CHAPTER 1

Introduction and context

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CHAPTER 1. INTRODUCTION AND CONTEXT

1.1 PURPOSE OF THIS CHAPTER

This chapter provides the background and context to, and the strategic rationale for, the proposed programme of development in the Northern Cape. The chapter outlines the main development components comprising the proposed Boegoebaai port and Special Economic Zone (SEZ), as well as outlining the approach and methods adopted by the Strategic Environmental Assessment (SEA).

1.2 BACKGROUND TO THE PROPOSED DEVELOPMENT PROGRAMME

Green hydrogen[1] (GH_2), and its derivative Power-to-X (PtX) products, such as green ammonia and green methanol, could decarbonise the South African energy economy, generate new revenues, create jobs and skills, and facilitate a Just Energy Transition[2]. As part of South Africa's ambition to reduce its reliance on fossil fuels and become a player in the globally emerging GH_2 market, the Northern Cape has proposed the development of large-scale GH_2 production in the region. The Northern Cape Green Hydrogen Masterplan (NCGHM) (2023) posits that GH_2 potential could be realised through the development of the proposed Boegoebaai port and rail project, an adjacent SEZ, and supporting regional energy generation and transmission networks and pipelines (Figure 1-1).

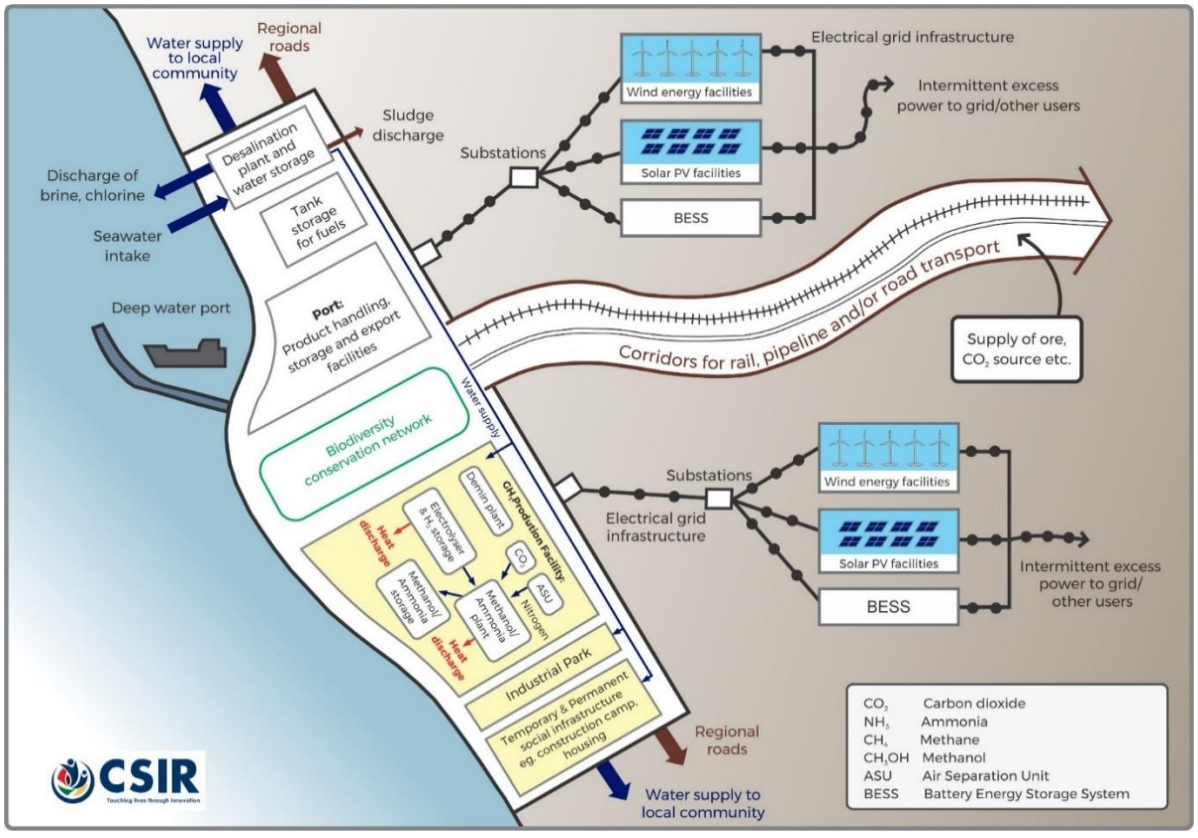


Figure 1-1: Schematic of the main infrastructure components for the Northern Cape regional GH_2 programme (notional drawing, not to scale).

[1] There are many different definitions and perspectives on the concept of "green". Here, we use the term in the narrow sense, meaning a product developed where upstream production facilities are supplied by renewable energy.
[2] The Just Energy Transition is a South African policy framework for managing the shift from a high-carbon to a low-carbon, economy in a manner that is socially equitable and inclusive.

As a signatory to the Paris Agreement, South Africa has committed to transitioning to a net-zero carbon economy by 2050. GH_2 may play a key role in realising this ambition (DSI, 2021). This transition aligns with South Africa's National Development Plan 2030 and Just Energy Transition agenda, which include the development of GH_2 as a keystone opportunity for the nation. With its very high solar and wind resource potential, South Africa is well-positioned to become a global player in the GH_2 economy, contributing to decarbonisation while creating jobs and enhancing energy security (The Presidency, 2025).

The Northern Cape, South Africa's largest province, is well positioned to become a leading GH_2 production hub, at the same time, contributing to the broader development of a national green hydrogen ecosystem across the South African energy and manufacturing sector (NCGHM, 2023). The *Boegoebaai Port and Rail Infrastructure Project: Northern Cape*, has been designated a Strategic Integrated Project (SIP) under SIP 21(o) (DPWI, 2020), as well as an industrial development initiative under the South African National Development Plan 2030. The *Boegoebaai Green Hydrogen Development Programme* has also received SIP status and will be overseen by the Presidential Infrastructure Coordinating Committee (DPWI, 2022).

