and surplus food, food packaging, organic waste, etc.

- a) An integrated waste management approach shall be used, based on the principles of waste minimisation, reduction, re-use and recycling of materials.
- b) Contractor shall be responsible for the establishment of a solid waste control and removal system that is acceptable to the Engineer / RE and ECO in order to prevent the spread of waste in, and beyond, the construction area.
- c) The Contractor shall ensure that the site is kept free of litter. The general cleanliness of the site shall form part of the Engineer's / RE's and ECO's inspections.
- d) Solid waste shall be removed from site daily and may not be temporarily stored on site.
- e) No waste material or litter shall be burnt or buried on site.
- f) All solid waste shall be disposed of offsite either at the municipal landfill site in Lüderitz or collected by a third party / municipality appointed waste collection service. The Contractor shall supply the Engineer / RE with certificates of disposal, if disposal at the landfill is required.

5.9 PROTECTION OF NATURAL FEATURES, FLORA AND FAUNA

- a) No unauthorised vegetation removal is allowed.
- b) Approved clearing of natural vegetation shall be kept to a minimum (refer to Section 5.3 and 5.4). The removal (including plant harvesting and firewood collection), damage and disturbance of natural vegetation without the written approval of the Engineer / RE is prohibited.
- c) Avoid any construction activities, including driving, after dusk and before dawn to minimise risk of animal injury or mortality.
- d) 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/red light rather than a white light.
- e) The Contractor shall ensure that no hunting, trapping, shooting, poisoning or otherwise disturbance of any fauna takes place.
- f) The feeding of any wild animals or leaving of organic food remains by construction staff is prohibited.
- g) Any animal (mammal, reptile, amphibian, bird, or arthropods (e.g., spider, scorpions or large beetles) found to be trapped within the site or in distress as a result of the site activities shall be appropriately relocated to a suitable site under the guidance of the ECO, relevant specialist (if required) or relevant authorities.
- h) The Contractor shall not permit staff to make use of any natural water sources found within the TKNP for construction purpose.
- i) The Contractor shall not deface, paint, damage or mark any natural feature (e.g., rocks, etc.) situated on or around the site for survey or any other purposes unless agreed beforehand with the RE. This includes collection and piling of rocks to form a beacon or other landmark. Any features affected by the Contractor in contravention of this clause shall be restored / rehabilitated to the satisfaction of the RE.

5.10 CHANCE FINDS PROCEDURE

When a suspected cultural heritage site, artefact or fossil is discovered on site the Chance Finds Procedure shall be implemented (refer to Appendix C for examples of archaeological facts found during the May 2022 site visit). The purpose of this procedure is to provide guidance on the management of cultural heritage that may be discovered during construction or excavation. This procedure shall be used as a guideline in the event of a discovery on site.

- a) When a suspected cultural heritage site, artefact or fossil is discovered, the construction activity in the immediate area shall cease immediately, and the potential find shall be reported to the ECO.
- b) The area shall be cordoned off from any surrounding activities, where applicable.
- c) The ECO will conduct a preliminary investigation of the site and, if necessary, communicate any necessary information to a professional archaeologist.
- d) Should the archaeologist, in consultation with the National Heritage Council, recommend an in-depth study or excavation, Hyphen shall contract a professional archaeologist to assess the find and obtain the relevant permitting (comply with permit requirements). Alternatively, the activity could be relocated to avoid the archaeological site or artefact.
- e) Records shall be kept of the chance find, including mapping of the site.

5.11 TRAFFIC MANAGEMENT AND CONTROL

- a) All drivers shall adhere to the final agreed access routes all times and implement strict track discipline. Strictly no deviation from designated routes or tracks is allowed.
- b) Avoid the need for vehicle passing or overtaking, as far as possible, by ensuring there is clear communication between vehicles (radio communication) travelling to / from site.
- c) All vehicles shall have a broom to sweep any tracks that deviate from access routes (refer to Section 5.19).
- d) Reasonable speeds shall be maintained on the access roads in order to prevent accidents, excessive noise and unnecessary dust. Speed limits shall be enforced, and where a speed limit is not specified then speed shall depend on the type of vehicle, status of the road and other traffic but speeds between 20 and 40 km/h are typically regarded as acceptable.
- e) Hooting, flashing lights and excessive noise by workers and construction vehicles (e.g., unnecessary revving of vehicles) shall be avoided.
- f) Wildlife shall be allowed to move out of the way of any traffic.
- g) Any collisions with wildlife, including with snakes or birds, shall be photographed, documented, and reported to MEFT (TKNP official).

