Excel Dynamic Solutions (Pty) Ltd

ENVIRONMENTAL AND SOCIAL ASSESSMENT (ESA)

FOR

THE ESTABLISHMENT OF THE GREEN HYDROGEN & METHANOL, SOLAR & DESALINATION PLANT & OTHER ASSOCIATED INFRASTRUCTURE LOCATED IN HENTIESBAY, ERONGO REGION

ECC APPLICATION:00 7407

ENVIRONMENTAL ASSESSMENT REPORT: FINAL VERSION

Author(s): **Ms. Aili Iipinge** Company: **Excel Dynamic Solutions (Pty) Ltd** Telephone: **+264 (0) 61 259 530** Fax2email: **+264 (0) 886 560 836** Email: **info@edsnamibia.com**	Client: **Ugab Power Reserve Pty Ltd**

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EXECUTIVE SUMMARY

Excel Dynamic Solutions (Pty) Ltd (The Consultant) has been appointed by Ugab Power Reserve Pty Ltd (The Proponent) to act on their behalf in obtaining the Environmental Clearance Certificate (ECC) for the proposed development of the green hydrogen, methanol, solar and desalination plant and other associated infrastructure located near Henties Bay in the Erongo Region. The proposed site (centre coordinates: 22006'26'' S 14018'42 '' E) covers an area of 3,500 hectares, within the Henties Bay Town &Townland No.133.A portion of the site falls within the Dorob National Park.

The proposed development and its associated facilities are among the listed activities that may not be undertaken without an Environmental Clearance Certificate (ECC). Thus, it is subject to an ECC, to be issued by the Ministry of Environment, Forestry and Tourism (MEFT) under the Department of Environmental Affairs. Subsequently, to ensure that the proposed activity is compliant with the national environmental legislation, the project Proponent appointed an independent environmental consultant, Excel Dynamic Solutions (Pty) Ltd, to undertake the required Environmental Assessment (EA) process and apply for the ECC on their behalf.

Brief Project Description

The proposed project involves establishing a Green Hydrogen and Methanol Production Facility near Henties Bay in the Erongo Region of Namibia. The development will be supported by a solar photovoltaic (PV) power plant, a seawater desalination plant, and associated infrastructure.

The project aims to produce green hydrogen by electrolysing desalinated seawater with electricity generated from solar power. The hydrogen produced will primarily be utilised on-site to synthesise green methanol. In addition, excess hydrogen may be stored or transported for export or domestic use. Both hydrogen and methanol will be stored in designated facilities and conveyed via appropriate infrastructure to identified off-take points.

Furthermore, the electricity generated by the solar PV power plant will be integrated into the national grid, contributing to the supply managed by NamPower, thereby supporting Namibia's broader energy security and renewable energy objectives.

Key project components in the proposed development include:

- A 750MW Solar PV Power Plant and associated substations and powerlines;
- A seawater desalination plant, including marine intake and brine discharge infrastructure;
- Green hydrogen production unit (200MW Electrolyser Unit);

• Methanol synthesis, storage and handling facilities;

• Water, hydrogen, methanol and brine pipelines;

• Access roads, internal roads and other associated infrastructure.

The project will be developed in phases, including both construction and operational phases, with decommissioning activities undertaken at the end of the project life. The development aligns with Namibia's national objectives for renewable energy development, industrial growth, and the transition to a low-carbon economy.

Public Consultation

Public Consultation Activities

Regulation 21 of the EIA Regulations details the steps to be taken during a public consultation process, and these have been used to guide this process. The public consultation process assisted the Environmental Consultant in identifying all potential impacts and in identifying possible mitigation measures and alternatives for certain project activities. The communication with I&APs about the proposed project was done through the following means and in this order to ensure that the public is notified and allowed to comment on the proposed project:

- A Background Information Document (BID) containing brief information about the proposed facility was compiled and distributed by means of email to relevant Authorities, and upon request to all newly registered Interested and Affected parties (I&APs).
- Project Environmental Assessment notices were published in The Namibian Newspaper on 12 and 19 December 2025, explaining the activity and its locality, inviting members of the public to register as I&APs and submit their comments/concerns.
- A consultation meeting was scheduled and held with the I&APs on 16 March 2025, with stakeholders on 15 October 2024 at The Ministry of Environment , Forestry and Tourism (MEFT), Swakopmund , The municipality of Henties Bay Boardroom and at the Roman Catholic Hall in Henties Bay at 08H00 , 10H00 and 17H30, respectively .
- No Major issues were raised regarding the study and the project, but rather community members expressed that they are looking forward to the project.

Potential Impacts identified

The following potential positive and negative impacts are anticipated to occur during the construction and operational phase of the proposed development:

Impact Type	Summary of Impacts
Positive Impacts	• Promotion of renewable energy through the use of solar power for green hydrogen and methanol production, supporting Namibia's low-carbon transition. • Reduction of greenhouse gas emissions compared to conventional fossil-fuel-based production methods. • Economic development through job creation during construction and operation phases. • Employment creation, skills development and technology transfer. • Improved water security by using desalinated seawater instead of limited freshwater resources. • Export and revenue generation through the production of green fuels for domestic use and international markets. • Support for local businesses through procurement of locally available goods and services.
Negative Impacts	• Temporary environmental disturbance during construction, including habitat loss, noise and increased activity. • Potential marine impacts from seawater abstraction and brine discharge if not properly managed. • Health and safety risks associated with the storage and handling of hydrogen, methanol and other hazardous chemicals. • Land use change and alteration of landscape character due to industrial development. • Visual and social impacts from large-scale infrastructure such as solar plants, pipelines and industrial facilities. • Possible impacts on archaeological or cultural heritage resources within the project area.

CONCLUSIONS AND RECOMMENDATIONS

The from the proposed development were identified, described, and assessed. For the significant adverse (negative) impacts contractors, and project-related employees.

The public was consulted as required by the EMA and its 2012 EIA Regulations (Sections 21 to 24). This was done via the two local newspapers (New Era and The Namibian) used for this environmental assessment. A consultation through a face-to-face meeting with the I&Aps on 16 March 2025 at The Ministry of Environment, Forestry and Tourism (MEFT), Swakopmund, The municipality of Henties Bay, Bay Boardroom and at the Roman Cathoric Catholic Hall in Henties Bay and no major comment or concern were raised during this phase. Only community members are looking forward to the project.

The issues and concerns raised by the registered I&APs formed the basis for this Report and the Draft EMP. The issues were addressed and incorporated into this Report, whereby mitigation measures have been provided to avoid and/or minimise their significance on the environmental and social components. Most of the potential impacts were found to be of medium significance. The effective implementation of the recommended management and mitigation measures will particularly reduce the significance of adverse impacts that cannot be completely avoided (from medium to low). To maintain the desirable rating, the implementation of management and mitigation measures should be monitored directly by the Proponent, or by their Environmental Control Officer (ECO), which is highly recommended. The monitoring of this implementation will not only be done to maintain the reduced-impacts rating or a low rating, but also to ensure that all potential impacts identified in this study, and any that might arise during implementation, are properly identified in time and addressed right away.

On this basis, it is the opinion of the Consultant that an ECC should be issued on the condition that the management and mitigation measures specified in the Environmental Management Plan (EMP) are implemented and adhered to.

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
BID	Background Information Document
CV	Curriculum Vitae
DEA	Department of Environmental Affairs
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EDS	Excel Dynamic Solutions
ESA	Environmental Scoping Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
I&APs	Interested and Affected Parties
MEFT	Ministry of Environment, Forestry and Tourism
PPE	Personal Protective Equipment
Reg	Regulation
S	Section
TOR	Terms of Reference

DEFINITION OF TERMS

Accommodation	Facilities for overnight stay and the services commonly associated therewith, including facilities provided on any premises where camping in caravans, tents or similar devices is allowed.
Alternative	A possible course of action, in place of another that would meet the same purpose and need of the proposal.
Baseline	Work done to collect and interpret information on the condition/trends of the existing environment.
Biophysical	That part of the environment that does not originate with human activities (e.g. biological, physical and chemical processes).
Cumulative Impacts/Effects Assessment	In relation to an activity, may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Ecological Processes	Processes play an essential part in maintaining ecosystem integrity. Four fundamental ecological processes are the cycling of water and nutrients, the flow of energy, and biological diversity (as an expression of evolution).
Environmentally Sustainable Tourism	The development and operation of the tourism industry in such a manner that the assets and attractions on which the industry depends are protected, and in particular, the safeguarding and maintaining of ecological processes, biodiversity, aesthetic and cultural qualities for the long-term benefit of the tourism industry and Namibia's people.

Environment	As defined in Environmental Management Act - the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including – (a) the natural environment that is land, water and air; all organic and inorganic matter and living organisms and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.
Environmental Management Plan	As defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environmental effects are to be mitigated, controlled and monitored.
Interested and Affected Party (I&AP)	In relation to the assessment of a listed activity, it, it includes - (a) any person, group of persons or organisation interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity. Mitigate - practical measures to reduce adverse impacts. Proponent – as defined in the Environmental Management Act, a person who proposes to undertake a listed activity. Significant impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.
Fauna	All of the animals found in a given area.
Flora	All of the plants found in a given area.
Mitigation	The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.

Monitoring	Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).
Nomadic Pastoralism	Nomadic pastoralists live in societies in which the husbandry of grazing animals is viewed as an ideal way of making a living, and the regular movement of all or part of the society is considered a normal and natural part of life. Pastoral nomadism is commonly found where climatic conditions produce seasonal pastures but cannot support sustained agriculture.
Proponent	Organization (private or public sector) or individual intending to implement a development proposal.
Public Consultation/Involvement	A range of techniques for informing, consulting, or interacting with stakeholders affected by the proposed activities.
Scoping	An early and open activity to identify the impacts that are most likely to be significant and require specialised investigation during the EIA work. Canalso be used to identify alternative project designs/sites to be assessed, obtain local knowledge of the site and surroundings and prepare a plan for public involvement. The results of scoping are frequently used to prepare a Terms of Reference for the specialized input into full EIA.
Terms of Reference (ToR)	Written requirements governing full EIA input and implementation, consultations to be held, data to be produced and form/contents of the EIA report. Often produced as an output from scoping.
Tourism	The activities of foreign visitors and Namibian residents travelling to and staying at places outside of their usual environment for not more than one year for the purposes of visiting, experiencing

	and enjoying Namibia's natural, social and self-constructed amenities, and for business and other purposes.
Tourist	Any person who travels to a destination away from their normal place of residence for recreational or business purposes.

1 INTRODUCTION

1.1 Project Background

Excel Dynamic Solutions (Pty) Ltd (The Consultant) has been appointed by Ugab Power Reserve Pty Ltd (The Proponent) to act on their behalf in obtaining the Environmental Clearance Certificate (ECC) for the proposed development of the green hydrogen, methanol, solar and desalination plant and other associated infrastructure located near Henties in the Erongo Region. The proposed site (centre coordinates:-22.0973379; 14.365146) covers an area of 3,500 hectares, within the Henties Bay Town &Townland No.133 and a portion within the Dorob National Park.

The proposed development and its associated facilities form part of the listed activities that may not be undertaken without an Environmental Clearance Certificate (ECC). Thus, it is subjected to an ECC, to be issued by the Ministry of Environment, Forestry and Tourism (MEFT) under the department of Environmental Affairs. Subsequently, to ensure that the proposed activity is compliant with the national environmental legislation, the project Proponent appointed an independent environmental consultant, Excel Dynamic Solutions (Pty) Ltd to undertake the required Environmental Assessment (EA) process and apply for the ECC on their behalf.