While the primary export from the port would be green ammonia supplied to both international and local customers, the economic rationale for the port is also supported by the region's mineral endowments including iron ore, manganese, zinc, lead, and copper, and is home to approximately 24% of global manganese reserves. However, despite access to 338 km of Atlantic coastline, the province is currently economically 'landlocked'. All mineral exports are transported by road or rail to ports in other provinces, leading to high logistic costs and limited direct economic benefit from export activities. Limited access to port infrastructure has hampered the ability of both existing and emerging exporters to meet market demand. In some instances, such as manganese exports, neighbouring countries like Namibia have benefited economically from Northern Cape resources due to more accessible port infrastructure. The development of a deep-water port in Boegoebaai could reduce transport distances and costs, increase export competitiveness, and unlock substantial value for the provincial economy. This could further encourage industrial development within the SEZ, attract green manufacturing (e.g., solar PV and wind turbine production), and support the industrialisation of the regional economy.

The Northern Cape intends to establish 5 gigawatts (GW) of electrolyser capacity by 2030, supported by 10 GW of solar and wind power generation infrastructure. The long-term vision is to scale this to 40 GW by 2050. GH_2 production, at the scale envisaged, will be a diverse and multifaceted process with many direct and indirect impacts on social and ecological receiving environments, both positive and negative. All programme components, including their interconnected transport corridors, will require substantial areas of land surface, as well as other resource intensive inputs, all proposed in a sparsely populated but ecologically sensitive arid region. Existing, and potentially competing, land uses in the region include conservation, agriculture, fishing, tourism, mining, and other subsistence livelihoods (Figure 1-2).

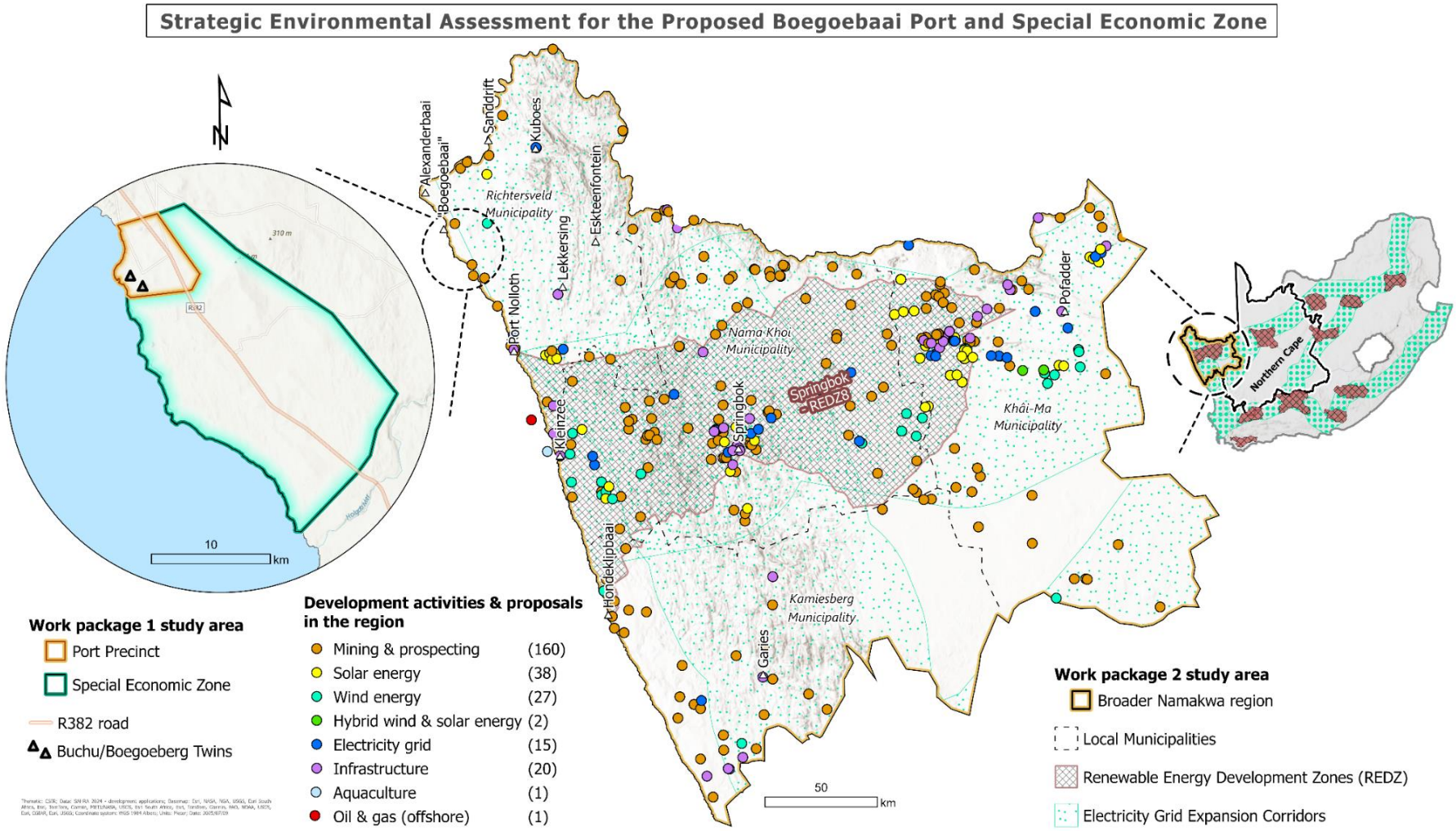


Figure 1-2: The proposed Boegoebaai port and SEZ (Work Package 1 study area) are located in the Richtersveld Local Municipality, Namakwa District, of the Northern Cape Province. Economic activities include widespread mining and prospecting. The area between Port Nolloth and Alexander Bay, including the land to the west of the R382 where the port and SEZ are proposed, has been mined for diamonds for over a century. A renewable energy sector is also emerging with established Renewable Energy Development Zones (REDZ) and Electricity Grid Infrastructure (EGI) Corridors.