5.12 CEMENT AND CONCRETE BATCHING

Although no concrete batching is anticipated on site as pre-cast concrete bases will be delivered to the site, the following shall be implemented for any ad hoc batching that may be necessary.

- a) The concrete batching activities shall be located in an area of low environmental sensitivity within the demarcated construction footprint to be identified and approved by the Engineer / RE, in consultation with the ECO.
- b) Concrete mixing directly on the ground shall not be allowed and shall take place on impermeable surfaces to the satisfaction of the Engineer / RE.
- c) All excess concrete / aggregate shall be removed from site on completion of concrete works and disposed of at an approved landfill site.
- d) Washing of the excess cement / concrete into the ground shall not be allowed.

MS3: If ad hoc cement batching is required, the Contractor shall submit a Method Statement detailing cement storage, concrete batching areas and methods, method of transport of cement and concrete, storage and disposal of used cement bags, etc. for each concrete batching operation.

5.13 ABLUTION FACILITIES

- a) A sufficient number of toilets shall be provided for the site staff at a ratio of not less than 1 toilet per 15 people.
- b) Chemical toilet facilities only shall be located within the demarcated laydown area.
- c) No toilet facilities shall be located closer than 100 m to any water body or ephemeral surface water feature.
- d) Toilets shall be adequately secured to the ground and weighted to prevent them from toppling due to wind or any other cause.

-
- e) Certificates of service/disposal by appropriate service providers or at appropriately licensed facilities shall be retained for submission to the Engineer / RE or ECO.
 - f) Discharge of waste from toilets into the environment (e.g., burial of ablution waste from toilets) is strictly prohibited.

5.14 ACCOMMODATION

- a) No accommodation (or camping) shall be provided on site within the TKNP, unless approval is obtained from MEFT (TKNP official).
- b) No open fires shall be allowed on site for any purpose.

5.15 EATING AREAS

- a) The Contractor shall establish eating areas, as agreed with the Engineer / RE or ECO. These areas shall provide adequate temporary shade and protection from the wind to ensure staff do not move off site.
- b) The Contractor shall ensure that all eating areas are cleaned up on a daily basis and no littering occurs and that a designated waste bin (secured from wind) is provided. Solid waste shall be removed from site daily.
- c) No natural water resource within the TKNP shall be used for washing of pots, plates, clothing, etc.

5.16 FIRE CONTROL

- a) No open fires shall be allowed on site for any purposes (e.g., cooking or warmth).
- b) The Contractor shall ensure that all site personnel are aware of the procedure to be followed in the event of a fire.
- c) The Contractor shall ensure that there is basic fire-fighting equipment on site at all times. This equipment shall include fire extinguishers and / or beaters.
- d) Smoking is not allowed on site, other than at designated smoking points. Cigarette butts shall not be discarded on the ground.

5.17 EROSION CONTROL

Erosion is not anticipated to occur at the site. However, all reasonable measures shall be taken to limit erosion:

- a) The Contractor shall, as an ongoing exercise, provide erosion control, where necessary, to the satisfaction of the Engineer / RE.

5.18 ALIEN VEGETATION CONTROL

- a) All construction vehicles shall be sprayed (undercarriage and tyres) with water at a designated facility outside the TKNP prior to first entry (i.e. it is not necessary to spray a vehicle daily after initial Park access).

-
- b) The ECO shall conduct routine checks for alien invasive plants in construction areas as part their inspection activities. A list of potential alien invasive plant species is presented in Appendix D.
 - c) The Contractor shall be responsible for ensuring that all disturbed areas remain free of invasive alien species during the construction period; after which Hyphen shall assume responsibility until after decommissioning. Any alien invasive plants found in areas disturbed by the Project shall be removed, bagged and incinerated (in designated area outside the TKNP).