In terms of the Environmental Management Act (EMA) No. 07 of 2007, Section 27(2) (j); Government Notice No. 29, Section 6; and Government Notice No. 30, the proposed project constitutes several listed activities that require an ECC from the Department of Environmental Affairs (DEAF) of MEFT. The relevant listed activities as per EIA regulations are presented in Table 1 below:

Listed Activity Category (EIA Regulations, 2012)	Relevant Listed Activity Description	Project Component Triggering the Activity
Energy Generation, Transmission and Storage Activities	The generation of electricity and the construction of facilities for the generation, transmission and supply of electricity	Construction and operation of a solar power plant, substations and associated powerlines for the Green Hydrogen and Methanol Facility
Industrial and Manufacturing Activities	The construction and operation of industrial-scale manufacturing and processing plants	Construction and operation of the green hydrogen production facility, electrolysers, methanol synthesis plant and associated industrial infrastructure

Hazardous Substance Treatment, Handling and Storage	The storage, handling, processing or disposal of hazardous substances and waste	Storage and handling of hydrogen, methanol, chemicals, fuels and reagents, as well as the generation of hazardous waste during construction and operation
Water Resource Developments	The abstraction of water for industrial use, the construction and operation of desalination plants, and the discharge of effluent	Abstraction of seawater, construction and operation of a desalination plant, and discharge of brine into the marine environment
Infrastructure Development	The construction of roads, pipelines, bulk supply infrastructure and related facilities	Construction of access roads, internal roads, water intake and discharge pipelines, hydrogen and methanol pipelines, transmission lines and ancillary infrastructure
Land Use Change and Development	The rezoning or transformation of land and large-scale development activities	Change of land use from its current designation to industrial use for the establishment of the project

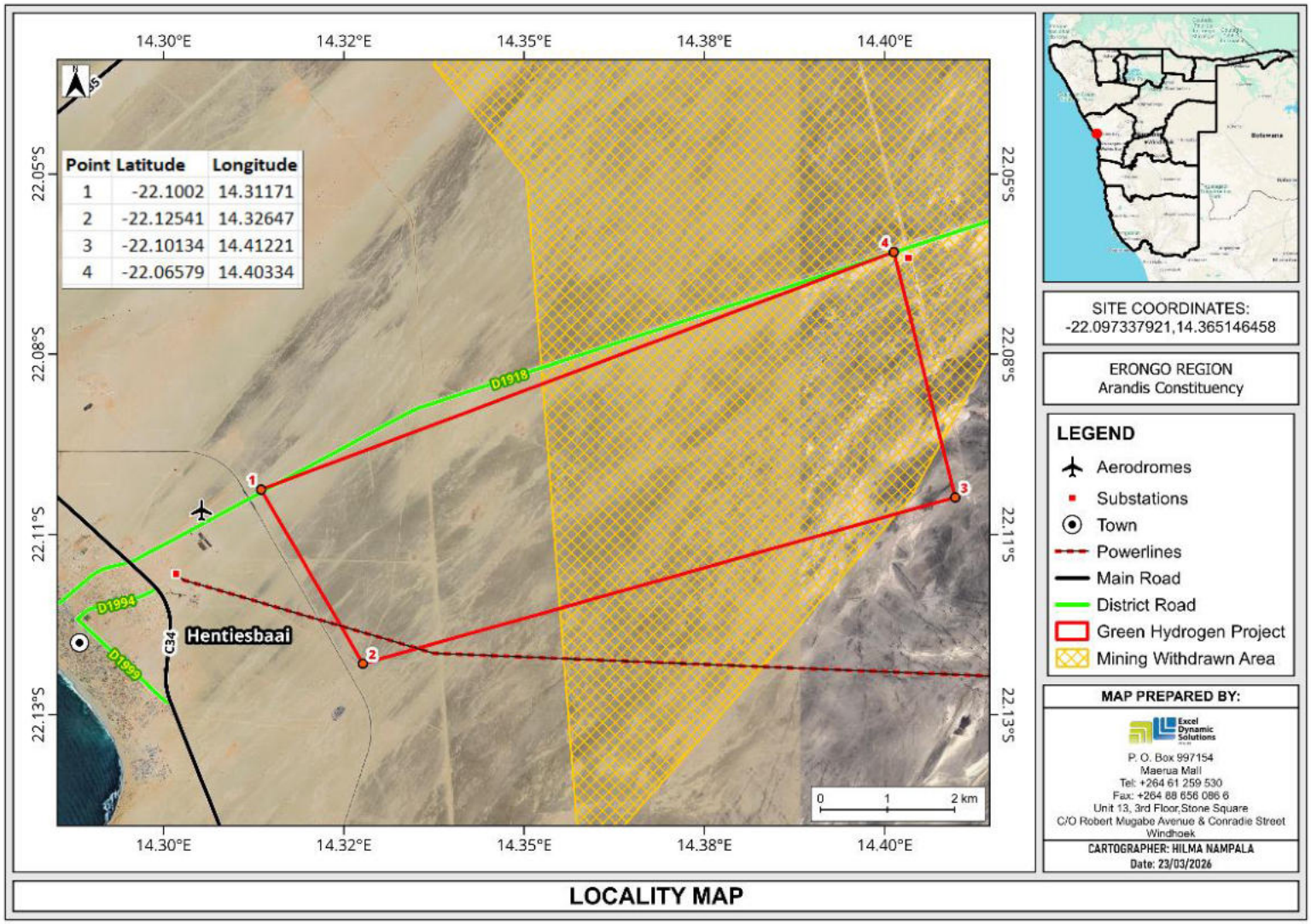

Figure 1: The locality map of the proposed projects

1.2 Terms of Reference and Scope of Works

Excel Dynamic Solutions (Pty) Ltd (EDS) has been appointed by The Proponent to undertake an environmental assessment (EA) and, thereafter, apply for an ECC for the proposed development. There were no formal Terms of Reference (ToR) provided to EDS by the Proponent. Instead, the consultant relied on the requirements of the Environmental Management Act (No. 7 of 2007) (EMA) and its Environmental Impact Assessment (EIA) Regulations (GN. No. 30 of 2012) to conduct the study.

The application for the ECC was compiled and submitted to the Competent Authority, the Ministry of Environment, Forestry and Tourism (MEFT), as the environmental custodian for project registration purposes (Appendix A). Upon submission of an Environmental Scoping Assessment (ESA) Report and Draft Environmental Management Plan (EMP), an ECC for the proposed development will be considered by the Environmental Commissioner at the MEFT's Department of Environmental Affairs and Forestry (DEAF).

1.3 Appointed Environmental Assessment Practitioner

To satisfy the requirements of the EMA and its 2012 EIA Regulations, the Proponent appointed EDS to conduct the required EA process on its (Proponent's) behalf. The findings of the EA are incorporated into this report and the draft EMP (**Appendix B**). These documents will be submitted as part of the ECC application to the Environmental Commissioner at the DEAF. Ms. Aili Iipinge does the consultation process and reporting. Ms Iipinge's CV is presented in **Appendix C.**

1.4 Motive of the Proposed Project

The proposed Green Hydrogen and Methanol Production Facility near Henties Bay in the Erongo Region of Namibia is driven by the urgent need to transition to sustainable, low-carbon energy systems while also addressing Namibia's national development priorities. The project responds to both global demand for clean energy alternatives and local socio-economic and energy challenges, making it a strategically important development.

Globally, demand for green hydrogen and its derivatives, such as green methanol, is rapidly increasing as countries seek to decarbonise sectors that are difficult to electrify, including heavy industry, maritime transport, and aviation. As many countries lack sufficient renewable energy resources to produce green hydrogen domestically, there is a growing reliance on imports. This

presents a significant opportunity for Namibia to position itself as a competitive exporter in the emerging global green energy market (International Energy Agency [IEA], 2023).

Namibia is particularly well-suited to such a development due to its exceptional solar energy potential, with solar irradiance levels exceeding approximately 2,200 kWh/m²/year. The proposed project will harness this resource by developing a 750 MW solar photovoltaic (PV) power plant, including associated substations and power lines, to generate renewable electricity required for hydrogen production (World Bank, 2022). In addition, surplus electricity generated will be integrated into the national grid managed by NamPower, thereby contributing to domestic energy supply, reducing reliance on electricity imports, and enhancing national energy security.

The coastal location of Henties Bay provides further justification for the project. The availability of seawater enables the development of a desalination plant, including marine intake and brine discharge infrastructure, to supply water for electrolysis. This ensures that hydrogen production does not place additional strain on Namibia's limited freshwater resources, which is a critical consideration in the arid Erongo Region (International Renewable Energy Agency [IRENA], 2022).

The core of the project is the green hydrogen production unit, comprising a 200 MW electrolyser, which will use renewable electricity to split desalinated water into hydrogen and oxygen. The hydrogen produced will primarily be utilised on-site in methanol synthesis facilities, where it will be converted into green methanol for storage, handling, and export. Supporting infrastructure will include pipelines for water, hydrogen, methanol, and brine, as well as access roads, internal roads, and other ancillary infrastructure required for construction and operation.

From a national development perspective, the project addresses key challenges, including limited industrialisation, economic dependence on primary sectors, and the need for economic diversification. The establishment of a green hydrogen and methanol industry introduces a new industrial sector with the potential to attract significant foreign direct investment, promote technology transfer, and stimulate long-term economic growth (Government of Namibia, 2022). The project is also expected to generate substantial employment opportunities during both construction and operational phases, contributing positively to local and regional socio-economic development.

Furthermore, the project aligns with Namibia's policy and regulatory frameworks, which prioritise renewable energy development, sustainable resource use, and climate change mitigation. The Government of Namibia has identified green hydrogen as a strategic sector capable of driving future economic growth. The proposed development also contributes to Namibia's commitments

under international climate agreements by supporting efforts to reduce greenhouse gas emissions and transition to a low-carbon economy (Government of Namibia, 2021).

The project site's proximity to the Port of Walvis Bay further strengthens its justification by providing access to established export infrastructure, enabling efficient transportation of green hydrogen and methanol to international markets. Additionally, the production of green methanol adds value through downstream processing and product diversification, enhancing the overall economic viability of the development while supporting global efforts to adopt cleaner fuels.

2 PROJECT DESCRIPTION

The Proponent has obtained the necessary rights and authorisations to undertake the site preparation, construction, installation, operation, management, and maintenance of the proposed Green Hydrogen and Methanol Production Facility near Henties Bay in the Erongo Region of Namibia. The proposed development will be implemented by the different phases of the project lifecycle. These phases are designed to ensure efficient planning, execution, and environmental management throughout the project. The proposed methods for the proposed project are divided into the following categories:

2.1 Pre-development (Site Preparation) Phase

The pre-construction and site preparation phase includes all activities undertaken prior to the commencement of major construction works. This phase is critical to ensure that the project is properly planned, authorised, and implemented in an environmentally responsible manner.

2.1 Pre-Construction and Site Preparation Phase

The pre-construction and site preparation phase includes all preparatory activities undertaken prior to the commencement of physical construction works for the proposed Green Hydrogen and Methanol Production Facility. During this phase, detailed engineering designs and technical specifications for all project components, including the solar photovoltaic (PV) power plant, seawater desalination plant, electrolyser facility, methanol synthesis plant, and associated infrastructure, will be finalized.

Site preparation activities will include demarcating project boundaries, clearing vegetation within the approved development footprint, stripping and stockpiling topsoil for future rehabilitation, and performing limited earthworks to establish stable construction platforms. Temporary facilities such as construction camps, laydown areas, storage zones, and site offices will be established, together with access arrangements, including upgrading existing roads or constructing new access routes where required. Temporary provision of services such as water, sanitation, and electricity for construction activities will also be arranged. Throughout this phase, environmental management measures will be implemented to minimise disturbance to sensitive areas, control dust and erosion, and ensure that all activities are confined to the approved development footprint in accordance with the Environmental Management Plan (EMP). **Figure 3 below shows an overview of the site where the proposed development will be**.

