Boegoebaai Port, SEZ and Namakwa Region SEA

Working Group Meeting 4 Key Notes & Actions

Date: 27 November 2025 | **Time:** 09:00 – 12:30 | **Platform:** Microsoft Teams

Attendees: **Appendix A**

Purpose: Lead Authors to present draft findings of Work Package 2 (WP2)[1] of the Strategic Environmental Assessment (SEA) for the proposed Boegoebaai Port, Special Economic Zone (SEZ) and Namakwa region. The session aimed to introduce the Working Group (WG) to the draft findings before Chapters are shared for formal public review.

Agenda:

1. Welcome and Meeting Objectives
2. Context and Objectives of the SEA
3. Specialists Presentations – WP2 Draft findings
   - ❖ Water Resources & Aquatic Ecosystems
   - ❖ Ecology, Biodiversity & Conservation
   - ❖ Bats
   - ❖ Birds
   - ❖ Fauna
   - ❖ Biodiversity Offset Framework
   - ❖ Heritage
   - ❖ Infrastructure & Planning
   - ❖ Socio-Economics
4. Next Steps and Closing Remarks

Key Notes

1) <u>Welcome and opening:</u>

The Fourth WG meeting for the SEA of the Boegoebaai Port, SEZ and broader Namakwa Region was opened by the Chairperson (Abulele Adams), who outlined the purpose and agenda of the meeting:

- To present the preliminary findings of the Specialist Assessment studies, aligned with WP2 draft SEA outputs and provide a platform for WG members to engage and provide input on the SEA outputs.

2) <u>Context and Objectives of the SEA:</u>

Greg Schreiner (CSIR) presented on the overarching purpose, design and key aspects of the SEA process.

- The presentation highlighted that CSIR's role focuses on designing, facilitating, and integrating the SEA process and findings, and providing platforms for stakeholder co-production of knowledge.

[1] WP1 of the SEA focused on the Port and SEZ, and was concluded and published in December 2025. WP2 of the SEA focusses on the broader Namakwa region, including the port and SEZ

- It was clarified that CSIR holds no financial or ideological interest in the green hydrogen development proposals in the Northern Cape.
- It was emphasised that the SEA is not a public relations exercise or approval process, and rather an evidence-based, transparent and credible scientific assessment process.
- The presentation distinguished an SEA from an Environmental Impact Assessment (EIA); noting that an SEA functions as a knowledge and planning tool and does not result in a decision on whether a development proposal should go ahead or not. The SEA outputs provide evidence and guidance to inform future decision-making processes, planning instruments, including EIA processes, spatial development frameworks, environmental management frameworks and other long-term planning tools. It was underscored that an SEA is positioned at the early conceptual and planning phases for potential development, to form the foundation for future detailed work that is still required, such as technical or financial studies which may take place years or decades from now.
- It was noted that the need for SEA was due to large-scale infrastructure development proposals in the Northern Cape, including the Boegoebaai port, SEZ, and renewable energy infrastructure, and other infrastructure required to produce green hydrogen, which represent opportunities for energy modernisation and investment, however, occur in socially and ecologically sensitive environments. For this reason, the need for coordinated and integrated planning was emphasised to prevent unintended or substantial adverse consequences.
- The structure of the SEA was revisited:
    - WP1 focuses on the 33 500 hectares (ha) proposed Port and SEZ, and its local environmental and social sensitivities. WP1 was already presented during previous WG meetings, has been finalised and aimed for publication in December 2025.
    - WP2 addresses the broader 5.8 million ha regional scale to assess scenarios[2], cumulative risks and opportunities of developing a hydrogen economy in the Northern Cape.
- It was noted that the current discussions and specialist presentations are focused on preliminary findings related to WP2. The SEA process facilitated by the CSIR, involved more than 70 appointed experts, the majority of whom are external specialists contracted based on recommendations from various stakeholders, including members of the WG. This multi-author team model was adopted, inclusive of independent peer reviewers, to ensure quality and credibility across the chapters.

3) <u>Specialist Presentations:</u>

❖ **<u>Water Resources & Aquatic Ecosystems</u>**

Liz Day (Liz Day Consulting) presented the findings on water resources and aquatic ecosystems, including groundwater, surface hydrology, and inland and estuarine aquatic systems. Key points from the presentation included:

- Groundwater sensitivity mapping focused on areas with high human dependence, strategic water source areas, threats from failing wastewater treatment infrastructure, and water scarcity. Risks associated with green hydrogen development include impacts on recharge capacity due to

[2] Scenario 0: Baseline – green hydrogen development does not happen, but other environmental, social and economic trends (such as climate change, unemployment and migration, and mining and renewable energy development) continues.
Scenario 1: A moderate green hydrogen economy is established (0.5 million tonnes per annum of hydrogen is produced which required 10 gigawatt of renewable energy).
Scenario 2: A large green hydrogen economy is established (4 million tonnes per annum of hydrogen is produced which required 80 gigawatt of renewable energy).

increased surface hardening, groundwater availability and quality. Opportunities include potential relief on groundwater resources through affordable desalination availability and improved technical and management expertise.