5.19 REHABILITATION OF DISTURBED AREAS

- a) All areas disturbed by construction activities, laydown areas, etc., and not required during operation, shall be rehabilitated to the satisfaction of the Engineer / RE after the construction phase is complete.
- b) As a minimum, the roller paint brush “brooming” method shall be used, especially on terrain where tracks are unlikely to naturally restore, e.g., gravel plains.

6. ENVIRONMENTAL SPECIFICATIONS: OPERATION

This section includes specifications for the operation (or maintenance) phase. As noted in Section 2.4, it is anticipated that 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. LIDAR sensors are typically located at a position for a minimum of 6 months before being moved to another location or being removed from site.

Many of the specifications are similar to that implemented during the construction phase and are not repeated below, except that there will be no Engineer, RE, HSE Officer or ECO in place during operation.

6.1 PARK ENTRY AND SITE ACCESS

Refer to Section 5.2.

6.2 MATERIALS HANDLING AND STORAGE

- a) All equipment, vehicles or other items required for maintenance shall be removed from site daily (preferable) or if, necessary, stored within a demarcated area near each mast / LIDAR site and protected animals (such as hyenas).
- b) Drip trays shall be provided for stationary plant (such as compressors, pumps, generators, etc.) and for "parked" plant (e.g., mechanised equipment).

6.3 REFUELLING AND MAINTENANCE

Refer to Section 5.6.

6.4 ACCIDENTAL LEAKS AND SPILLS

Refer to Section 5.7.

6.5 WASTE MANAGEMENT

Refer to Section 5.8.

6.6 PROTECTION OF NATURAL FEATURES, FLORA AND FAUNA

- a) Refer to Section 5.9.
- b) During operations, if a nest (on a met mast structure) is active (i.e. birds incubating eggs or raising chicks) it must be left undisturbed and may not be removed until breeding activities have concluded (i.e. the chicks have fledged and / or the adult birds have permanently left the nest).
- c) Maintenance staff shall record any carcasses found at met mast sites. Record data in a spreadsheet and share with Hyphen's avifaunal / environmental consultants or MEFT (TKNP official) on a regular basis.

6.7 TRAFFIC MANAGEMENT AND CONTROL

Refer to Section 5.11.

6.8 ABLUTION FACILITIES

There will be no ablution facilities on site. Toilet paper shall be burned on site or removed and disposed of in Lüderitz.

6.9 ACCOMMODATION

No accommodation (or camping) shall be provided on site within the TKNP, unless approval is obtained from MEFT (TKNP Park Warden).

6.10 EATING AREAS

Refer to Section 5.15.

6.11 FIRE CONTROL

Refer to Section 5.16.

6.12 ALIEN VEGETATION CONTROL

- a) The maintenance team shall conduct routine checks for alien invasive plants. A list of potential alien invasive plant species is presented in Appendix D.
- b) The maintenance team shall be responsible for ensuring that all disturbed areas remain free of invasive alien species until decommissioning. Any alien invasive plants found on site shall be removed, bagged and incinerated (in designated area outside the TKNP).




6.13 REHABILITATION OF DISTURBED AREAS





- c) On completion of the Project, the Contractor shall ensure that all structures, equipment, materials, etc. are removed with minimum damage to the surrounding area.
- d) All areas disturbed by the Project (including access tracks create for this Project, mast foundations, anchors, etc.), unless these areas form part and are approved as part of the larger Green H2 Project, shall be rehabilitated to the satisfaction of MEFT (Directorate of Wildlife and National Parks) after the Project is complete.
- e) As a minimum, the roller paint brush “brooming” method shall be used, especially on terrain where tracks are unlikely to naturally restore, e.g., gravel plains.
- f) Excavated holes or trenches shall be filled and reinstated.