Figure 2: An overview of the proposed site

Figure 2 The site layout

2.2 Construction and Operational Phase

2.2.1 Construction Phase

The construction phase of the proposed development will be undertaken by suitably qualified and experienced contractors, in accordance with approved engineering designs, technical specifications, and relevant national and international standards.

Development of the project will be implemented in a phased approach as follows:

- Phase 1: Installation and commissioning of an initial 40 MW AC Solar Photovoltaic (PV) facility, including associated infrastructure such as mounting structures, inverters, internal cabling, and grid connection components.
- Phase 2: Expansion of the solar PV facility to achieve the full project capacity of approximately 750 MW, together with the integration of associated energy and industrial infrastructure.

Construction activities will include, but are not limited to:

- Site preparation, including clearing, grading, and levelling
- Establishment of construction laydown areas and temporary facilities
- Installation of solar PV modules, mounting structures, and tracking systems (if applicable)
- Construction of substations and transmission lines
- Installation of supporting infrastructure, including internal roads and drainage systems
- Development of the desalination plant, hydrogen production unit, and methanol synthesis facilities
- Installation of pipelines for water, hydrogen, methanol, and brine conveyance

Given the project's coastal location and associated environmental conditions (e.g., high salinity, humidity, and ultraviolet radiation), all materials and equipment used during construction will be selected to ensure durability and resilience. Key technical requirements include:

- Use of corrosion-resistant materials and protective coatings for structural components
- Application of marine-grade protection standards for electrical and mechanical equipment
- Installation of UV-resistant cabling systems suitable for prolonged outdoor exposure
- Equipment designed with appropriate Ingress Protection (IP) ratings for coastal environments

- Implementation of enhanced sealing systems for cable entries and sensitive components

Other aspects involved during the construction phase include:

- **Human Resources:** Around 40 – 60 personnel will be employed during the construction, and about 50 personnel will be used during the operation. These employees will be accommodated in Henties Bay.
- **Water Supply**: About 5,000 litres of water per day will be used for construction and other domestic use.
  Fuel Supply (machinery and equipment): Diesel will be used for machinery and equipment, as well as a power generator.
- **Accessibility:** The site is accessible via the C34 road, which will divert into an existing road that will lead to the proposed site. Project-related vehicles will make use of this existing road to access the site.

2.1 Waste Management

Sewage*:* Mobile chemical ablution facilities will be provided on-site. Sewage waste will bedisposed of appropriately in accordance with the manufacturer's instructions for the facility.

Solid waste: Sufficient waste bins (containers) will be made available at the project site for waste storage, which will later be disposed of at the nearest approved waste facility.

Hazardous _waste*:* The waste fuel/oils will be carefully stored in a standardised containerfor disposal at an approved hazardous waste management facility (Henties Bay dumping site).

Health and Safety: Adequate and appropriate Personal Protective Equipment (PPE) will be provided to project personnel. At least two first aid kits will be readily available on-site.

Potential Accidental Fire Outbreaks: Fire extinguishers will be readily available in vehicles, at construction sites during construction, and at the facility during operation.

2.3 Operation Phase

The operation phase will commence following project, the project's commissioning, and will involve the long-term operation and maintenance of all project components.

The operational project will comprise:

- A 750 MW Solar PV Power Plant, including substations and transmission infrastructure
- A seawater desalination plant with marine intake and brine discharge systems
- A 200 MW green hydrogen production facility (electrolyser unit)
- Methanol synthesis, storage, and handling facilities
- Associated pipelines for water, hydrogen, methanol, and brine transport
- Internal road networks and supporting infrastructure

Operational activities will include:

- Continuous generation of electricity from solar PV systems
- Operation of desalination systems to supply process water
- Production of green hydrogen through electrolysis
- Conversion of hydrogen into methanol and associated storage and export handling
- Routine inspection, servicing, and maintenance of all equipment and infrastructure

Due to the coastal environmental conditions, specific operational measures will be implemented to ensure system efficiency and longevity, including:

- Regular cleaning of solar PV panels to remove salt deposits, dust, and debris
- Preventive maintenance programmes for corrosion control
- Monitoring and maintenance of electrical systems to ensure integrity under humid and saline conditions
- Inspection of sealing systems and enclosures to prevent moisture ingress

2.3 Decommissioning Phase

The decommissioning phase will occur at the end of the operational lifespan of the proposed Green Hydrogen and Methanol Production Facility, or if the facility is permanently closed. This phase will involve the safe shutdown, dismantling, removal, and disposal of all project infrastructure, including the solar photovoltaic (PV) power plant, desalination plant, electrolyser units, methanol synthesis and storage facilities, pipelines, and associated roads and support infrastructure. Before decommissioning activities, a detailed decommissioning plan will be developed in accordance with applicable environmental legislation and best practice guidelines, outlining procedures for site closure, waste management, and rehabilitation.

All hazardous and non-hazardous materials will be managed and disposed of in an environmentally responsible manner, with preference given to reuse and recycling where feasible. Infrastructure such as solar panels, steel structures, pipelines, and mechanical equipment will be dismantled and transported to approved facilities for recycling or disposal. Any contaminated materials or soils identified during the decommissioning process will be appropriately treated or removed to prevent environmental contamination. Following the removal of infrastructure, disturbed areas will be rehabilitated through land re-contouring, replacement of stockpiled topsoil, and re-vegetation with suitable indigenous plant species where applicable, to restore the site as closely as possible to its original condition or an agreed post-project land use. Environmental monitoring will be undertaken during and after decommissioning to ensure the effectiveness of rehabilitation measures and to verify compliance with environmental requirements.

3 PROJECT ALTERNATIVES

Alternatives are defined as the “different means of meeting the general purpose and requirements of the activity” (EMA, 2007). This section will highlight the different ways in which the project can be undertaken and identify the alternative that will be the most practical but least damaging to the environment.

Once the alternatives have been established, these are examined by asking the following three questions:

- What alternatives are technically and economically feasible?
- What are the environmental effects associated with the feasible alternatives?
- What is the rationale for selecting the preferred alternative?

The alternatives considered for the proposed development are discussed in the following subsections.

3.1 Alternatives Considered

The environmental assessment for the proposed development has accommodated the ordeal that might be taken into consideration. This includes the review of the likelihood of the construction activities. It should be noted that the best alternative shall be identified to minimise impacts on the environment and society. Furthermore, the supplemental construction activities may be considered an alternative to address any impacts of serious concern.

4 LEGAL FRAMEWORK: LEGISLATION, POLICIES AND GUIDELINES

This Chapter outlines the regulatory framework applicable to the proposed project. **Table 1** provides a list of applicable and relevant frameworks for the project.

4.1 The Environmental Management Act (No. 7 of 2007)

This EIA was carried out in accordance with the Environmental Management Act (EMA) and its Environmental Impact Assessment (EIA) Regulations (GG No. 4878, GN No. 30).

The EMA has stipulated requirements for completing the documentation to obtain an Environmental Clearance Certificate (ECC) for permission to undertake certain listed activities.

The Environmental Impact Assessment (EIA) Regulations, GN 28-30 (GG 4878), detail the requirements for public consultation within the environmental assessment process (GN 30 S21). The EIA regulations also outline the required details of a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).

Other legal obligations that are relevant to the proposed activities are presented in Error! Reference source not found..

Table 1: Applicable local, national and international standards, policies and guidelines governing the proposed development

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
The Constitution of the Republic of Namibia, 1990, as amended	The Constitution of the Republic of Namibia (1990 as amended) addresses matters relating to environmental protection and sustainable development. Article 91(c) defines the functions of the Ombudsman to include:	By implementing the environmental management plan, the establishment will be in compliance with the constitution in terms of environmental management and sustainability. Ecological sustainability will be main priority for the proposed development.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	"…the duty to investigate complaints concerning the over-utilisation of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia…"	
Health & Safety Regulations, 10th Draft	Makes provision for the health and safety of persons employed or otherwise present in the development area. These deal with, among other matters, clothing and devices, design, use, operation, supervision and control of machinery, fencing and guards, and safety measures during repairs and maintenance.	The Proponent should comply with all these regulations with respect to their employees.
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	Regulation 3(2)(b) states that "No person shall possess [sic] or store any fuel except under authority of a license or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area"	The Proponent should obtain the necessary authorization from the Ministry of Mines and Energy for the storage of fuel on-site.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
The Regional Councils Act (No. 22 of 1992)	This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning point of view, their duties include, as described in section 28, "to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment.	The relevant Regional Councils are considered to be I&APs and must be consulted during the Environmental Assessment (EA) process. The project site falls under the Erongo Regional Council; therefore, they should be consulted regarding any development onsite .
Local Authorities Act No. 23 of 1992	To provide for the determination, for purposes of traditional government, of traditional authority councils; the establishment of such traditional authority councils; and to define the powers, duties and functions of traditional authority councils; and to provide for incidental matters.	The Henties Bay Constituency is the responsible local Authority of the area, therefore they should be consulted regarding any development on-site.
Water Act 54 of 1956	The Water Resources Management Act 11 of 2013 is presently without regulations; therefore, the Water Act No 54 of 1956 is still in force: Prohibits the pollution of water and implements the principle that a person disposing of effluent or waste has a duty of care to prevent pollution (S3 (k)).	The protection of water resources (both quality and quantity/abstraction) should be a priority.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	Provides for control and protection of groundwater (S66 (1), (d (ii)). Liability of clean-up costs after closure/abandonment of an activity (S3 (l)). (l)).	
Water Resources Management Act (No 11 of 2013)	The Act provides for the management, protection, development, use and conservation of water resources; and provides for the regulation and monitoring of water services, and provides for incidental matters. The objects of this Act are to: Ensure that the water resources of Namibia are managed, developed, used, conserved and protected in a manner consistent with, or conducive to, the fundamental principles set out in Section 66 - protection of aquifers, Subsection 1 (d) (iii) provide for preventing the contamination of the aquifer and water pollution control (Section 68).	
National Heritage Act No. 27 of 2004	To provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.	

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
The National Monuments Act (No. 28 of 1969)	The Act enables the proclamation of national monuments and protects archaeological sites.	The Proponent should ensure compliance with these Acts requirements. The necessary management measures and related permitting requirements must be taken. This was done in consultation with the National Heritage Council of Namibia.
Nature Conservation Amendment Act, No. 3 of 2017:	National Parks are established and gazetted in accordance with the Nature Conservation Ordinance, 1975 (4 of 1975), as amended. The Ordinance provides a legal framework with regard to the permission of entering a state-protected area, as well as requirements for individuals damaging objects (geological, ethnological, archaeological and historical) within a protected area. Though the Ordinance does not specifically refer to mining as an activity within a protected area (PA) or recreational area (RA), it does restrict access to PA's and prohibits certain acts therein as well as the purposes for which permission to enter game parks and nature reserves may be granted.	The Proponent will be required to enhance the conservation of biodiversity and the maintenance of the ecological integrity Project Site area. The Proponent will also be required to comply with the existing and planned local operational management plans, regulations and guidelines.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
The Parks and Wildlife Management Bill of 2008:	Aims to provide a regulatory framework for the protection, conservation, and rehabilitation of species and ecosystems, the sustainable use and sustainable management of indigenous biological resources, and the management of protected areas, to conserve biodiversity and to contribute to national development.	Duty of care must be applied to soil conservation, and management measures must be included in the EMP.
Mine Health & Safety Regulations, 10th Draft	Makes provision for the health and safety of persons employed. These deal with, among other matters, clothing and devices, design, use, operation, supervision and control of machinery, fencing and guards, and safety measures during repairs and maintenance.	The Proponent should comply with all relevant regulations with respect to their employees.
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding the health and safety of labourers.	