- Surface hydrology assessment considered drainage networks, ephemeral river systems, the Orange River abstractions and reticulation network, aridity, and farm dam density. The sensitivity mapping identified all watercourses as highly sensitive, with large inward-draining areas rated as Very Low sensitivity. Risks from green hydrogen development include increasing stress on already limited water resources and worsening aridity driven by climate change, while opportunities include improved abstraction, storage, and reticulation management through enhanced technical capacity and potential additional freshwater supply under certain scenarios.
- Aquatic ecosystems, including the Orange River, its floodplain, ephemeral rivers, pans, wetlands, and estuaries, were assessed for biodiversity significance and ecosystem services. Many estuaries are already degraded, and systems are highly sensitive to hydrological changes, physical disturbance, fragmentation, and alien plant invasion. All drainage lines and estuaries were mapped as Very High sensitivity, with certain catchments rated high due to important aquatic features despite low surface water sensitivity. Risks include habitat degradation and biodiversity loss, with Very High sensitivity areas recommended for outright avoidance. There are no biodiversity-associated opportunities identified for aquatic ecosystems.
- General recommendations include: avoidance of sensitive areas; investment in training and infrastructure for water management; rehabilitation of degraded ecosystems (notably the Orange River); quantification of additional water volumes and quality requirements associated with green hydrogen development; assessing the feasibility of excess freshwater production via desalination; ensuring that environmental water requirements for the Orange River system remain achievable; and consideration of proactive aquatic ecosystem offset banking.
- Freshwater availability is a critical constraint in this arid to hyper-arid region, with indirect ecological risks from increased water supply and development footprints. Groundwater recharge areas should be avoided, and water resource limitations were identified as key constraints for solar and wind energy developments.

Questions/Discussion

A WG member asked for clarity on whether there are any case studies on the implementation of seawater desalination, and what ecological impacts or costs were experienced.

- It was explained that the study presented is primarily focused on inland and estuarine areas and therefore does not include an assessment of the direct impacts of coastal desalination but rather considered the indirect effects that increased freshwater availability (from desalination) might have. It was also added that the marine study (WP1) has considered desalination specifically from the perspective of brine-related impacts. It was further noted that the current study does discuss the impacts on water quality associated with groundwater desalination, including the management of additional brine, which is recognised as an important consideration.
- A WG member commented in relation to the above question that desalination is indeed part of national planning from the water sector's perspective. The member highlighted that the Water Partnership Office, housed within the Development Bank of Southern

Africa, is currently focusing on desalination development along the South African coastline. A programme is being developed, with the support of the IFC and specialist consultants, to assist municipalities with the development of desalination capacity. The member emphasised that the impacts of brine dispersal and brine release to the receiving marine environment constitute a major field of research. There are numerous international examples showing both successful brine management. They stressed that brine impacts must be evaluated on a case-by-case basis, as the effects depend on both the design of the system and the characteristics of the receiving marine environment. Brine discharge is not inherently harmful; impacts depend heavily on how the system is engineered and managed. It was further noted that while desalination is not a cheap method of producing freshwater, it has become significantly more affordable in the past decade. It was emphasised that in comparison to the overall economics of producing green hydrogen, the cost of desalination, even at relatively small scales, is considered negligible. The member highlighted that desalination should therefore not be viewed as a negative practice within green hydrogen production, as its relative cost contribution is minimal.

- A note was shared in the chat indicating that desalination impacts have been addressed in WP1, Chapter 2, as well as the link to the chapter.

❖ **Bats**

Philip Desmet (Ecosol GIS) presented on behalf of Werner Marais (Animalia), outlining the bat sensitivity analysis and associated risks from proposed developments. Key points from the presentation include:

- Bat sensitivity mapping was undertaken using environmental surrogates. Very High sensitivity zones include open water, perennial rivers, wetlands, coastline, protected areas, and known bat roosts; High sensitivity zones include limestone geology supporting caves; Medium zones include non-perennial watercourses.
- It was noted that detailed species-level distribution and diversity data for bats in the region are limited, which constrains precise assessment of impacts.
- The relationship between sensitivity zones and development suitability was outlined, with Very High and High sensitivity areas considered largely unsuitable for developments posing risks to bats. Medium sensitivity areas were identified as potentially suitable with strict mitigation measures, while Low sensitivity areas were considered more suitable for development.
- Risks associated with development include disturbance of roosts (reducing reproduction), fragmentation of foraging habitat (disrupting ecological processes), and collisions with turbines, all contributing to population decline and increased risk of extinction.
- Strategic management recommendations highlighted the importance of collecting national-scale mortality and distribution data to improve impact predictions and inform planning.
- Avoidance of Very High sensitivity areas was emphasised as the most effective mitigation strategy, reflecting the principle of keeping natural areas intact and minimising impacts on sensitive ecosystems.

- Recommendations for environmental assessments include incorporating detailed bat population data, understanding ecological processes (e.g., migratory pathways), and ongoing monitoring to support informed decision-making.
- The overarching theme is that avoiding sensitive habitats, enhancing data availability, and prioritising evidence-based mitigation measures are critical for protecting bat populations in the context of green hydrogen and other developments.

Questions/Discussion

A WG member explained that there is an important methodological difference between sensitivity and risk. Sensitivity refers to the susceptibility of the receiving environment to perturbation and change, while risk within the SEA process is the intersection of consequence and likelihood. It was emphasised that although a Very High or High sensitivity receiving environment will result in very high pre-mitigation risk, if the recommended management measure is avoidance, then the post-mitigation risk would be low, because the assumption is that no development will take place in those high-sensitivity areas. It was noted that this may appear counterintuitive, but it is methodologically consistent with the risk assessment framework applied to all specialist studies.

- It was acknowledged that the explanation is correct. The importance of distinguishing between different development types was highlighted, with a suggestion that risks associated with wind and solar infrastructure could be disaggregated, particularly for birds and bats, as risks linked to solar developments in High-sensitivity areas may be lower than those associated with wind energy infrastructure.