If GH_2 products were to be produced at scale in the Northern Cape, the macro socioeconomic benefits could be substantial. Likewise, the local benefits across the entire value chain of GH_2 production, storage, transportation could help to create new opportunities, jobs and skills. But the social and ecological risks of development at these scales are not insubstantial and need to be guided by transparent, evidence-informed planning processes with a view to long-term sustainability. For this reason, a SEA was initiated through a collaboration between the South African National Energy Development Institute (SANEDI), the Northern Cape Economic Development, Trade and Investment Promotion Agency (NCEDA), and Transnet National Ports Authority (TNPA). Given their experience in SEA, renewable energy, port and GH_2 planning, the Council for Scientific and Industrial Research (CSIR) was appointed to play a coordinating role and undertake an independent SEA process

1.3 PROJECT ASPECTS

Given the multiscale scope of the SEA, its processes and outputs were split between two Work Packages (see Section 1.4). This section describes the types and scale of infrastructure and development activities considered within the scope of Work Package 1 of the SEA. **Error! Reference source not found.**

1.3.1 The Proposed Boegoebaai Port

The proposed short-term port layout (Figure 1-3), is intended to accommodate bulk liquid items such as ammonia and diesel oil, dry bulk materials such as iron ore and manganese, and assorted break bulk cargo, which arrives in bulk and is then separated into individual components, such as lead and zinc. Consequently, TNPA needs to make provision for the infrastructure necessary to facilitate the import and export operations for all these commodities. An estimated 5 million tonnes per annum (Mtpa) of dry bulk (manganese) and 1.0 Mtpa of break bulk (lead and zinc) are expected to be exported by 2030/31. There are also plans to export 1.4 Mtpa of GH_2 derivatives and various agricultural products (0.2 Mtpa). Diesel imports are expected to reach around 1.3 Mtpa by 2030. All exports and imports will be transported mainly through the road network in the first phase of the new port.

The port will include a two-berth jetty connected to the land via an access trestle; a sea-side berth dedicated to dry bulk and liquid cargo and a conventional multi-purpose berth (landside). The berths are sheltered from wave energy by a concrete armoured breakwater. The bulk berth will be fitted with a ship loader and a conveyor system connected to landside closed stockpiles. The bulk berth will be capable of liquid bulk import and export, and fitted with pipelines that are connected to diesel and ammonia storage tanks. The multi-purpose berth will handle containerised cargo and break bulk using two mobile cranes. Multi-purpose cargo will be stored in a dedicated multi-purpose terminal. An Admin Craft Basin will initially store equipment for breakwater construction and will be used to berth the marine fleet once the port is operational. The Admin Craft Basin will be designed as a dig-out basin within the main breakwater, protected by a secondary breakwater. The short-term port layout also involves constructing the required dry bulk terminal, multi-purpose terminal, and port administration and control buildings. Security fencing, port entrance facilities, fire station and clinic will be required. Internal port roads and rail, and truck staging facility will also be required to respond to the needs of the first phase of development.

Figure 1-3: Artist's impression of the Boegoebaai port layout. indicating the initial elements of Phase 1A development required to meet initial import and export demands (TNPA, 2024).

Detailed descriptions of the infrastructure aspects associated with the proposed short-term Boegoebaai port layout (Phase 1A) are provided in Table 1-1 below. The longer-term vision for the Boegoebaai port (Phase 1B) is designed for flexibility to accommodate future changes in commodities and operations. This assumes that the port will continue to primarily export commodities from Phase 1A, with the potential for other GH_2 derivatives such as methanol, naphtha and e-kerosene to be added to the export mix. The projected export volumes of green ammonia, combined with methanol, naphtha and e-kerosene is expected to increase to 2.15 Mtpa from 2035 to 2050. By 2050, plans include extending the breakwater, adding multi-purpose and liquid bulk berths, a container terminal, a ship repair yard, and expanding stockpiling and enclosed warehouses for dust control. Supporting infrastructure will include rail connections, road-over-rail bridges, and tippler facilities.

Table 1-1: Detailed description of infrastructure aspects in the vicinity of the proposed Boegoebaai port (Phase 1A).