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Road Traffic and Transport Act, No. 22 of 1999	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads; the licensing of drivers; the registration and licensing of vehicles; the control and regulation of road transport across Namibia's borders; and for matters incidental thereto. Should the Proponent wish to undertake activities involving road transportation or access onto existing roads, the relevant permits will be required.	Mitigation measures should be provided for; if the roads and traffic impact cannot be avoided, the relevant permits must be applied for.
Electricity Act, 2007	Regulates the energy sector in Namibia, including generation, transmission, and distribution of electricity.	• Depending on the project's energy sources and potential for on-site generation, compliance with this act might be necessary. • The act may also provide guidance on energy efficiency measures
Labour Act (No. 6 of 1992)	The Ministry of Labour (MOL) aims to ensure harmonious labour relations by promoting social justice, occupational health and safety, and enhanced labour market services for the benefit of all Namibians. This ministry insures effective implementation of the Labour Act no. 6 of 1992.	The Proponent should ensure that the development does not compromise the safety and welfare of workers.

4.2 International Policies, Principles, Standards, Treaties and Conventions

The international policies, principles, standards, treaties, and conventions applicable to the project are as listed in **Table 2** below.

Table 2: International Policies, Principles, Standards, Treaties and Convention applicable to the project

Statute	Provisions	Project Implications
Equator Principles	A financial industry benchmark for determining, assessing, and managing environmental and social risk in projects (August 2013). The Equator Principles have been developed in conjunction with the International Finance Corporation (IFC) to establish an International Standard with which companies must comply to apply for approved funding by Equator Principles Financial Institutions (EPFIs). The Principles apply to all new project financings globally across all sectors. **Principle 1:** Review and Categorization **Principle 2**: Environmental and Social Assessment **Principle 3:** Applicable Environmental and Social Standards **Principle 4:** Environmental and Social Management System and Equator Principles Action Plan **Principle 5:** Stakeholder Engagement **Principle 6:** Grievance Mechanism **Principle 7:** Independent Review **Principle 8:** Covenants	These principles are an attempt to: '…encourage the development of socially responsible projects, which subscribe to appropriately responsible environmental management practices with a minimum negative impact on project-affected ecosystems and community-based upliftment and empowering interactions.'

Statute	Provisions	Project Implications
	Principle 9: Independent Monitoring and Reporting **Principle 10:** Reporting and Transparency	
The International Finance Corporation (IFC) Performance Standards	The International Finance Corporation's (IFC) Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. As of 28 October 2018, there are ten (10) Performance Standards (Performance Standards on Environmental and Social Sustainability) that the IFC requires a project proponent to meet throughout the life of an investment. These standard requirements are briefly described below. **Performance Standard 1**: Assessment and Management of Environmental and Social Risks and Impacts **Performance Standard 2**: Labour and Working Conditions	The Performance Standards are directed towards clients, guidingon how to identify risks and impacts. They are designed to help avoid, mitigate, and manage risks and impacts in a sustainable way of doing business, including the Client's (Borrower) stakeholder engagement and disclosure obligations in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts, thereby enhancing

Statute	Provisions	Project Implications
	Performance Standard 3: Resource Efficient and Pollution Prevention and Management **Performance Standard 4:** Community Health and Safety **Performance Standard 5:** Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement **Performance Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources **Performance Standard 7**: Indigenous Peoples/Sub-Saharan African Historically Undeserved Traditional Local Communities **Performance Standard 8:** Cultural Heritage **Performance Standard 9:** Financial Intermediaries (FIs) **Performance Standard 10:** Stakeholder Engagement and Information A full description of the IFC Standards can be obtained from http://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-standards?cq_ck=1522164538151#ess1	development opportunities. IFC uses the Sustainability Framework, along with other strategies, policies, and initiatives, to direct the Corporation's business activities toward achieving its overall development objectives.

Statute	Provisions	Project Implications
The United Nations Convention to Combat Desertification (UNCCD) 1992	Addresses land degradation in arid regions with the purpose of contributing to the conservation and sustainable use of biodiversity and the mitigation of climate change. The convention's objective is to forge a global partnership to reverse and prevent desertification/land degradation, and to mitigate the effects of drought in affected areas, to support poverty reduction and environmental sustainability. United Nations Convention.	The project activities should not contribute to desertification.
Convention on Biological Diversity 1992	Regulate or manage biological resources important for conserving biological diversity, whether within or outside protected areas, with a view to ensuring their conservation and sustainable use. Promote the protection of ecosystems and natural habitats, and the maintenance of viable species populations in their natural surroundings.	Removal of vegetation cover and destruction of natural habitats should be avoided, and where not possible, minimised.
Stockholm Declaration on the Human Environment, Stockholm (1972)	It recognises the need for “a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.	Protection of natural resources and prevention of any form of pollution.

Relevant international Treaties and Protocols ratified by the Namibian Government

- Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES), 1973.

- Convention on Biological Diversity, 1992.
- World Heritage Convention, 1972.

5 ENVIRONMENTAL BASELINE

The proposed activities will be undertaken in specific environmental and social conditions. Understanding the pre-project conditions of the environment will aid in providing background "information" on the status quo, and future projections of environmental conditions after proposed works on the site have been done. This also helps the EAP in identifying the sensitive environmental features that may need to be protected through the recommendations and effective implementation of mitigation measures provided.

The baseline information presented below is sourced from a variety of sources, including reports on studies conducted in the Erongo Region. The Consultant obtained further information during the public consultation meeting and during the site visit.

5.1 Biophysical Environment

5.2 Climate

Based on the Koppen-Geiger climate classification, Henties Bay is characterised by an arid, hot desert climate (Peel et al., 2007). Precipitation is virtually absent during the year, averaging 2.6 mm (**see figure 3**). basis, every year,average, the maximum and minimum temperatures are 24.5 and 13.8 °C, respectively, and 72% of days are cloudy in Henties Bay (Meteoblue, 2026) **(see figure 4**).

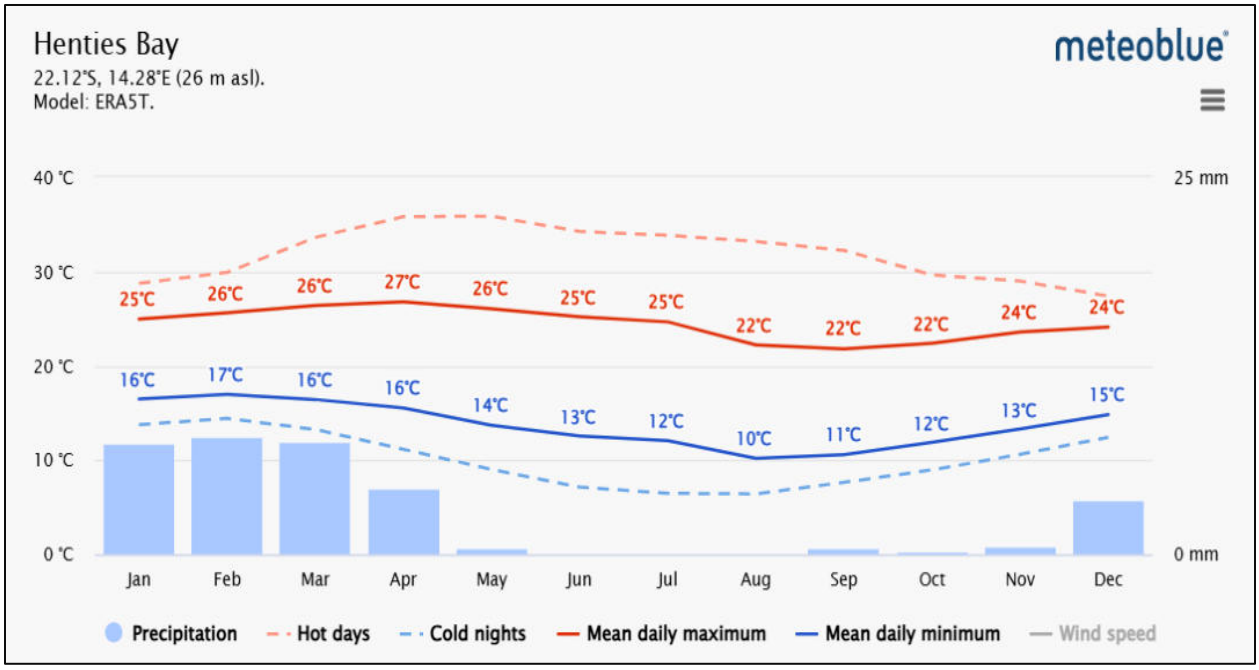

Figure 3: Climate data for Henties Bay

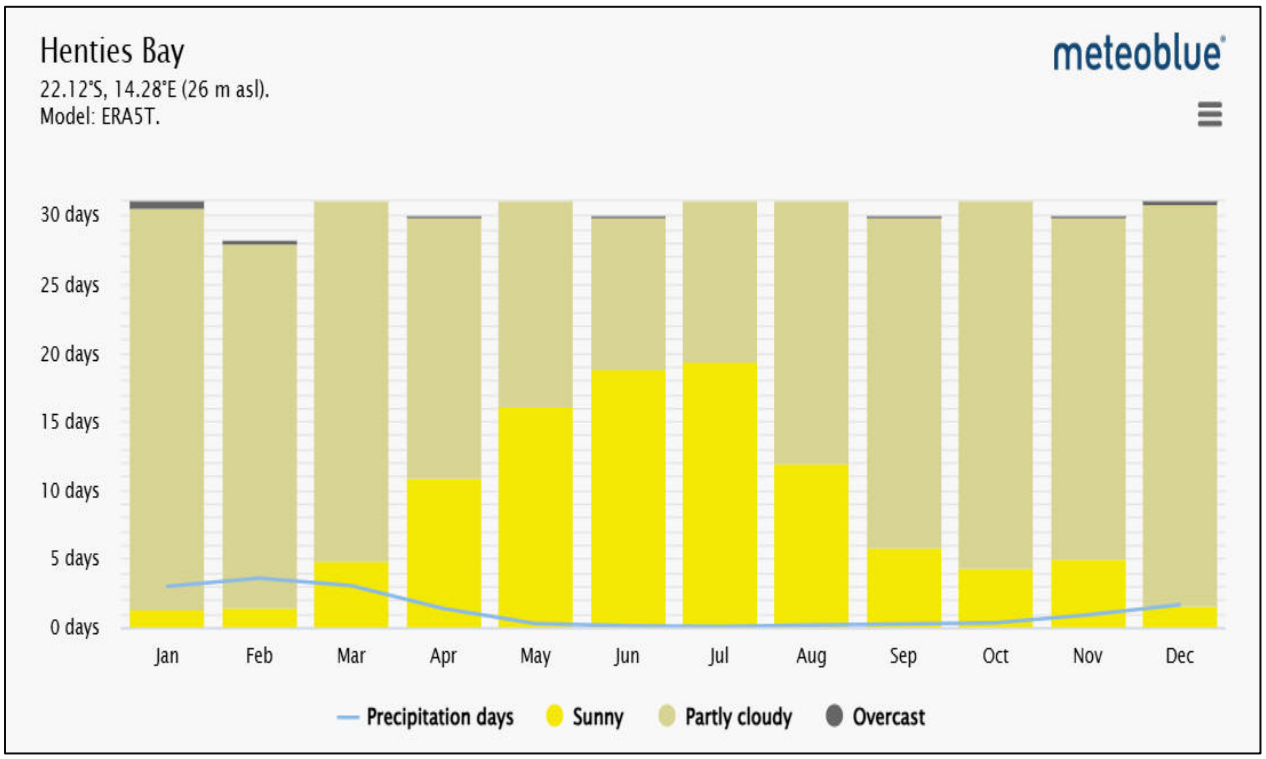

Figure 4: Cloud cover or the Henties Bay area

5.3 Topography

Henties Bay is located in the Coastal plain landscape, which has elevations ranging between 500 and 1000 metres above sea level (Mendelsohn et al., 2022). The elevation of the proposed site is indicated in **Figure 5**. This town is situated on a large area of old river sediments deposited thousands of years ago, forming a sea-facing cliff (Ward & Bulley, 1988). Ward and Bulley (1988) further emphasised that the lower Omaruru River supplies the sand, while the north-easterly Berg winds, which occur mainly in winter, are responsible for transporting it.