A WG member suggested that one of the SEA outputs should be a clear identification of all areas that must be avoided across all specialist studies. They explained that although post-mitigation risk may be rated as low, this rating assumes that the required mitigation (such as avoidance) has already been implemented. The member also highlighted that in many South African case studies, avoidance measures were not implemented, even though they were recommended. It was noted that EIA decision-makers often look only at the after-mitigation risk rating without considering whether the recommended avoidance was applied in practice.

- It was confirmed that the SEA will produce outputs which will include areas recommended for avoidance based on sensitivity of the receiving environment.

❖ **Birds**

Albert Froneman (AfriAvian) presented the bird sensitivity analysis and associated risks from proposed developments. Key points included:

- Sensitivity mapping was based on available data, including Bird Atlas, providing citizen science inputs, and species distribution models. The weighted assessment focused on 44 priority bird species, including threatened, endemic, and range-restricted bird species.
- High sensitivity areas were driven by the presence of priority species such as the endangered and range-restricted Ludwig's Bustard, as well as other species of conservation concern that are more habitat generalists such as Martial Eagles. Coastal sensitivity was further informed by tracking data for Black Harriers moving along the coastline.

- The sensitivity map was described as representing relative sensitivity and potential risk to renewable energy development, incorporating both wind and solar infrastructure.
- Key impacts of proposed developments include habitat loss and displacement due to construction and operation, noise and lighting disturbance, linear infrastructure footprints, collisions with wind turbines and power lines, and electrocution, particularly for large raptors and vultures.
- The risks and opportunities assessment indicated that avifaunal impacts are predominantly negative in the absence of mitigation, with High to Very High risks to priority bird species in very high sensitivity areas. Scenario 2 showed the greatest cumulative risk, with potential severe to extreme consequences for endangered and critically endangered species. With mitigation, risks could be reduced to moderate-high, though some residual impacts remain. It was noted that even the baseline scenario reflects ongoing pressures from climate change, mining, agriculture, and existing renewable energy developments already affect avifauna in the region.
- Strategic management recommendations highlighted:
    - Use of sensitivity mapping and spatial planning to designate no-go zones and buffers around critical habitats.
    - Adoption of bird-safe technological designs and operational mitigation measures to minimise collisions.
    - Power line design improvements to reduce electrocution risks.
    - Data collection and monitoring at wind energy facilities was highlighted, particularly to assess mortality thresholds using tools such as population viability analysis and potential biological removal.
    - Independent oversight, formal avifaunal standards, and transparent data management were identified as essential to ensure compliance and effective mitigation.
    - Incentives and financing for biodiversity focused actions, including retrofitting hazardous infrastructure and securing key buffer habitats through conservation initiatives.

Questions/Discussion

The importance of distinguishing between wind and solar within the sensitivity model was noted. It was explained that although it is acceptable at this stage to present an aggregated sensitivity model (wind and solar), the specialist team may also disaggregate the model if wind and solar sensitivities differ substantially. also It was further emphasised that even if the sensitivity model remains aggregated, the management actions and mitigation recommendations should be disaggregated by technology type. For example, management guidance should clearly state where wind development must be avoided entirely, while solar development may still be permissible subject to EIA and context-specific assessment.

- It was confirmed that the Chapter had already been amended to address the point above. It was explained that although a composite sensitivity map was presented in the meeting, the full Chapter includes separate maps for sensitivity to wind development (e.g., collision risk) and sensitivity to solar development (e.g., habitat loss). It was also noted that mapping distinguishes between collision impacts (more relevant to wind) and habitat-related impacts (more related to solar).

- It was further emphasised that the strategic management actions in the Chapter already specify which technology types should be avoided within relevant sensitivity areas

A question was raised regarding future mitigation technologies, specifically whether the specialist team had considered the likely development of shutdown on demand and similar emerging technologies, currently very expensive but expected to become standard practice within 10-20 years. The member queried whether the management actions include reference to how these technologies may assist in addressing collision risk for certain species in the future.

- It was explained that shutdown on demand and similar technologies had been considered within an adaptive management framework. It was highlighted that many of these technologies are currently extremely costly, but there is clear evidence that they will become more affordable and widely adopted over time. It was noted that adaptive management provisions allow for the incorporation of emerging technologies where monitoring identifies unanticipated impacts or higher-than-expected mortality rates.

❖ **Fauna**

Corné Niemandt (Bios Diversitas) presented an overview of the fauna sensitivity assessment and associated impacts from proposed developments. Key points included:

- The assessment focused on species of conservation concern, including mammals, golden moles, and other fauna. Species distribution models were limited, with updates expected as ongoing surveys provide more information.
- Key differences between development types were highlighted: wind energy projects generally have lower localized impacts, while solar and green hydrogen developments create larger footprints, leading to habitat modification, disruption of ground dwelling and burrowing species, and additional barriers from fencing.
- The proposed port, pipeline, and other linear infrastructure intersect areas of High sensitivity, particularly along the coast, affecting species such as golden moles, as well as indirectly influencing connectivity, edge effects, and invasive species pressures.
- Sensitivity mapping indicates concentrations of sensitive fauna along coastal zones, with inland impacts being less severe for species with larger ranges, such as hyenas.
- Impacts vary depending on development scenarios. Smaller, localised infrastructure projects have limited impacts, whereas larger-scale projects create significant cumulative impacts. Careful planning and site selection within lower sensitivity or already degraded areas can help mitigate risks.
- Recommended mitigation measures focus on avoidance of Very High and High sensitivity areas, ground-truthing, careful planning for solar and wind projects, and prioritising the use of Low-sensitivity or previously degraded land.
- Opportunities may exist to implement sustainable land-use practices that benefit fauna and biodiversity in the longer term, provided developments are carefully planned and managed.