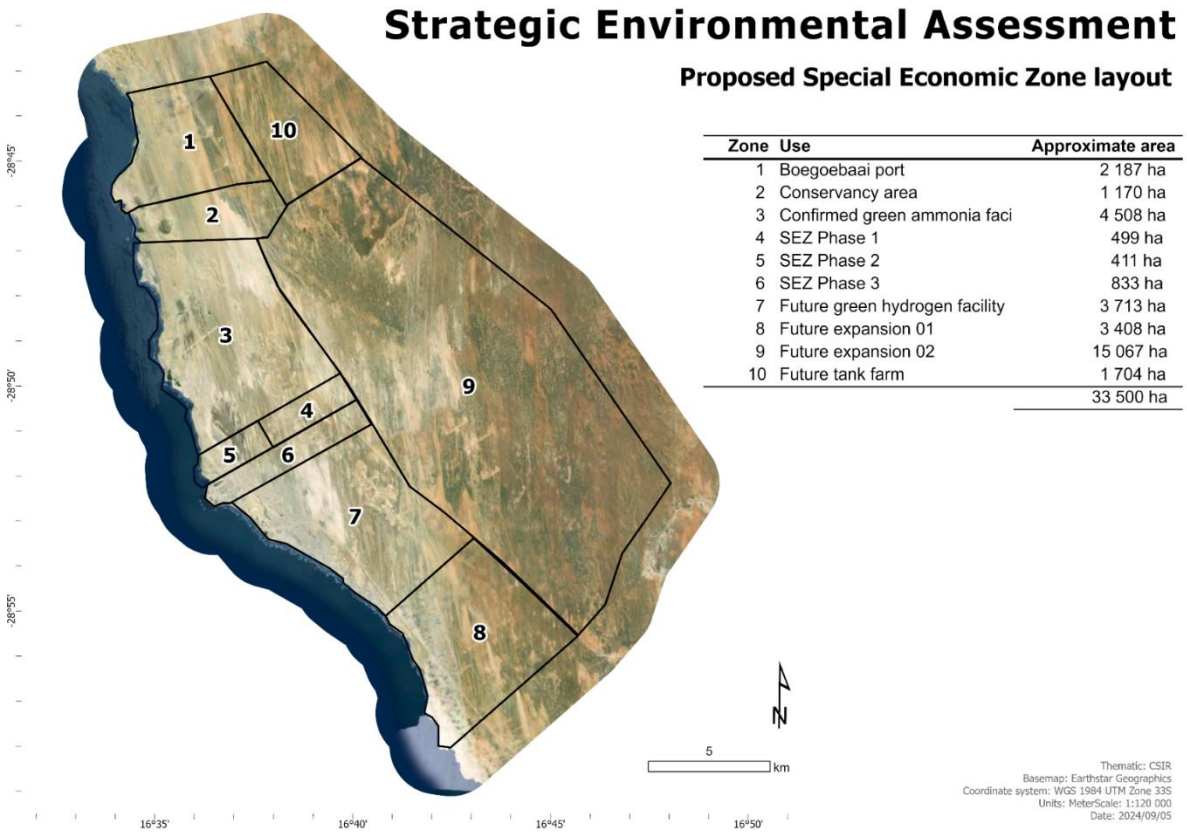
Infrastructure aspect	Description
Jetty	The jetty structure will act as a multi-use berth facility, designed to handle dry bulk, liquid bulk and multi-purpose cargo. The main jetty will consist of two berths: a 295 m long multi-purpose berth designed to accommodate Panamax vessels and a 350m long bulk berth that can accommodate Capesize vessels. The main jetty is connected to the shoreline via a 160m long access trestle. The main jetty and access trestle are founded on circular reinforced concrete piles with a sacrificial steel tubular casing. The superstructure includes reinforced concrete precast beams and slabs with in-situ concrete casts and topping to stitch the structure together. The main jetty supports ship loaders, conveyor and mobile cranes which service the bulk and multi-purpose terminal berths respectively., Vehicular access is provided via a single carriageway located beneath the ship loaders with turning circles provided at the ends of both the dry bulk and multi-purpose terminal jetty. The access trestle comprises of a single carriageway for vehicular access with the conveyor and ancillary services running adjacent.
Breakwaters	The rubble mound main and secondary breakwaters protect against wave energy at the berths and in vessel turning areas. The primary armour will be an appropriately designed, requiring an estimated 2,785 million m^3 of rock, 63,150 m^3 of reinforced concrete, and approximately 13,150 armour units.
Admin Craft Basin (Harbour)	A dig-out admin craft basin provides additional wave protection inside the main breakwater for marine fleet. The structure comprises a concrete deck supported on vertical concrete piles cast into steel casings, with a transverse beam supported by an anchored concrete abutment on the land side.
Materials Handling Equipment	The equipment will be defined by the terminal operator based on operational requirements and contracted volumes. For the bulk berth, this includes a travelling shiploader, conveyors, and stacker/reclaimers for dry bulk cargos like manganese, lead, and similar break bulk. The multi-purpose terminal berth will use mobile cranes, trucks, and front-end loaders for break bulk and containers.
Dry Bulk Material Handling	Manganese will be stored in closed stockpiles, similarly to lead and zinc which require enclosed warehouses. Dust suppression systems, which involve water spraying the stockpile and conveyor cargo, are specified for manganese storage. A mobile stacker and bucket wheel will handle stacking and reclaiming operations.
Quayside Material Handling Equipment	Travelling ship loaders are selected for efficiency in handling large volumes of dry bulk cargo, with spatial dimensions allowing truck passage underneath during operations.
Conveyor Belts	Systems handling zinc and lead must be fully enclosed, while those handling manganese require arched coverage. Elevated belt conveyors are designed with handrailed walkways for safe access and maintenance.
Dust Control	Dust suppression and collection systems are incorporated, with all material handling equipment designed to prevent material accumulation outside the dust collection system.
Buildings	Proposed port buildings include a Port Access Gateway and Induction Centre, Port Authority Building (with a Wellness Centre and Emergency Services Building), and Terminal Operator's Building (with workshops and satellite ablution buildings).
Bulk Services: Water	Average daily water demand is estimated at 660 kL/day. Two options were considered: a pipeline from Alexander Bay with a water treatment plant, or an onsite desalination plant. The desalination plant (1ML/day capacity) is considered more feasible. Elevated reservoirs will provide pressure for fire suppression discharge.
Bulk Services: Sewer	The site will be divided into separate drainage areas with isolated reticulation systems, on-site treatment, and disposal. Drainage areas will use a

Infrastructure aspect	Description
	combination of wastewater treatment plant, septic tank and soak-away systems.
Stormwater	The drainage system will separate clean and dirty water, with clean water runoff diverted around the site. High-risk dirty runoff water will flow into concrete-lined channels, and low-risk dirty runoff water will flow into block and vegetated channels. Pollution control ponds will be lined with HDPE, attenuated to the 1:50 year pre-development condition and discharged to the receiving natural environment, such as the ocean.
Electrical	The internal electrical network will include an intake substation (22kV), primary and secondary substations, distribution substations, street and area lighting, and small power and lighting for buildings.
Electronics	Security systems include fencing, CCTV coverage, access control, and coastal/railway protection systems, and will comply with the International Ship and Port Facility Security requirements. General electronic systems include fire detection, public address, evacuation systems, building management system, and security control room. Information and Communication Technology services include fibre connections, server rooms, network equipment, microwave links, and manhole and sleeve infrastructure.
Fuel storage	A liquid bulk storage facility with two 35,000 m^3 tanks and tanker loading facilities is included. Tanker vessels will discharge into storage tanks via pipeline at the multi-purpose terminal berth. This represents the first phase of the liquid bulk terminal development.
Internal Port Roads and Bridges	Port Access Interchange: Located 60 km north of Port Nolloth off the R382, designed to accommodate large volumes of heavy vehicle traffic for continuous flow. Port Access Control: Separate entrances with an access gateway and a combined weighbridge and access gateway, allowing multiple trucks to queue without causing congestion. Truck Offloading Area: Designed with three offloading terminals operating independently to prevent congestion and ensure continuous offloading.
External Roads	Development of the port in the short-term will attract mining ore transported by trucks along the R382, serving as the primary route for transporting mining commodities until rail transport viability is considered for future port expansion phases.