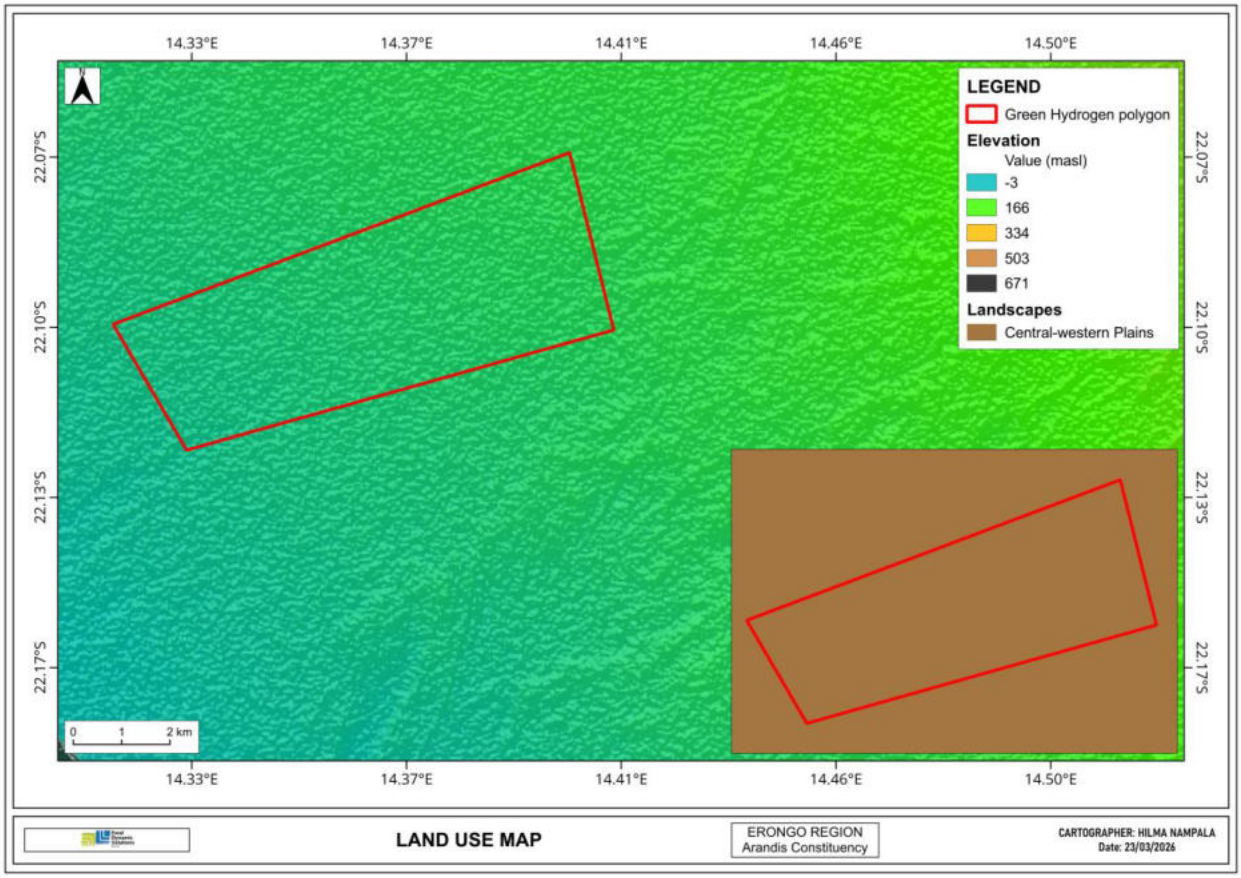

Figure 5: Shows the landscape and topography of the project area

Figure 6: The site overview

5.4 Soil

The proposed project site is primarily characterised and surrounded by Petric Gypsisols (see Figure **7**). Gypsisols develop in areas where sulphate and calcium are present to form gypsum—a soft mineral made of calcium sulphate—and where evaporation greatly exceeds precipitation (Mendelsohn et al., 2022).

It is notable that during the construction phase of the project, the Soil Conservation Act (No 76 of 1969) should be taken into account to ensure that soils are conserved in a way that does not promote soil erosion. (Refer to the EMP).

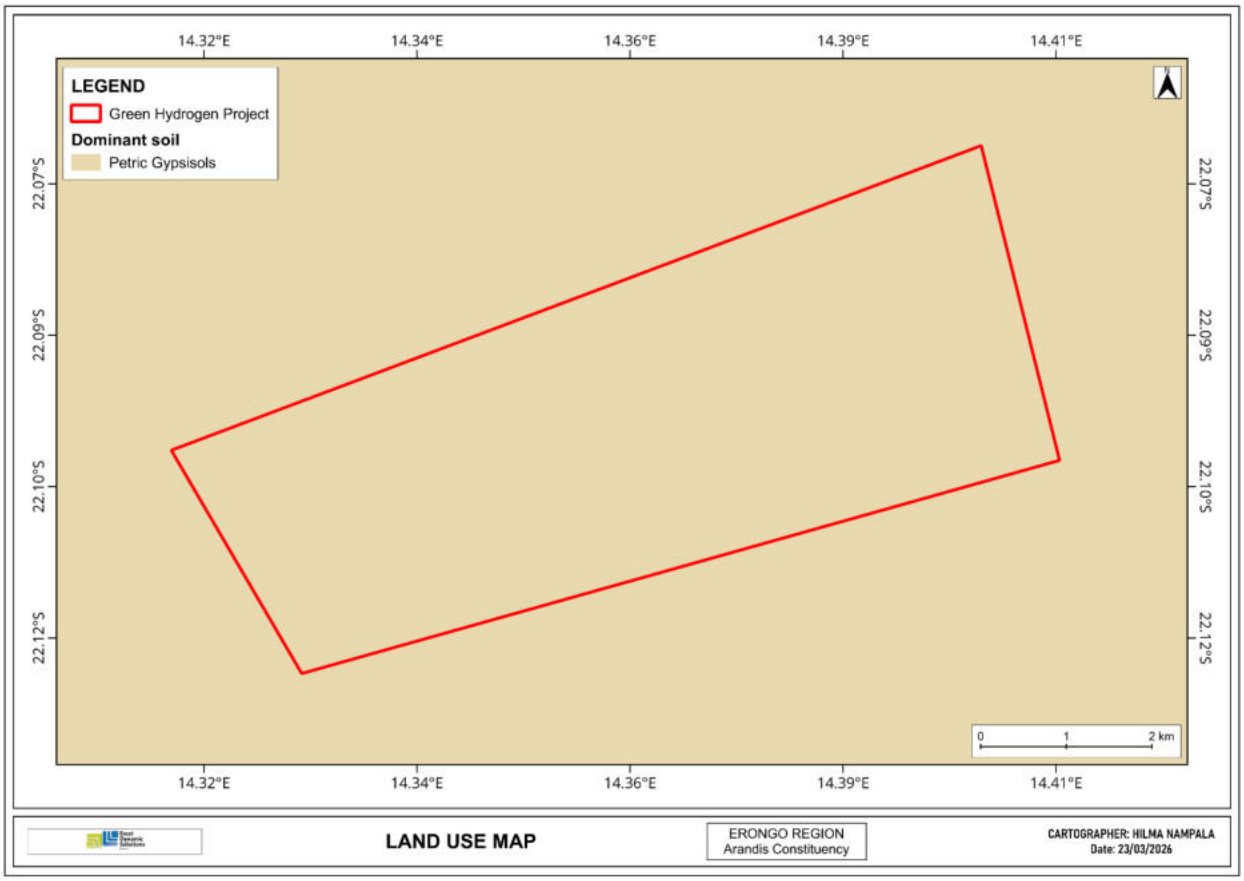

Figure 7: Shows the soils for the proposed project

5.5 Hydrology and Water Resources

The proposed project area has high groundwater vulnerability. Five boreholes exist within the proposed site. In terms of groundwater potential of rock bodies, the proposed project site is located in an area with rock bodies that generally have low potential, with locally moderate potential (see **figure 8**). Figure 9 shows the existing water infrastructure within the proposed site.

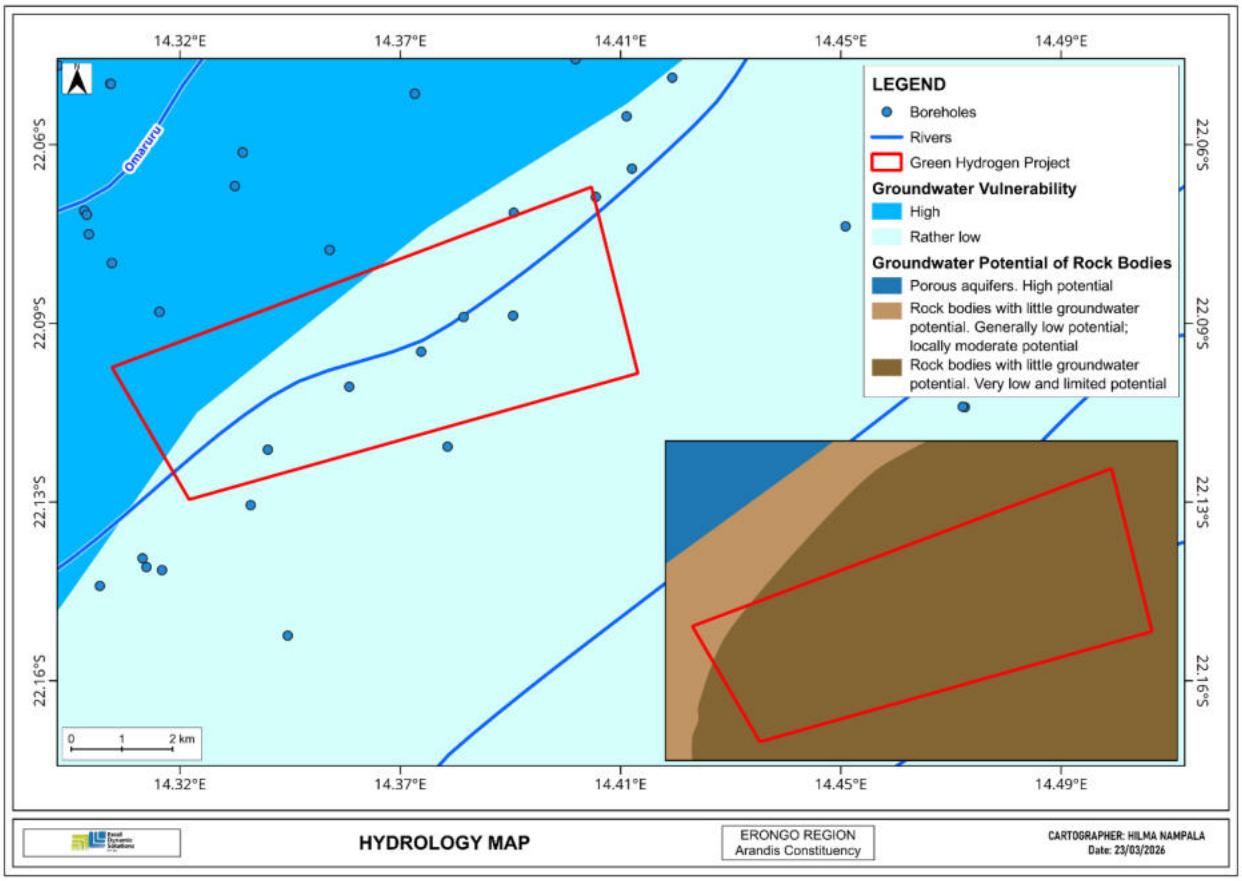

Figure 8: Shows the hydrology map for the proposed development

Figure 9: The existing water infrastructure within the proposed site

5.6 Flora and Fauna

The proposed project area is located near Henties Bay, within the central Namib coastal desert ecosystem, which forms part of the broader Namib Desert. The region is characterised by arid

climatic conditions, low rainfall, strong coastal winds, and sandy to gravelly soils, resulting in a sparse but highly specialised biodiversity adapted to extreme desert environments.