Questions/Discussion

Clarification regarding the notional sketch of proposed pipelines, rail, and transmission lines. It was emphasised that these alignments are purely notional and serve only to show conceptual connection

points between areas. These routings are not based on engineering designs and will be determined in future EIA processes, which would be informed by SEA outputs to avoid sensitive features.

A WG member raised concern regarding the map showing future infrastructure for the green hydrogen project. They highlighted that the depiction appears to overlook historically disadvantaged traditional seasonal farmers who use the area for winter grazing. The member requested clarity on how such green hydrogen related development would affect emerging traditional farmers who rely on the land for livestock grazing.

- It was clarified that the issue of herders, including nomadic and seasonal herders is addressed in more detail in the socio-economic (and heritage) chapter, to be presented later.

❖ **Ecology, Biodiversity & Conservation**

Philip Desmet (Ecosol GIS) provided an overview of biodiversity and ecological sensitivities in the Namakwaland/Namaqualand region, highlighting flora, ecological processes, and strategic conservation priorities. Key points included:

- Namakwaland is globally unique, with exceptional species diversity and density, particularly for plants. The region is highly sensitive due to endemic and rare species, making it a biodiversity hotspot.
- It was noted that multiple, ongoing threats already affect biodiversity in the region, including livestock grazing, historic and active mining, renewable energy development, linear infrastructure, and biodiversity poaching. These pressures are occurring independently of the proposed green hydrogen development and are compounded by climate change. Exceptions were observed in protected areas such as the Namaqua National Park, highlighting the role of land management in moderating climate impacts.
- Red List of Ecosystems assessment indicates that approximately 45-50% of the region's ecosystems can be classified as threatened when factoring in degradation and productivity decline. This has implications for development planning and biodiversity offset application.
- Sensitivity mapping integrated five primary inputs: (1) biodiversity spatial planning informants, (2) protected area development plans, sensitivity areas for (3) birds, (4) bats, and (5) aquatic.
- . The combined sensitivities map showed that approximately 34%, 42%, and 24% of the landscape falls into Low-Medium, Medium-High, and High-Very High sensitivity, respectively. The combined sensitivity analysis showed that approximately one-third of the region (i.e., 34%, equating to ~2 million hectares) falls within Low-to-Medium sensitivity categories, indicating that spatial options exist to steer development away from highly sensitive biodiversity areas through strategic planning.
- Risks associated with development were summarised as:
    - Direct loss of biodiversity pattern through habitat loss and potential species extinction (particularly given high endemism),
    - Longer-term disruption of ecological processes, leading to cumulative extinction risk over time.
- Key interventions include avoidance of sensitive areas, implementing biodiversity offsets (where impacts are unavoidable). It was suggested that offsets may need to explicitly address ecological processes, not only habitat extent.

- Potential opportunities associated with green hydrogen development were also highlighted. These include addressing historical mining degradation (notably around Alexander Bay), supporting biodiversity restoration, contributing to biodiversity economy initiatives, and reducing community dependence on livestock grazing which is identified as an ongoing major driver of biodiversity loss in combination with climate change.
- It was emphasised that green hydrogen planning should align with and support biodiversity economy objectives, protected area expansion, and integrated spatial planning. The need for a detailed regional spatial framework (Vision 2040), including designed ecological corridors, was strongly stressed.
- The protection of Namakwa's sense of place and landscape wildness was identified as a critical but under-addressed consideration. It was noted that industrialisation poses risks to the region's aesthetic and cultural value, which represents one of its greatest long-term assets and should be explicitly integrated into strategic planning processes.

❖ **Biodiversity Offset Framework**

Mark Botha (Conservation Strategy Tactics & Insight) presented an overview of the biodiversity offset framework for regional green hydrogen developments, building on the existing offset framework developed for WP 1.

- The framework is strategic in nature and not project-specific, with a clear set of assumptions informing its application:
    - The framework focuses on terrestrial ecosystems, while marine impacts are addressed separately by the marine specialist team. Impacts on generalist birds affected by habitat displacement are assumed to be catered for by the vegetation type offsets.
    - The landscape contains a high density of sensitive features, with approximately 70% of the area considered sensitive in some form.
    - Existing environmental authorisations for renewable energy projects are insufficient to meet the needs of even small green hydrogen scenarios, thus much more renewable energy infrastructure will be required.
    - Current projects also lack comprehensive information on offset liabilities or locations, and many have been approved for 5 to 7 years, meaning renewal processes would need to account for cumulative impacts.
    - Several other assumptions underlie the framework, including the political will to resolve land tenure and legacy rehabilitation issues, allowing new infrastructure to be sited on previously disturbed land.
    - Standard mitigation measures are assumed to be incorporated into generic Environmental Management Programmes, including innovative design approaches to minimise vegetation clearance, such as mounting photovoltaic panels above intact vegetation to reduce offset requirements.
    - Fixed infrastructure such as electrolysers and storage tanks is largely immobile and will require offsets, while most renewable energy infrastructure is flexible, although unavoidable roads and power lines may still trigger offset requirements.
    - Institutional limits in the conservation sector restrict the capacity to establish and manage offset sites.