APPENDIX A: LIST OF PROTECTED PLANTS THAT MAY BE FOUND IN THE PROJECT AREA REQUIRING A PERMIT FROM THE MEFT (FORESTRY DIRECTORATE)


p(F) = protected Forest Act

p = protected Nature Conservation Ordinance






No.	Plant species	Protection
1.	<p><i>Vachellia (Acacia) erioloba</i> Camel thorn tree</p>  <p>Source: C. Mannheimer</p>	p(F)
2.	<p><i>Aloidendron dichotomum</i> Quiver tree</p>  <p>Source: A. Burke</p>	p(F)
3.	<p><i>Aridaria noctiflora ssp. Noctiflora</i> Night Desertfig</p>  <p>Source: Tig</p>	p

No.	Plant species	Protection
4.	<p><i>Cephalophyllum ebracteatum</i></p>  <p>Source: P. Mier</p>	p
5.	<p><i>Crassula deceptor</i></p>  <p>Source: G. Malan</p>	p
6	<p><i>Crassula ausensis ssp. Ausensis</i></p>  <p>Source: W. Giess</p>	p
7.	<p><i>Eberlanzia clausa</i></p>  <p>Source: T. Rebelo</p>	p

No.	Plant species	Protection
8.	<p><i>Eberlanzia sp</i></p>  <p>Source: P.M. Burgoyne</p>	p
9.	<p><i>Juttadinteria attenuate</i></p>  <p>Source: N. Helme</p>	p
10.	<p><i>Juttadinteria deserticola</i></p>  <p>Source: C. Mannheimer</p>	p
11.	<p><i>Psammophora modesta</i></p>  <p>Source: P. Mier</p>	p


No.	Plant species	Protection
12.	<p data-bbox="252 264 529 297"><i>Psammophora nissenii</i></p>  <p data-bbox="678 600 938 629">Source: C. Mannheimer</p>	p

APPENDIX B: EXAMPLES OF BIRD NESTS AND NESTING BIRDS

	
<p>(a) Gray lark nest</p>	<p>(b) Gray lark on nest</p>
	
<p>(c) Red-capped lark nest</p>	<p>(d) Ludwig's bustard egg</p>
	
<p>(a) Ludwig's bustard nest and egg</p>	

Source: J. Kemper

APPENDIX C: EXAMPLES OF ARCHAEOLOGICAL FINDS FROM THE MAY 2022 SITE VISIT




	
<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 discoloured, 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>




Source: D. Noli

	
<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>

Source: D. Noli

APPENDIX D: LIST OF POTENTIAL ALIEN INVASIVE PLANT SPECIES THAT CAN EXPECTED TO OCCUR ON SITE

No.	Alien Invasive Plant Species
1.	<p><i>Ricinus communis</i> Castor oil plant</p>  <p>Source: C. Mannheimer</p>
2.	<p><i>Prosopis glandulosa</i> Honey mesquite</p>  <p>Source: C. Mannheimer</p>
3.	<p><i>Argemone ochroleuca</i> Prickle poppy</p>  <p>Source: C. Mannheimer</p>
4.	<p><i>Datura inoxia</i> Downy thorn apple</p>

No.	Alien Invasive Plant Species
	 <p data-bbox="678 555 938 582">Source: C. Mannheimer</p>
5.	<p data-bbox="256 600 515 674"><i>Datura stramonium</i> Common thorn apple</p>  <p data-bbox="614 1126 874 1153">Source: C. Mannheimer</p>
6.	<p data-bbox="256 1171 459 1245"><i>Nicotiana glauca</i> Wild tobacco</p>  <p data-bbox="687 1547 948 1574">Source: C. Mannheimer</p>

RECORD OF REPORT DISTRIBUTION

SLR Reference:	733.08032.00003
Title:	PROPOSED METEOROLOGICAL MAST AND REMOTE SENSING CAMPAIGN IN THE TSAU//KHAEB NATIONAL PARK: ENVIRONMENTAL MANAGEMENT PLAN
Report Number:	02
Client:	Hyphen Hydrogen Energy (Pty) Ltd

Name	Entity	Copy No.	Date Issued	Issuer
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