Flora

Vegetation in the area is generally scattered, drought-resistant, and slow-growing**,** with plant cover varying depending on proximity to the coast and dune systems. Common plant species include succulents and xerophytic shrubs adapted to fog moisture and saline conditions.

Figure 10: The succulent plant species found within the proposed site

Fauna

The fauna of the Henties Bay area is adapted to arid desert and coastal conditions. Mammals commonly found in the broader region include gemsbok (oryx), springbok, Cape fox, bat-eared fox, and, occasionally, brown hyena in more remote areas. Small mammals such as gerbils and shrews are also present, although often nocturnal and elusive.

Reptiles are well adapted to sandy environments and include various lizard species, geckos, and snakes, such as the sidewinding adder. Invertebrate diversity is also significant, particularly beetles and other arthropods adapted to desert survival strategies.

The coastal zone supports rich marine and avian biodiversity. The nearby coastline is influenced by the cold Benguela Current, supporting productive marine ecosystems. Although during the site visit no animal was spotted on site.

5.7 Heritage and Archaeology

Archaeological sites in Namibia are protected under the National Heritage Act of 2004 (No. 27 of 2004). Evidence shows that has. There are fossil remains of lineal hominin ancestors as early as modern humans, and their ancestors have lived in Namibia for more than 1 million years. There are fossil remains of lineal hominin ancestors dating back to the Miocene Epoch (Kinahan, 2017). Namibia has a relatively complete sequence spanning the mid-Pleistocene to the Recent Holocene, represented by thousands of archaeological sites mainly concentrated in the central highlands, the escarpment, and the Namib Desert.

During the site visit, no archaeologically significant structure or infrastructure was spotted on the site. Therefore, it is highly recommended that the National Heritage Act, 27 of 2004, be adhered to on-site, and that a qualified archaeologist be on standby/call during the setting up of the site to ensure that no archaeological resources that may be discovered on site are affected/ damaged.

5.8 Socio-Economic conditions

Henties Bay is a small coastal town characterised by a limited, service-based economy that is highly dependent on tourism and seasonal population fluctuations.

The town has an estimated permanent population of approximately 7,000–8,000 residents, which increases significantly during peak holiday seasons due to tourism and second-home ownership (Namibia Statistics Agency, 2023; Henties Bay Municipality, 2022). This seasonal influx places additional pressure on local infrastructure and services.

The local economy is primarily driven by tourism, particularly recreational fishing, holiday accommodation, and related sectors such as retail and hospitality (Ministry of Environment, Forestry and Tourism [MEFT], 2022). The town is widely regarded as a key recreational fishing destination along Namibia's coast. In addition, there has been growth in the property and real estate sector, largely linked to holiday homes and retirement properties, although much of this investment benefits non-resident owners (NBC, 2023).

Despite these activities, unemployment remains high, with limited economic diversification and few large-scale industries. Many residents rely on seasonal or informal employment, reflecting the town's narrow economic base (NBC, 2023; MEFT, 2022).

In terms of infrastructure, Henties Bay is serviced by basic but constrained systems, including:

- Road infrastructure: Access via the coastal C34 route, linking the town to Swakopmund and Walvis Bay (Roads Authority Namibia, 2021).
- Water supply: Primarily dependent on external bulk supply systems, with increasing consideration for desalination due to water scarcity (NamWater, 2022).
- Electricity: Supplied through the national grid, managed by NamPower (NamPower, 2022).
- Sewerage and waste management: Existing systems are functional but under pressure due to population growth and seasonal demand (Henties Bay Municipality, 2022).
- Social services: Limited healthcare, education, and municipal services relative to growing demand.

Overall, infrastructure is increasingly strained, requiring upgrades to support future development and population growth.

From an EIA perspective, the socio-economic environment of Henties Bay is considered constrained but with development potential. Proposed large-scale developments—such as renewable energy, desalination, and green hydrogen projects—have the potential to:

- Create employment opportunities
- Stimulate economic diversification
- Improve local infrastructure

However, careful planning and management will be required to ensure that such developments do not overburden existing services or negatively impact the town's tourism-based economy and sensitive coastal environment.

6 PUBLIC CONSULTATION PROCESS

Public consultation forms an important component of an Environmental Assessment (EA) process. It provides potential Interested and Affected Parties (I&APs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process, thus assisting the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and determining the extent to which further investigations are necessary. Public consultation can also aid in identifying possible mitigation measures. Public consultation for this scoping study has been done in accordance with the EMA and its EIA Regulations.

6.1 Pre-identified and Registered Interested and Affected Parties (I&APs)

Relevant and applicable national, regional, and local authorities, local leaders, and other interested members of the public were identified. Pre-identified I&APs were contacted directly, while other parties who contacted the Consultant after project advertisement notices in the newspapers were registered as I&APs upon their request. Newspaper advertisements for the proposed development were placed in two widely read national newspapers in the region (The Namibian Newspaper and New Era Newspaper). The project advertisement/announcement ran for two consecutive weeks, inviting members of the public to register as I&APs and submit their comments. The summary of pre-identified and registered I&APs is listed in **Table 3** below, and the complete list of I&APs is provided in **Appendix D**.

Table 3: Summary of Interested and Affected Parties (I&APs)

National (Ministries and State-Owned Enterprises)
Ministry of Environment, Forestry and Tourism
Ministry of Health and Social Services
Regional, Local and Traditional Authorities
Erongo Regional Council
Henties Bay Municipality
General Public
Interested members of the public
Namibia Community-Based Tourism Association

6.2 Communication with I&APs

Regulation 21 of the EIA Regulations details the steps to be taken during a public consultation process, and these have been used in guiding this process. Communication with I&APs with regard to the proposed development was facilitated through the following means and in this order:

- A Background Information Document (BID) containing brief information about the proposed facility was compiled and distributed by means of email to relevant Authorities, and upon request to all newly registered Interested and Affected parties (I&APs).
- Project Environmental Assessment notices were published in The Namibian Newspaper on 12 and 19 December 2025, explaining the activity and its locality, inviting members of the public to register as I&APs and submit their comments/concerns.
- A consultation meeting was scheduled and held with the I&APs on 16 March 2025, with stakeholders on 15 October 2024 at The Ministry of Environment, Forestry and Tourism (MEFT), Swakopmund, The municipality of Henties Bay Boardroom and at the Roman Catholic Hall in Henties Bay at 08H00, 10H00 and 17H30, respectively.
- No Major issues were raised regarding the study and the project, but rather community members expressed that they are looking forward to the project.

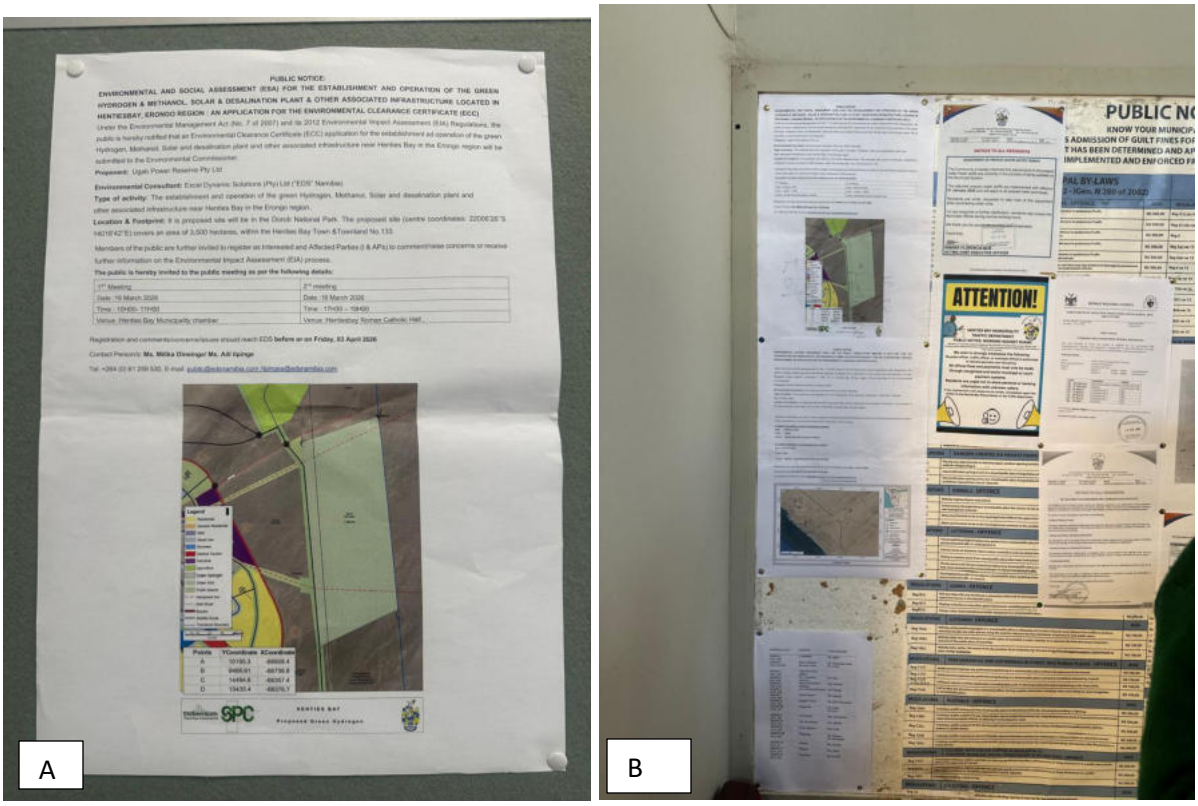

Figure 11: Public notices placed at A-MEFT Swakopmund , B – Henties Bay Municipality C- Roman Catholic Hall -Henties Bay