- The framework also assumes that international green hydrogen markets will favour best-practice mitigation and offsets over-and-above minimum legal requirements.

- Preliminary calculations were outlined showing that about 16 000 ha of fixed infrastructure would require a 10:1 offset ratio, while 20% of renewable energy infrastructure, approximately 128 000 ha under a large green hydrogen scenario, would require a 2:1 offset ratio. This results in an estimated 183 000 ha of offset sites needed for the large scenario (Scenario 2), and around 40 000 ha for the small scenario (Scenario 1).
- Approximately 1 million ha of potential receiving sites have been identified based purely on biodiversity features. It was stressed that this identification did not involve landowner engagement and only limited conservation authority/agencies engagement to date.
- It was reiterated that some impacts - particularly those exceeding thresholds of potential concern (e.g. impacts on certain listed ecosystems and sensitive marine and avifaunal receptors) - may not be readily offsetable and could require ecological compensation, subject to regulatory acceptance.
- It was emphasised that offsets should be implemented proactively, before impacts occur, and as part of a coordinated scheme across for all green hydrogen developments.
- Collaboration with landowners and authorities is critical to avoid conflicts and ensure ecological benefits, including reducing grazing pressure on sensitive vegetation and maintaining ecological connectivity.
- Piecemeal offsets at the EIA stage would create challenges in implementation and negotiation.
- Ecological compensation, particularly for large birds and listed ecosystems, is complex and legally sensitive and should be a last resort if the impacts are acceptable.
- Social compensation for lost livelihoods is not included in the framework, and current economic viability assessments for the green hydrogen fleet may not fully account for offset costs.
- Offset cost must be incorporated into economic viability calculus.

Questions/Discussion

A WG member asked whether, at a high-level government scale, it would be worthwhile to make a strategic decision to declare certain areas for conservation at this stage, particularly those that may be earmarked for conservation in the future. The member highlighted that doing this early could provide greater certainty for green hydrogen development, simplify decision-making for individual projects, enable early planning ecological corridors, and allow costs to be better quantified at an early stage.

- It was explained that this approach aligns with the recommendations contained in the Biodiversity Offset Framework chapter. It was clarified that taking such a proactive decision now would support the conservation economy, clarify long-term costs and implications for liability holders, and that there is nothing preventing government from making such a high-level declaration. It was also noted that that there is no downside to doing so, especially if local communities and landowners are part of the discussions and declaration process.
- Indicative, high-level cost estimates of implementing biodiversity offsets at the regional scale, were discussed during the question-and-answer session, suggesting that costs of securing land and long-term management - while substantial in absolute terms - would be relatively small in the context of overall green hydrogen and associated infrastructure investment costs.

❖ **Heritage**

Jayson Orton (ASHA Consulting) presented the heritage assessment for the study area, highlighting historical, archaeological, palaeontological, built, living, and cultural heritage. Key points included:

- The overall sensitivity of the heritage features is High and Very High, primarily in protected areas and communal zones. Heritage is largely point-based (e.g., archaeological sites, graves, and historic buildings) and may not be visible on broad-scale maps. Communal areas supporting small-scale livestock herding are regarded as High sensitivity due to their connection with living heritage traditions. Maritime heritage is generally Low sensitivity, with Medium sensitivity only at recorded shipwreck locations. Provincial heritage sites are automatically considered Very High sensitivity. The southeastern part of the study area generally shows Low heritage sensitivity, except for palaeontology, which has a High sensitivity.
- Palaeontology: Most of the study area is Low sensitivity, with High sensitivity localised in the south-east and mountainous regions. Notable finds include the Kangasaurus dinosaur bone, stromatolites and trace fossils. Small-scale development may result in moderate fossil loss; however, excavation and mitigation offer opportunities to enhance scientific knowledge. Management involves monitoring during excavation where necessary.
- Archaeology: Archaeological sites are dispersed across the study area, with higher concentrations near the Orange River, Buffels River, coastline, and historical copper railway alignment. Key examples include Later Stone Age artefacts, early Stone Age hand axes, grindstones, rock engravings, rock paintings, historical graffiti, threshing floors, and remains of 19th-century artifacts. The sensitivity is High in proximity to water sources and historical features; and Low to Moderate elsewhere. Development could destroy artefacts if not mitigated, but sampling, excavation, and recording can preserve archaeological knowledge. Monitoring is recommended, particularly near the coast and undisturbed inland rocky areas.
- Maritime heritage: Offshore areas are generally Low sensitivity; and Medium sensitivity applies where historic records indicate shipwrecks. Magnetometer surveys are recommended for detecting subsurface debris if development is proposed. The overall risk is Low; mitigation can include identification and preservation of any finds.
- Historical graves: Graves older than 60 years, outside municipal cemeteries, are protected under the Heritage Resources Act. Graves are point-specific and sparsely distributed. The sensitivity is Moderate to High due to cultural significance. Graves can be found, protected, identified or celebrated; mitigation requires specific protocols in EIA processes.
- Built Environment: The region contains historical buildings, including farmsteads, water wells, and vernacular architecture. The sensitivity is Moderate. Direct impacts are Low as developments usually avoid existing structures. Adaptive reuse, restoration, and buffers are recommended to prevent indirect degradation from nearby development.
- Living heritage: Communal areas and seasonal livestock grazing areas are considered High sensitivity. The sensitivity is Low to Moderate risk of loss outside communal areas; opportunities exist to conserve traditional practices within communal land. Negotiation with local communities is critical to balance heritage protection and ongoing land use.
- Cultural landscapes and visual heritage: Cultural landscapes include aesthetically significant arid landscapes, tourism areas (e.g. flower season), and iconic scenic routes. Steep slopes, high points,

national parks, and protected areas are visually sensitive. The risk is variable, with high visual impact risk along major routes and iconic landscapes, low in southeastern areas. Rehabilitation of existing impacts, avoidance, and protection of sensitive landscapes; integration into offset planning; early designation of protected areas.