1.3.2 The proposed Boegoebaai Special Economic Zone

The Boegoebaai SEZ is envisioned as a multifaceted hub, primarily focusing on the export of GH_2/PtX products and commodities through the port. The SEZ will prioritise opportunities in manufacturing, logistics, and agro-processing to deliver a broad range of products and services (NCGHM, 2023). The Northern Cape targets include an initial 1.2 GW of electrolyser capacity to be completed by 2028, scaling up to 5 GW by 2030, and reaching 40 GW by 2050. The Boegoebaai SEZ area, encompassing approximately 33 500 ha (inclusive of the proposed conservancy area adjacent to the Boegoebaai port), will be developed in phases (as described in Table 1-2 and depicted in Figure 1-4) consisting of 10 proposed zones:

- **Zone 1**: Port Precinct (described in Section 1.3.1) – 2 187 ha
- **Zone 2**: Conservancy area – 1 170 ha
- **Zone 3:** Confirmed green ammonia facility – 4 508 ha
- **Zone 4:** SEZ Phase 1 – 499 ha
- **Zone 5:** SEZ Phase 2 – 411 ha
- **Zone 6:** SEZ Phase 3 – 833 ha
- **Zone 7:** Future green hydrogen facility – 3 713 ha
- **Zone 8:** Future expansion 01 – 3 408 ha
- **Zone 9:** Future expansion 02 – 15 067 ha
- **Zone 10:** Future tank farm – 1 704 ha



Zone	Use	Approximate area
1	Boegoebaai port	2 187 ha
2	Conservancy area	1 170 ha
3	Confirmed green ammonia faci	4 508 ha
4	SEZ Phase 1	499 ha
5	SEZ Phase 2	411 ha
6	SEZ Phase 3	833 ha
7	Future green hydrogen facility	3 713 ha
8	Future expansion 01	3 408 ha
9	Future expansion 02	15 067 ha
10	Future tank farm	1 704 ha
		33 500 ha

Figure 1-4: The footprint of the proposed Boegoebaai Port (Zone 1) and phases of the proposed SEZ which include a diversity of landuses across Zones 2 to 10.

The initial development of the SEZ will accommodate the green ammonia facility and the envisaged 5 GW of electrolyser capacity by 2030. This will include a sea water intake line, discharge lines to the ocean, a desalination plant, 5 GW electrolyser GH_2 production facility and green ammonia production facility, and hydrogen and ammonia storage tanks. Future SEZ activities are outlined in Table 1-2. Two entrances to the SEZ Phase 1 are proposed: a northern entrance for commercial, socio-service, and private traffic, and a southern entrance for industrial traffic. The truck staging area and the SEZ desalination plant are planned to be located near the southern entrance, facilitating road freight to and from the N14 and N7 highways.

Table 1-2: Proposed infrastructure and development activities per SEZ zone

SEZ zone	Description of infrastructure
1) TNPA port precinct	See Section 1.3.1 and Table 1.1 above.
2) Conservancy area	Conservancy area of approximately 1 170 ha that has been roughly demarcated based on initial inputs on conservation priorities such as the Boegoeberg koppies and seal colony on the Boegoebaai point. A habitat unit known as Swartvygie Heuweltjie Strandveld, located just inland of Boegoebaai, has suffered extensive damage from mining over the past century. The only intact areas are protected by the Buchuberg twins and hardened roads, which prevent sand scour. It is crucial for any port and GH_2 projects to avoid these intact portions, as they cannot be offset. There is also an interesting archaeological site at the proposed development – the Boegoebaai cave/lair.
3) Green ammonia facility	The green ammonia facility will be located near the TNPA port precinct to minimise pipeline length and enhance efficiency. The site is adjacent to the coast to facilitate desalination processes and house the 188 ML/day desalination plant. Infrastructure will include desalination plant and associated infrastructure (including seawater intake infrastructure and discharge pipeline); Water treatment unit and water reservoir; Containerised units for the electrolysers; Air separation unit; Liquid air energy system for nitrogen storage; Hydrogen and oxygen storage; Ammonia processing unit and liquid ammonia storage tank; Pipelines required for hydrogen, its' derivatives and by-products, and a control room. Seawater will be desalinated through a Reverse Osmosis (RO) process and then further processed to Demineralized water, which is needed for the production of GH_2 via water electrolysis. Cooling tower blowdown will be disposed of back to sea with the Reverse Osmosis brine and other treated wastewater streams. It is expected that the blended total dissolved solids of the cooling tower blowdown stream and the Reverse Osmosis brine and waste streams will be acceptable for seawater discharge. Firewater will be provided through firewater tanks on site. There is an opportunity to combine firewater and desalinated water storage on site. Seawater will be the backup source of firewater in case of an emergency and the stored firewater is not adequate. Lye solution purge from the GH_2 Plant will be discharged with the other return streams to the sea. Other effluent is oxygen and small quantities of off-gas which are expected to be safe to vent to atmosphere.
4-6) SEZ Industrial Park	The Industrial Park will be designated for mixed-use purposes, a manufacturing cluster, logistics and warehousing, offices. The SEZ will also include a 2.7 ML/day desalination plant, including pump station, supply pipelines, feeder pipelines etc. Seawater will be extracted and filtered, with a portion of the filtered water supplied to the SEZ Industrial Park for its use and for distribution to Port Nolloth. The SEZ Industrial Park will then desalinate this water at its own facility. The remaining filtered water will be processed through a separate desalination plant for operational use.
7) Future GH_2 facility	This will be a replication of the work that is anticipated at the initial Green Ammonia Facilities: Water treatment unit and water reservoir; Containerised units for the electrolysers; Air separation unit; Liquid air energy system for nitrogen storage; Hydrogen and oxygen storage; Ammonia processing unit and liquid ammonia storage tank; Pipelines required for hydrogen, its' derivatives and by-products, and a control room.
8) Future expansion area 01	This will be a replication of the work that is anticipated at the initial Green Ammonia Facilities: Water treatment unit and water reservoir; Containerised units for the electrolysers; Air separation unit; Liquid air energy system for nitrogen storage; Hydrogen and oxygen storage; Ammonia processing unit and liquid ammonia storage tank; Pipelines required for hydrogen, its' derivatives and by-products, and a control room.
9) Future expansion area 02	This will be a replication of the work that is anticipated at the initial Green Ammonia Facilities: Water treatment unit and water reservoir; Containerised units for the electrolysers; Air separation unit; Liquid air energy system for nitrogen storage; Hydrogen and oxygen storage; Ammonia processing unit and liquid ammonia storage tank; Pipelines required for hydrogen, its' derivatives and by-products, and a control room.
10) Future tank storage	Proposed area of approximately 1 704 ha inland of the R382 road.