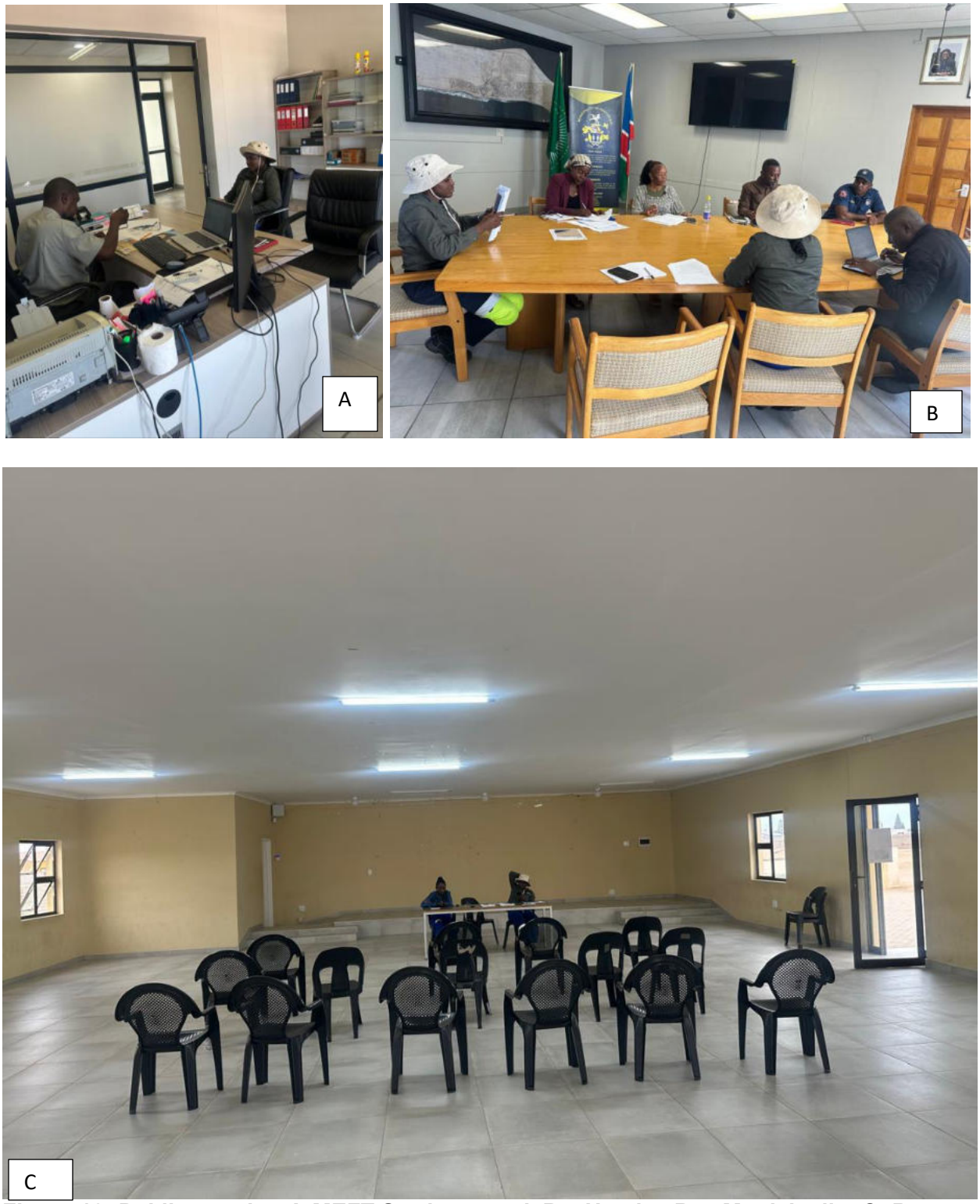

Figure 12: Public meeting A-MEFT Swakopmund, B – Henties Bay Municipality C- Roman Catholic Hall -Henties Bay

Issues raised by affected and interested parties have been recorded and incorporated into the environmental report and EMP. The summarized issues raised during the public meeting are presented below;

1. **The community members are in support of the proposed project, and they are looking forward to the commencement of the project.**

7 IMPACT IDENTIFICATION, ASSESSMENT AND MITIGATION MEASURES

7.1 Impact Identification

Proposed development activities are usually associated with different potential positive and/or negative impacts. In an environmental assessment, the focus is primarily on negative impacts. This is done to ensure that these impacts are addressed by providing adequate mitigation measures such that an impact's significance is brought under control, while maximizing the positive impacts of the development. The potential positive and negative impacts that have been identified from the proposed development activities are listed as follows:

Impact Type	Summary of Impacts
Positive Impacts	• Promotion of renewable energy through the use of solar power for green hydrogen and methanol production, supporting Namibia's low-carbon transition. • Reduction of greenhouse gas emissions compared to conventional fossil-fuel-based production methods. • Economic development through job creation during construction and operation phases. • Employment creation, skills development and technology transfer. • Improved water security by using desalinated seawater instead of limited freshwater resources. • Export and revenue generation through the production of green fuels for domestic use and international markets. • Support for local businesses through procurement of locally available goods and services.
Negative	• Temporary environmental disturbance during construction, including habitat

Impacts	loss, noise and increased activity. • Potential marine impacts from seawater abstraction and brine discharge if not properly managed. • Health and safety risks associated with the storage and handling of hydrogen, methanol and other hazardous chemicals. • Land use change and alteration of landscape character due to industrial development. • Visual and social impacts from large-scale infrastructure such as solar plants, pipelines and industrial facilities. • Possible impacts on archaeological or cultural heritage resources within the project area.

7.2 Impact Assessment Methodology

The Environmental Assessment process primarily ensures that potential impacts that may occur from project activity are identified and addressed with environmentally cautious approaches and legal compliance. The impact assessment method used for this project is in accordance with Namibia's Environmental Management Act (No. 7 of 2007) and its Regulations of 2012, as well as the International Finance Corporation (IFC) Performance Standards.

The identified impacts were assessed in terms of scale/extent (spatial scale), duration (temporal scale), magnitude (severity), and probability (likelihood of occurrence), as presented in Table 5, Table 6, Table 7, and **Table 8**, respectively.

To enable a scientific approach to determining environmental significance, a numerical value is assigned to each rating scale. This methodology ensures uniformity and allows potential impacts to be addressed in a standard manner, making a wide range of impacts comparable. It is assumed that an assessment of the significance of a potential impact is a good indicator of the risk associated with it. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact;
- Assessment of the pre-mitigation significance of the impact; and
- Description of recommended mitigation measures.

The recommended mitigation measures for each potential impact contribute to achieving environmentally sustainable operational conditions for the project across various features of the biophysical and social environment. The following criteria were applied in this impact assessment:

7.2.1 Extent (spatial scale)

Extent indicates the physical and spatial scale of the impact. **Table 5** shows the rating of impact in terms of the extent of spatial scale.

Table 4: Extent or spatial impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Impact is localized within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond the site boundary: Regional	Impact extend National or international boundaries

7.2.2 Duration

Duration is the timeframe over which the impact is expected to occur, measured relative to the project's lifetime. **Table 6** shows the impact rating by duration.

Table 5: Duration impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

7.2.3 Intensity, Magnitude/severity

Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. The magnitude of the alteration can be either positive or negative. These ratings were also taken into account during the severity assessment. **Table 7** shows the impact rating in terms of intensity, magnitude, or severity.

Table 6: Intensity, magnitude or severity impact rating

Type of criteria	Negative				
	H- (10)	M/H- (8)	M- (6)	M/L- (4)	L- (2)
Qualitative	Very high deterioration, high quantity of deaths, injury or illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat/diversity or resource, severe alteration or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat/biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species/habitat / diversity or resource, no or very little quality deterioration.

7.2.4 Probability of occurrence

Probability describes the likelihood that the impacts will actually occur. This determination is based on previous experience with similar projects and/or based on professional judgment. **Table 8** shows the impact rating in terms of the probability of occurrence.

Table 7: Probability of occurrence impact rating

Low (1)	Medium/Low (2)	Medium (3)	Medium/High (4)	High (5)
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.

7.2.5 Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact “without mitigation” is the main determinant of the nature and degree of

mitigation required. As stated in the introduction to this section, for this assessment, the significance of the impact without prescribed mitigation actions is measured.

Once the above factors (**Table 4**, **Table 5**, **Table 6** and **Table 7**) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

SIGNIFICANCE POINTS (SP) = (MAGNITUDE + DURATION + SCALE) X PROBABILITY

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate or low significance, based on the following significance rating scale (**Table 9**).

Table 8: Significance rating scale

Significance	***Environmental Significance Points***	***Colour Code***
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	1 to 30	L
Neutral	0	N
Low (negative)	-1 to -30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60	H

Positive (+) – Beneficial impact

Negative (-) – Deleterious/ adverse+ Impact

Neutral – Impacts are neither beneficial nor adverse

For an impact with a high (-ve) significance rating, mitigation measures are recommended to reduce it to a medium (-ve) or low (-ve) rating, provided that a medium (- ve) rating can be sufficiently controlled with the recommended mitigation measures. To maintain a low or medium

significance rating, monitoring is recommended for a period to confirm the impact is low or medium and under control.

The assessment of the development phases is done for pre-mitigation and post-mitigation.

The risk/impact assessment is driven by three factors:

Source: The cause or source of the contamination.

Pathway: The route taken by the source to reach a given receptor

Receptor: A person, animal, plant, ecosystem, property, or a controlled water source. If contamination is to cause harm or impact, it must reach a receptor.

A pollutant linkage occurs when a source, a pathway, and a receptor are present. Mitigation measures aim firstly to avoid risk, and if the risk cannot be avoided, to minimise the impact. Once mitigation measures have been implemented, the identified risk would be reduced in significance (Booth, 2011).

The potential negative impacts stemming from the proposed project are described, assessed, and mitigation measures in the form of management action plans are provided in the Draft Environmental Management Plan.

7.3 Assessment of Potential Negative Impacts

The main potential negative impacts associated with the construction, operation and maintenance phase are identified and assessed below:

7.3.1 Land Disturbance and Loss of Biodiversity

The proposed Green Hydrogen and Methanol Production Facility will be located in a desert ecosystem characterised by sparse vegetation cover and specialised flora and fauna adapted to arid conditions. The development includes multiple infrastructure components such as the solar photovoltaic (PV) plant, hydrogen production facilities (electrolysers), desalination plant, methanol synthesis and storage facilities, pipelines, access roads, and associated infrastructure. Site preparation, construction activities, and installation of these facilities—including vegetation clearing, trenching, pitting, and other earthworks—may result in land disturbance and habitat modification within the development footprint.

These activities may lead to the loss or fragmentation of microhabitats, which could negatively affect soil microorganisms and other small, sensitive organisms that contribute to ecosystem functioning. Although the project area has relatively low overall biodiversity compared to more

productive ecosystems, habitat disturbance may still result in localised displacement and reduced abundance of certain species, particularly those adapted to desert conditions.

The presence and movement of construction personnel, vehicles, and machinery associated with both the hydrogen production and supporting infrastructure may further contribute to faunal disturbance, potentially altering natural movement patterns and causing temporary avoidance of the affected area. In addition, noise and vibration generated during construction activities may lead to short-term displacement of sensitive species from nearby habitats.

With regard to flora, vegetation clearing will result in the direct loss of plant cover within the project footprint, which is unavoidable for establishing infrastructure, including hydrogen production facilities and associated systems. Dust generated during construction activities may also settle on surrounding vegetation, potentially affecting photosynthesis, transpiration, and overall plant health in the immediate vicinity of the site. However, these impacts are expected to be localised, reversible, and temporary. Under the status, the impact can be rated as medium significance. With the implementation of appropriate mitigation measures, the rating will be reduced to a low significance rating. The impact is assessed in **Table 11** below.

Table 9: Assessment of the impacts of the project on biodiversity

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: -3	M: -3	M: -6	M/H: 4	M: -48
Post mitigation	L/M: -2	L/M: -2	L/M: -4	L/M: 2	L: -16

7.3.2 Generation of Dust (Air Quality)

Dust emanating from site access roads during the transport of equipment to and from the site (time to time) may compromise air quality in the area. Movement of heavy vehicles, such as trucks, can create dust, though it is not always severe. Additionally, activities carried out as part of the construction works would contribute to airborne dust levels. The medium significance of this impact can be reduced to a low significance rating by properly implementing mitigation measures. The impact is assessed in **Table 12** below.

Table 10: Assessment of the impacts of the project on air quality

Mitigation Status	Extent	Duration	Intensity	Probability	Significance

Pre mitigation	M: -3	M: -3	M/L: -4	M/H: 4	M: -40
Post mitigation	L - 1	L - 1	L- 2	L - 1	L – 4

7.3.3 Soil and Water Resources Pollution

The proposed project activities are associated with a variety of potential pollution sources (i.e., lubricants, fuel, and wastewater) that may contaminate/pollute soils and eventually groundwater and surface water. The anticipated potential source of pollution to water resources from the project activities would be hydrocarbons (oil) from project vehicles, machinery, and equipment, as well as potential wastewater/effluent from construction-related activities.