- Historical copper mining landscape: Mid-19th century copper mining areas, including the Springbok-Concordia region, are historically significant. Previously assessed for World Heritage Site declaration but not included due to integrity concerns. The sensitivity is High, and the area should be avoided in development planning.
- Management Recommendations include:
    - All heritage types require project-specific assessment during EIAs.
    - Archaeology: Monitor, excavate, and record sites; prioritise avoidance of sensitive locations.
    - Palaeontology: Monitoring during excavation in High sensitivity zones.
    - Maritime heritage: Use magnetometer surveys to identify debris and wreckages, where relevant.
    - Graves: Implement chance find procedures if discovered during development.
    - Built Environment: Apply adaptive reuse, restoration, and buffer zones to prevent indirect loss.
    - Living heritage: Engage with communities to negotiate continued use and protection of communal grazing and cultural practices.
    - Cultural landscapes: Identify and protect scenic routes and iconic landscapes; consult with SANParks, UNESCO, South African Heritage Resources Authority (SAHRA) and local tourism operators.
    - Avoid high-risk areas including parks, reserves, World Heritage Sites, and historically significant mining landscapes.

Questions/Discussion

A WG member asked whether a more detailed viewshed analysis would be undertaken. The member enquired whether any such work had been completed or if it would be recommended for future assessments.

- It was clarified that a full visual assessment was not included as a chapter in the SEA, and that the visual sensitivity mapping presented was undertaken to show areas of High and Very High sensitivity, as a preliminary input. It was emphasised that comprehensive visual impact assessments are recommended at project level for future development phases.

❖ **Infrastructure & Planning**

Johan Maritz (CSIR) presented the draft findings for the infrastructure and planning assessment, focusing on municipal development planning, settlement infrastructure, and large-scale infrastructure projects. Key points included:

- Several engagements were held with multiple entities to obtain the most recent information, including meetings with the 4 municipalities in the SEA study area, namelythe Richtersveld, Nama Khoi, Kamiesberg and Khâi-Ma municipalities.
- Municipal development planning and management:

  - Under the baseline (Scenario 0), the demand for development is low and therefore pressure on planning is limited; many municipalities do not have registered planners and planning decisions are currently taken via a district Municipal Planning Tribunal.
  - Under the small green hydrogen scenario (Scenario 1), a significant increase in land-use applications is expected, particularly in Richtersveld. Without new capacity, institutions will be unable to manage high volumes and delays may arise from complex land ownership and Community Property Association (CPA) -related issues. The risk, without mitigation, is severe.
  - Under the large green hydrogen scenario, multiple infrastructure projects (renewable energy, pipelines, new rail) will exert further pressure on municipalities and that risks to the planning environment would be severe if not addressed.
- Settlement infrastructure development and management:
  - Baseline settlement growth is limited but several towns already experience infrastructure constraints.
  - Under the small green hydrogen scenario growth linked to port and SEZ development will put significant pressure on towns (specifically Port Nolloth and Alexander Bay) through in-migration of construction workers and technical personnel, straining bulk infrastructure and social facilities and increasing demand for land and housing. The risk severity is severe without mitigation, and moderate with mitigation.
  - Under the large scenario pressures will continue and may be sustained or extended by rail and pipeline projects; risks such as service challenges and growth in informality remain high, although they can be brought to moderate levels if mitigated.
- Construction of large infrastructure projects:
  - Under the baseline, roads (R382, N7, N14) currently experience low traffic volumes and routine maintenance. There are no pipeline or rail infrastructure present.
  - Under the small green hydrogen scenario, the new port, SEZ, transmission lines and renewable energy projects will create severe pressures on transport, land, and resources, placing heavy use on the R382 access route and likely requiring reconstruction (with disruptive impacts). The risk is high to severe.
  - It was emphasised that under the large scenario initiation of rail and pipeline developments will add further pressure (land acquisition, servitudes), will be complex. Heavy traffic will further strain regional roads. Risk, without mitigation, is severe.
- It was noted that the Boegoebaai port and SEZ comprise a number of large projects occurring almost in parallel, and that the combined construction phase impacts (especially on critical access roads such as the R382) are significant. It was highlighted that other planned projects in the region (for example the Namakwa irrigation scheme, Vioolsdrift dam, Namakwa SEZ) will further add to planning and settlement pressures and therefore need to be considered together rather than in isolation. Coordination across agencies and timely mitigation are essential to minimise risks.
- It was recommended that planning support mechanisms be strengthened to manage the expected high volume of land-use applications and that municipal planning capacity be built (including updated Spatial Development Frameworks (SDFs) and compliance monitoring). It was suggested that clear processes be established to secure servitudes and to address communal land-ownership disputes.