1.4 APPROACH TO THE SEA

The SEA is being undertaken to guide strategic planning for proposed infrastructure development in and around Boegoebaai, as well as the broader Namakwa region of the Northern Cape, South Africa. Readers are reminded that the SEA is not a decision-making process, in the same way that, for example, an Environmental Impact Assessment (EIA) is. The purpose of the SEA is to, in a transparent way, guide downstream planning and decision-making processes that may, or may not, occur over many years, if not several decades into the future. Integrating a variety of best practice science-policy processes, SEA should provide an evidence-based, cross-disciplinary perspective on the main opportunities and constraints associated with the proposed port and SEZ, within the broader context of large-scale, regional GH_2 development.

Given the multiscale scope of the SEA, its processes and outputs were split between two Work Packages: **Work Package 1** and **Work Package 2**. The scope, spatial scales and methodological approach across the two Work Packages are outlined in the sections which follow and summarised in Table 1-3. The geographical scope of the two Work Packages is depicted in Figure 1-2.

Table 1-3: Summary of the SEA Work Packages across different spatial scales, methods, and data collection practices.

	Work Package 1	Work Package 2
Spatial scale	Local (33 500 ha) covering the extent of the proposed port and SEZ.	Regional (>5 million ha) across four Local Municipalities, including the 33 500 ha extent covered by Work Package 1.
Methods	High resolution determination of receiving environment sensitivity with a view to practicing avoidance (top of the mitigation hierarchy).	Determination of the cumulative social and ecological impacts of a regional expansive GH_2 economy across development scenarios.
Resolution	Fieldwork, coupled with desktop reviews (peer reviewed and grey literature) and other sources where necessary (e.g., interviews).	Desktop reviews (peer reviewed and grey literature, interviews etc.) and other publicly available data and sources.

1.4.1 Work Package 1 (Boegoebaai Port & SEZ SEA)

Work Package 1 (the contents of this report) assessed the social and ecological sensitivities of the local-scale receiving environment within a systematic sensitivity framework (Table 1-4). Work Package 1 assessed sensitivities at relatively high resolution (often including fieldwork), around the proposed port and SEZ development, covering a spatial scale of approximately 33 500 hectares (ha). This was undertaken with the intention of guiding local-scale feasibility and planning studies (especially for the new proposed port) and future decision-making processes, like EIAs and other local-scale planning exercises which may occur in the future.

Table 1-4: Calibration of sensitivity categories for receiving environments across the Work Package 1 study area

Category	Description
VERY HIGH	Highly vulnerable to disturbance with little/no capacity for recovery. Includes endangered species, critical habitats, heritage/social resources, or ecosystems with very narrow tolerances for change.
HIGH	Sensitive to ecological and social change but with better recovery potential. Lower concentrations of endangered species, critical habitats, heritage resources, or ecosystems with some tolerance for change.
MODERATE	Some resilience to stress or change. Systems can absorb moderate impacts without long-term harm, or irreversible loss. Includes adaptable species, less valuable social/cultural resources and moderately sensitive habitats.
LOW	Likely already severely degraded by past disturbance, or higher adaptive resilience and low vulnerability. Includes widespread social resources, ecosystems or species with broad ecological niches and high regenerative capacity.
TRANSFORMED VEGETATION	Plant communities that have been adversely altered from its expected original state by past human activities and environmental change.
EXISTING ANTROPOGENIC DISTURBANCE	Areas where human-built features (e.g. buildings, infrastructure, tracks and roads) and physical disturbance (e.g. mined areas, tailing heaps, stock posts) currently exists or are visible in the landscape.