The spills (depending on volumes spilt on the soils) From this machinery, vehicles and equipment could infiltrate into the ground and pollute the fractured or faulted aquifers on site and, over time, reach further groundwater systems in the area. However, it should be noted that the scale and extent/footprint of the activities in which potential sources of pollution will be handled are relatively small. Therefore, the impact will be moderately low.

Pre-mitigation measure implementation: impact significance is low to moderate; upon implementation, it will be reduced to low. The impact is assessed in **Table 11** below.

Table 11: Assessment of the project impact on soils and water resources (pollution)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	M - 6	M - 3	M - 39
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

7.3.4 Waste Generation

Domestic and general waste will be generated on-site during both the construction and operational phases of the proposed development. This may include food waste, packaging materials, paper, plastics, and other general refuse associated with workforce activities. In addition, limited quantities of hazardous waste may be generated, particularly during maintenance

activities for the solar photovoltaic (PV) plant and desalination infrastructure. Such hazardous waste may include oils, lubricants, chemical residues, and contaminated materials.

If not properly managed, waste generation may on terrestrial and marine ecosystems, including harm to fauna, contamination of soil and water resources, and degradation of the surrounding environment. Improper waste handling may also attract vermin and contribute to visual pollution.

To minimise these risks, waste management measures will be implemented in accordance with best environmental practice and applicable Namibian regulations. These include the separation of biodegradable and non-biodegradable waste at the source, the provision of clearly labelled waste receptacles, and the routine collection and disposal at a recognised waste disposal facility, such as the Henties Bay Landfill. Hazardous waste will be handled, stored, transported, and disposed of in accordance with relevant legislation and guidelines to prevent environmental contamination.

Without mitigation, the impact of waste generation is considered to be of medium significance, due to the potential for localised environmental degradation. However, with the implementation of appropriate mitigation measures, the significance of the impact is expected to be reduced to low. The assessment of this impact is given in **Table 12**.

Table 12: Assessment of waste generation impact

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M - 2	M - 6	M - 3	M – 30
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

7.3.5 Occupational Health and Safety Risks

Project personnel (workers) involved in the proposed construction activities may be exposed to health and safety risks. These are in terms of accidental injury, owing to either minor (i.e., superficial physical injury) or major (i.e., involving heavy machinery or vehicles) accidents. The site safety of all personnel will be the Proponent's responsibility and should be adhered to as per the requirements of the Labour Act (No. 11 of 2007) and the Public Health Act (No. 36 of 1919). The heavy vehicle, equipment and fuel storage area should be properly secured to prevent any

harm or injury to the Proponent's personnel or local domestic animals. If machinery and equipment are not properly stored and packed, there may be safety risks for project workers.

The impact is probable and has a medium significance rating. However, with adequate mitigation measures in place, the impact rating will be reduced to low. This impact is assessed in **Table 13** Below are the mitigation measures provided.

Table 13: Assessment of the impacts of construction activities on health and safety

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M – 3	M - 6	M/H - 4	M – 48
Post mitigation	L/M - 2	L/M – 2	L - 2	L/M - 2	L - 12

7.3.6 Vehicular Traffic Use and Safety

Depending on the project needs, trucks, medium and small vehicles will be frequenting the area to and from sites. This could increase slow-moving, heavy vehicular traffic along these roads. The impact would be felt not only by the district road users but also by the local road users. This would add additional pressure on the roads.

However, only so many times a week or even monthly that construction-related heavy trucks will be transporting materials and equipment to the site. Therefore, the risk is anticipated to be short-term, infrequent, and of medium significance. Pre-mitigation, the impact can be rated medium and with the implementation of mitigation measures, the significance will be low as assessed in **Table 14** below.

Table 14: Assessment of the impacts of construction activities on road use (vehicular traffic)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

7.3.7 Noise and vibrations

Construction activities for the proposed project may be a nuisance to surrounding communities due to the noise generated. Excessive noise and vibrations can be a health risk to workers on site. Equipment used on site is of medium size, and the noise level is bound to be limited to the site only; therefore, the impact likelihood is minimal. Without any mitigation, the impact is rated as of medium significance. To change the impact significance from pre-mitigation significance to a low rating, the mitigation measures should be implemented. This impact is assessed in **Table 15** below.

Table 15: Assessment of the impacts of noise and vibrations

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M – 2	M - 6	M/H - 3	M – 30
Post mitigation	L - 1	L/M – 2	L - 2	L/M -2	L - 10

7.3.8 Potential marine impacts from seawater abstraction and brine discharge

Potential marine impacts may arise from seawater abstraction and brine discharge associated with the desalination component of the proposed project if not properly designed and managed. Seawater intake structures may result in the entrainment and impingement of marine organisms, including plankton and small fish, thereby affecting local marine biodiversity. In addition, the discharge of concentrated brine back into the marine environment may lead to localised increases in salinity, temperature fluctuations, and changes in water quality, which could negatively affect sensitive marine ecosystems near the outfall. These impacts are typically site-specific and dependent on oceanographic conditions, but may become significant if dilution and dispersion are inadequate. However, with appropriate engineering design—such as low-velocity intake systems and diffuser-based discharge structures—along with ongoing marine monitoring, these potential impacts can be effectively minimized to acceptable levels.

Prior to the implementation of mitigation measures, the impact is rated as of medium significance. However, upon mitigation (post-mitigation), the significance will change from medium to low rating. The impact is assessed below (**Table 16**).

Table 16: Assessment of the social impact of community property damage or disturbance

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M – 3	M - 6	M/H - 4	M – 48
Post mitigation	L - 1	L – 1	M/L - 4	M/L -2	L - 12

7.3.9 Disturbance to Archaeological and Heritage resources

There is a possibility of unveiling/discovering new archaeological and/or cultural materials in the proposed project area. If such materials are found, the areas must be mapped, and coordinates taken to establish “No-Go-Areas”, due to their sensitivity, and must be documented. They may be protected either by fencing them off or demarcation for preservation purposes, or excluding them from any development, i.e., no exploration activities should be conducted near these recorded areas through the establishment of buffer zones.

This impact can be rated as of medium significance if no mitigation measures are in place. Upon implementation of the necessary measures, the impact significance will be reduced to a lower rating. The impact is assessed in **Table 19**.

Table 19: Assessment of impacts of exploration on archaeology & heritage resources

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 5	M/H – 4	M - 4	M/H - 5	M – 52
Post mitigation	L/M - 2	L/M – 2	L - 2	L/M - 2	L - 12

7.3.10 Social Nuisance: Job seeking and Differing Norms, Culture and Values

The proposed project activities could attract an influx of people from outside the project area seeking job opportunities. Such influxes during the construction and operational phase may lead to social annoyance to the local community as well as conflicts. This is generally considered a concern, given the current youth unemployment rate in Namibia. People from other areas/regions may learn of the project's intentions through EIA notices in newspapers and be forced to look for work opportunities in the area. Different people may come with different ways of living in the area, which could interfere with the local norms, culture, and values. This could potentially lead to social clashes between the locals and outsiders (out-of-area job seekers).

Prior to the implementation of mitigation measures, the impact is rated as of medium significance. However, upon mitigation (post-mitigation) – see mitigation measures below, the significance will change from medium to low rating. The impact is assessed in **Table 17** below.

Table 17: Social impact assessment of outsiders' influx into the area (job seeking related)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M - 3	M - 6	M/H - 4	M – 48
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

Recommendations to reduce the influx of outsiders into the area

- The Proponent should prioritise the employment of more local people, and only if necessary and due to a lack of skills in the area, out-of-area people can be given some of the work. This is to avoid the influx of outsiders into the area for work that can be done by the locals.
- The workers should be engaged in health talks and training about the dangers of engaging in unprotected sexual relations which results in contracting HIV/AIDS and other sexual related infections.

- Out-of-area workers that may be employed (due to their unique work skills) on site should be sensitised on the importance of respecting the local values and norms, so that they can co-live in harmony with the local communities during the duration of their employment period on site.

7.4 Recommendations for Construction Closure phase

Operation Phase Recommendations

During the operational phase of the Green Hydrogen and Methanol Production Facility, it is recommended that a comprehensive Environmental Management Plan (EMP) be fully implemented and regularly updated to ensure effective environmental control and compliance. Continuous monitoring programmes should be established for key environmental components, including air quality, noise, groundwater use, and marine impacts associated with seawater abstraction and brine discharge. In particular, the desalination system should be operated using the best available technology to minimise entrainment and ensure adequate dilution and dispersion of brine effluent.

It is further recommended that strict health, safety, and risk management systems be implemented, given the hazardous nature of hydrogen and methanol, including leak detection systems, fire prevention measures, emergency response plans, and regular staff training. Energy efficiency should be prioritised across all operational processes to optimise the use of solar-generated electricity and reduce unnecessary energy losses. In addition, periodic environmental audits should be conducted to assess compliance with environmental authorisations and to identify opportunities for continual improvement.

Socio-economically, it is recommended that local employment and procurement be prioritised where feasible, and that ongoing stakeholder engagement be maintained to address community concerns and ensure transparency throughout the project's operational life.

7.5 Decommissioning Phase Recommendations

For the decommissioning phase, it is recommended that a detailed Decommissioning and Rehabilitation Plan be developed well in advance of project closure. This plan should outline procedures for the safe shutdown, dismantling, and removal of all infrastructure, including solar PV components, desalination equipment, hydrogen production systems, methanol facilities, pipelines, and associated infrastructure.

All hazardous materials and wastes should be managed in accordance with applicable environmental legislation and disposed of at licensed facilities. Where possible, materials such as metals, cables, and solar components should be reused or recycled to minimise environmental impact. Special attention should be given to preventing soil and groundwater contamination during dismantling activities.

Following infrastructure removal, all disturbed areas should be rehabilitated to a stable and self-sustaining condition through land reshaping, replacement of topsoil, and re-vegetation with appropriate indigenous species suited to the arid environment. Post-decommissioning environmental monitoring should be implemented to ensure the effectiveness of rehabilitation measures and to confirm long-term site stability.

It is also recommended that financial provisions, such as a decommissioning bond or fund, be secured during the operational phase to ensure sufficient resources are available for full site rehabilitation at the end of the project life.

8 CONCLUSIONS AND RECOMMENDATIONS

The from the proposed project activities were identified, described, and assessed. For the significant adverse (negative) impacts with a medium rating, appropriate management and mitigation measures were recommended for implementation by the Proponent, their contractors, and project-related employees.

The public was consulted as required by the EMA and its 2012 EIA Regulations (Sections 21 to 24). This was done via the two newspapers (New Era and The Namibian) used for this environmental assessment. A face-to-face consultation with I&APs was conducted. No major comments or concerns were raised on the proposed project activities.

The issues and concerns raised by the registered I&APs formed the basis for this Report and the Draft EMP. The issues were addressed and incorporated into this Report, with mitigation measures provided to avoid and/or minimise their significance and impact on the environmental and social components. Most of the potential impacts were found to be of medium rating significance. The effective implementation of the recommended management and mitigation measures will particularly reduce the significance of adverse impacts that cannot be completely avoided (from medium to low). To maintain the desirable rating, the implementation of management and mitigation measures should be monitored directly by the Proponent, or by their Environmental Control Officer (ECO), which is highly recommended. The monitoring of this implementation will not only be done to maintain the reduced impacts' rating or maintain a low ratingalso to ensurebut to also , but also to ensure that all potential impacts identified in this study and any that might arise during implementation are properly identified in time and addressed right away.

On this basis, it is the opinion of the Consultant that an ECC should be issued, on the condition that the management and mitigation measures specified in the Environmental Management Plan (EMP) are implemented and adhered to.

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