- For settlement infrastructure development and management theme, it was recommended that bulk service upgrades (water, sanitation, electricity) be prioritised, with Port Nolloth and Alexander Bay identified as critical focus settlements. It was also recommended that municipalities' financial viability and planning be strengthened, that housing and service delivery be prioritised to reduce informality, and that social infrastructure investments (schools, clinics, waste facilities) be aligned with projected settlement growth.
- For construction of economic infrastructure theme, it was recommended to shorten maintenance cycles and secure budgets for upkeep of the R382 (given expected traffic increases) and to monitor road conditions across the region to enable timely interventions. It was recommended that land acquisition and servitude processes be coordinated across agencies for pipelines, rail and transmission corridors, and that guidelines for construction camps be developed with municipalities to avoid overburdening local services. It was highlighted that given the region's water scarcity it is important to plan and monitor water demand as part of construction works.
- It was recommended that institutional, financial and infrastructure interventions be undertaken before development peaks and that early planning, land access resolution and provision of bulk infrastructure be treated as preconditions for successful port and SEZ development.

❖ **Socio-economics**

Doreen Atkinson (Karoo Development Foundation) presented the socio-economic draft findings. Key points included:

- The analysis covered four main socio-economic sectors (macro-economics, agriculture, tourism, institutional) and these should be read together because political/institutional arrangements condition technical outcomes.
- Macro-economic opportunity: the developments will stimulate economic agglomeration around Boegoebaai and SEZ corridor, increased property values, create jobs and training sectors, boost local business services and may attract firms to relocate into the region. It was highlighted that the port must remain multi-sectoral (serve mining, agriculture, commercial exports) rather than simply becoming a terminal, because multi-sectoral use spreads benefits across the regional economy. Construction phases are expected to generate boom-bust dynamics, with Port Nolloth and Springbok emerging as key regional service and economic hubs. Desalination linked to hydrogen production was also noted as a possible supplementary freshwater source for water-stressed communities. The SEZ is expected to strengthen economic linkages between mining hubs and the port, reinforcing agglomeration along the N14 corridor. However, strong concern was raised regarding heavy road trucking, which was described as incompatible with tourism and regional quality of life. Rail infrastructure was identified as a requirement to avoid long-term environmental, social and economic damage.
- Social risks can be severe without mitigation: rapid in-migration, boomtown effects, pressure on health and social services, increases in housing prices, informal settlements, crime, teenage pregnancy, widening inequality between those absorbed into new economy and those left behind. These dynamics may exacerbate social tensions and require proactive institutional responses, despite individual and household-level opportunities for advancement.
- Tourism is highly vulnerable: industrialisation and heavy ore-trucking on the N14 would damage landscape-based tourism and viewsheds. It was strongly argued that large-scale trucking is a near-

certain threat to tourism unless alternative transport (rail) is prioritised. A railway is essentially non-negotiable for bulk exports, rail was described as critical to avoid destroying tourism, reducing dust impacts and protecting agricultural export quality. Infrastructure multipliers identified include the upgrading of Springbok Airport to support scheduled commercial flights, highlighted as a strategic intervention that could benefit tourism, business and agriculture simultaneously.

- Water/desalination: desalination tied to green hydrogen plants could be an important source of freshwater for communities but raises trade-offs and technical or management considerations; this was presented as a potential benefit that requires technical validation.
- It was noted that health, housing and social infrastructure will require major expansion to accommodate workers and new residents; capacity gaps in local municipalities mean these services are a key vulnerability.
- Agriculture impacts are mixed: export-oriented agriculture (Orange River) could benefit from port access, while small-scale pastoralists risk loss of land access, dust and noise; the net outcome depends on transport choices and spatial planning.
- Mining benefits: improved port/rail infrastructure is likely to stimulate mining activity, which may increase local economic opportunities.
- Institutional issues: while the district municipality was viewed as relatively well positioned, local municipal capacity varies and will require support; a strong, coordinated regional planning/implementation body will be needed to manage cross-sectoral change and avoid institutional gaps between national, provincial and local actors. Tax bases will grow but need to be managed.
- Public participation was highlighted as especially sensitive given past injustices (land claims, mine closures, poor prior engagement). It was recommended that facilitation approaches need to be assessed before government launches a formal consultation process. At least three approaches were highlighted: (1) problem-driven iterative approach, (2) the green hydrogen community participation toolkit, and (3) achieving Free, Prior and Informed Consent (FPIC). These approaches require skilled facilitation, including negotiation and mediation expertise, supported by a pre-negotiation scoping phase to determine the most appropriate process. It was emphasised that no single approach should be applied without careful consideration.
- It was further noted that there is confusion between the SEA process and future public participation processes. It was emphasised that the SEA (scientific) process is not a substitute for future public participation, the correct sequencing is scientific evidence first, then meaningful, well-facilitated community engagement.
- In conclusion, it was noted that the proposed developments would result in an industrial landscape, with inherent costs, benefits and risks, some of which could be mitigated. The overarching decision involves a deeply normative choice between retaining a rural, remote landscape or transitioning to an industrial and active landscape.

Questions/Discussion

A WG member raised three main issues in response to the socio-economic presentation. The member emphasised that the notion of the Northern Cape and Richtersveld as 'rural and remote' was perceived as disrespectful to the communities; and that FPIC is a constitutional and statutory requirement and

must be obtained from affected communities of the Northern Cape, Namakwaland, Richtersveld, Alexander Bay, and Port Nolloth, as codified in statutory law and the Constitution, and not be framed as limited to the mining sector. Support was expressed for the proposal to prioritise rail transport over road-based freight, with strong agreement that a functional rail system is critical for the Northern Cape. However, uncertainty was raised regarding the long-term viability of the global green hydrogen market, noting that South Africa may take up to a decade to become competitive and that future demand trajectories remain unclear. Clarification was requested on the model used to estimate projected job creation for local communities. The member also highlighted that agriculture in the region should not be characterised as underperforming by default, but rather as a sector constrained by historical dispossession and current mining and rezoning applications, which have limited its growth potential.