Work Package 1 consists of seven chapters drafted by thirty-five authors, peer reviewed by eight independent peer reviewers, and includes contributions from a diversity of stakeholders involved in the process via a formally constituted project Working Group[3]. In addition to the Summary for Policymakers (SPM) (Schreiner et al., 2025), Work Package 1 includes the following chapters (Table 1-5):

Table 1-5: Chapter numbers, titles and recommended citations for Work Package 1

Chapter	Title	Citation
Chapter 1	Introduction and context (***this Chapter***)	Mqokeli et al., 2025
Chapter 2	Marine ecology	Clark et al., 2025
Chapter 3	Terrestrial and aquatic ecology	van Rooyen et al., 2025
Chapter 4	Biodiversity offset framework	Botha, 2025
Chapter 5	Heritage resources	Orton et al., 2025
Chapter 6	Fisheries and coastal livelihoods	Gammage et al., 2025
Chapter 7	Sustainable port planning	Taljaard & Weerts, 2025

Each Chapter was tasked with developing the following content in their respective contributions:

1. An Executive Summary of 2 pages with headline findings/recommendations;
2. A description of the receiving environment and land use dynamics;
3. Detailed sensitivity mapping classifying different receiving environments across the study area (Table 1-4);

[3] The Working Group is a multi-sectoral team of experts drawn from national, provincial, and local government departments, state agencies, academic and research institutions, non-governmental and community-based organisations, as well as industry and the private sector. Its purpose is twofold: to provide expert input throughout the SEA process; and to act as an information conduit, with members acting as links between their constituencies and the SEA, facilitating two-way communication, transparency, and inclusive engagement throughout the assessment.

4. An aspects and impacts register describing the impacts that may occur because of new infrastructure aspects and within sensitive receiving environments; and

5. Recommended strategic management actions for enhancing positive impacts and reducing negative ones, with a view to guiding future Port/SEZ planning and layouts, as well as guiding future project-specific EIAs.

A multi-author team, in the context of SEA refers to a structured, pluralistic authorship model designed to integrate diverse perspectives and expertise across an assessment process (see Schreiner et al., 2025). For the Boegoebaai SEA, multi-author teams were constituted through a consultative process with the Working Group (which included representatives from government, academia, NGOs, and other stakeholders) to nominate researchers who possess the required niche knowledge of this remote region, along with an understanding of strategic infrastructure impacts, academic credibility, and expertise in high-level strategic assessments. Multi-author teams were assembled for both Work Package 1 and Work Package 2 (Figure 1-5). The teams developed peer reviewed reports, with the Work Package 1 teams focusing on identifying the key sensitivities and impacts associated with the port and SEZ development, and the Work Package 2 teams undertaking a more strategic assessment of the cumulative risks and opportunities at a broader scale. Writing teams worked closely across both Work Packages for the duration of the SEA process, ensuring that all the salient issues were covered in at least one of the Work Package Chapters.

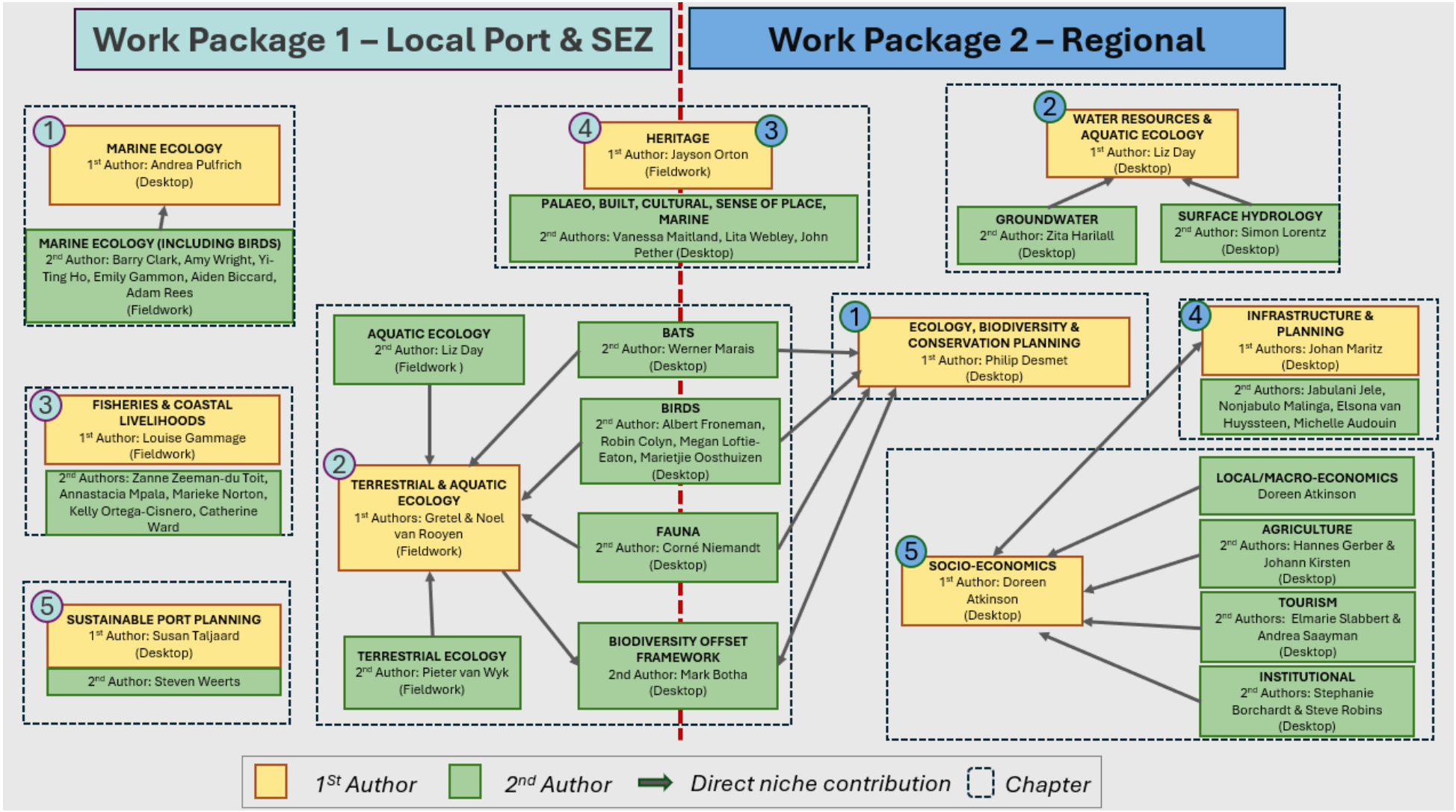


Figure 1-5: Multi-author teams and specialist chapters across the two Work Packages with points of collaboration and overlap indicated

1.4.2 Work Package 2 (Namakwa Region SEA)

A regional-scale assessment is currently underway and will cover, at a broader, cumulative scale, the main sustainability issues associated with an expansive Northern Cape GH_2 economy, assessed within the methodological paradigm of risk and opportunity. Work Package 2 content will be developed at a lower resolution than Work Package 1 and does not include any fieldwork. The spatial scale of Work Package 2 covers parts of the Namakwa District, delineated by the Richtersveld, Nama Khoi, Kamiesberg and Khâi Ma Local Municipalities. Work Package 2 will, in a highly structed risk/opportunity framework, assess the magnitude of impacts at regional scale across various future scenarios (see Schreiner et al., 2024). Work Package 2 will seek to guide local and regional planning, through processes like Spatial Development Frameworks (SDFs), Integrated Development Plans (IDPs) and Environmental Management Frameworks (EMFs), and any EIA processes that may be undertaken in the region. The strategic issues covered in Work Package 2 include ecology, biodiversity and conservation planning (including biodiversity offsets), water resources and aquatic ecology, heritage, infrastructure and planning, and socio-economic impacts.

1.5 REFERENCES

Botha, M. (2025) Strategic Environmental Assessment: Boegoebaai Port & Namakwa SEZ Biodiversity Offset Framework. Report to CSIR.

Clark, B.M., Ho, Y., Gammon, E., Biccard, A., Rees, A, Ulrich, A. & Wright, A.G. (2024) Boegoebaai Strategic Environmental Assessment – Marine Ecology. Report to CSIR

Department of Forestry, Fisheries and the Environment (DFFE) (2020). South Africa's Low Emission Development Strategy. Available at: https://www.dffe.gov.za/sites/default/files/docs/2020lowemission_developmentstrategy.pdf

Department of Public Works and Infrastructure (DPWI) (2020). Strategic Integrated Projects. Government Notice 812, Government Gazette 43547. Available at: https://infrastructuresa.org/wp-content/uploads/2022/01/Strategic-Integrated-Projects-July-2020.pdf

Department of Science and Innovation (DSI). 2021. Hydrogen Society Roadmap for South Africa.

DPWI) (2022). Strategic Integrated Projects. Government Notice 2835, Government Gazette 47658. Available at: https://www.gov.za/sites/default/files/gcis_document/202212/47658gon2835.pdf

Gammage, L. C., Zeeman, Z., Mpala, A., Norton M., Ortega-Cisnero, K. & Ward, C. (2025). Strategic Environmental Assessment for the proposed Boegoebaai Port and Special Economic Zone. Fisheries and Coastal Livelihoods. Report to CSIR.

Mqokeli, B., Schreiner, G., Snyman-van der Walt, L., Louw, H., Modise, S., Ruthenavelu, M., Zukulu, T. & Maluleke, J. (2025). Chapter 1: Introduction and context in Schreiner, G., Mqokeli, B., Snyman-van der Walt, L. Lochner, L. and Tsedu, R. (eds.). (2025). Work Package1: Strategic Environmental Assessment for the proposed Boegoebaai Port and Special Economic Zone. CSIR/SPLS/SE/ER/2025/0023/B, CSIR: Pretoria: ISBN xxxxxx. Available at Boegoebaai Port | CSIR

Northern Cape Green Hydrogen (NCGH2) (2023). Northern Cape Green Hydrogen Masterplan. Available at: https://www.ncgh2.co.za

Orton, J., Webley, L., Pether., J. & Maitland, V. (2025). Heritage Resources: Strategic Environmental Assessment for the proposed Boegoebaai Port and Special Economic Zone. Report to CSIR.

The Presidency (2025) Just transition to a low-carbon economy. State of the Nation Address 2025. Available at: https://www.stateofthenation.gov.za/priorities/growing-the-economy-and-jobs/just-transition-to-a-low-carbon-economy

Republic of South Africa (2014) Special Economic Zones Act No. 16 of 2014. Government Gazette No. 37664. Available at: https://www.gov.za/documents/special-economic-zones-act

Schreiner, G., Mqokeli, B., Snyman-van der Walt, L., Lochner, P., Louw, H., Modise, S., Ruthenavelu, M., Zukulu, T. & Maluleke, J. (2024) Strategic Environmental Assessment for the proposed Boegoebaai Port, SEZ and Namakwa Region: Briefing note for research partners. Note produced by CSIR, NCEDA and TNPA.

Schreiner, G., Mqokeli, B., Snyman-Van der Walt, L., Tsedu, R., Pulfrich, A., Clark, B., Ho, Y.-T., Gammon, E., Biccard, A., Rees, A., Wright, A., Taljaard, S., Weerts, S., Gammage, L., Zeeman-du Toit, Z., Mpala, A., Norton, M., Ortega-Cisnero, K., Ward, C., van Rooyen, G., van Rooyen, N., van Wyk, P., Day, L., Niemandt, C., Froneman, A., Colyn, R., Oosthuizen, M., Loftie-Eaton, M., Marais, W., Botha, M., Orton, J., Maitland, V., Webley, L., & Pether, J. (2025). Summary for Policymakers Work Package 1 of the Strategic Environmental Assessment for the proposed Boegoebaai Port and Special Economic Zone.

Taljaard, S. & Weerts, S. (2025) Boegoebaai SEA: Informing Sustainability Planning for proposed Port of Boegoebaai. CSIR Report.

United Nations Framework Convention on Climate Change (UNFCCC), *The Paris Agreement*. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement

Van Rooyen, G., Van Rooyen, N., Van Wyk, P., Day., L., Froneman, A., Colyn, R., Oosthuizen, M., Loftie-Eaton, M., Marais., W. & Niemandt, C. (2025). Strategic Environmental Assessment for the proposed Boegoebaai Port and Special Economic Zone. Terrestrial and Aquatic Ecology. Report to CSIR.