- It was clarified that the characterisation of the area as remote and pristine was intended to describe its appeal to tourists and residents, not as a value judgment against the communities. It was emphasised that the project would alter the area's character and that positions for or against it are often based on deeply held emotional or normative values. Regarding FPIC, it was explained that the principle originated from international mining-sector literature due to its historical development in that context, and has since been applied more broadly; engagement with all stakeholders, particularly communities, is essential. The sources for job and training numbers were cited from a socio-economic benefit study undertaken by Transnet. On agriculture, it was noted that structural challenges exist, but new projects could support agricultural development without necessarily creating a trade-off. For tourism, industrial development could reduce appeal, highlighting a potential trade-off as tourism is more directly sensitive to industrialisation, given its reliance on landscape quality and sense of place. On the green hydrogen market, it was noted that long lead times are typical for emerging industries, and that project proponents would be unlikely to proceed in the absence of long-term commercial feasibility.

A WG member queried whether consideration had been given to using the Cape Town - Bitterfontein rail line and extending that to reduce costs and impacts.

- It was indicated that commodity transport associated with the project is expected to originate from an easterly direction, moving from mining areas around Postmasburg westwards, and that the Bitterfontein route is therefore unlikely to be optimal for the primary freight flows envisaged. It was nevertheless acknowledged that any expansion of the rail network, including potential extensions towards Springbok, would be beneficial in reducing pressure on road infrastructure.

Concerns were raised regarding the institutional arrangements and governance capacity associated with the proposed Boegoebaai development, drawing on historical experience in the Richtersveld region. It was noted that past development initiatives, including mining and harbour-related activities, have often failed to deliver sustained local economic benefits, resulting instead in environmental degradation and social dislocation. Emphasis was placed on the need to avoid repeating these patterns. It was further stressed that FPIC must be understood as a community-centred legal and constitutional requirement, rather than a procedural formality driven by sectoral or project proponents. It was highlighted that consent must be obtained directly from affected communities and that consultation processes must be credible, inclusive, and trusted.

- In response, it was noted that the study explicitly recognises institutional fragmentation and governance gaps as a major risk. The need for a dedicated regional coordinating structure was reiterated, involving national and provincial departments, district and local municipalities, state-owned entities, and affected communities. It was indicated that existing institutions alone may be insufficient, and that strengthened or new mechanisms for integrated planning, coordination, and accountability would be required. It was further clarified that spatial planning, institutional reform, and governance arrangements are central to managing cumulative impacts and ensuring that development outcomes do not undermine social, environmental, and economic sustainability in the region.

A WG member raised concerns about the practical feasibility and economic realities of the proposed project, highlighting government fiscal and capacity constraints and poor track record in delivering large-scale rail and bulk infrastructure. Doubts were expressed about whether the necessary rail, required grid upgrades and current constraints, and desalination infrastructure could realistically be implemented, and whether the project risks remaining a conceptual "talk shop" without firm private-sector commitment. It was also highlighted that benefit-sharing mechanisms for communities are complex and risky, given historical distrust and limited institutional capacity to manage large financial inflows. There were concerns about whether the project could materialise without significant private-sector involvement and suggested that current discussions might be largely theoretical.

- It was clarified that the that the study assesses impacts if the project were to proceed. It was noted that such projects are likely to be largely private-sector driven, with government providing support rather than leading the investment. Institutional capacity for managing community funding and social investment would need to be developed, ideally through professional facilitators who can design effective engagement processes and support knowledge transfer to local organisations. It was added that even if the project does not proceed immediately, establishing these mechanisms could strengthen community institutions for future opportunities, concluding that while managing such processes is challenging, it is feasible with careful planning and the involvement of skilled professionals.

A WG member raised concerns about FPIC, emphasising that it is not a new or optional principle but a legal and constitutional requirement embedded in South African customary law and reflected in legislation. The member raised concerns about the economic rationale for the Boegoebaai, particularly whether it is aligned with South Africa's industrial policy in terms of beneficiation. It was argued that projected job creation appears limited and largely short-term or menial (e.g. construction), while the main beneficiaries may be foreign countries through the export of critical minerals and green hydrogen, with limited local value addition. The member also expressed concern that certain government or development agency stakeholders are presenting the project as a foregone conclusion, which is worrying for communities who are hearing about the project details for the first time.

- It was emphasised that FPIC is essential and involves a range of possible methodologies, which must be agreed upon by stakeholders through a pre-negotiation process facilitated by experienced, independent facilitators. It was noted that such negotiations fall outside the scope of the current SEA and would need to be separately designed, funded, and managed. It was also noted that economic benefits would primarily come from port operations, green hydrogen,

transport, and subsidiary sectors, with opportunities for upskilling and career development. Government must set clear requirements for investors to ensure local benefits. Regarding whether the project is predetermined, it was stated that opinions vary among stakeholders and there is no certainty, the project will proceed only if it proves profitable, and if it does, government must ensure that strong social, labour, and governance conditions are built into its licence to operate.

Questions Posted in the Meeting Chat

- A WG member commented that desalination of seawater is implemented globally and that numerous studies are available on the subject.
    - It was noted that issues of desalination in relation to coastal and marine ecosystems are addressed in WP1, Chapter 2, with the link shared in the chat (https://www.csir.co.za/sites/default/files/2025-10/Chapter%202%20Marine%20ecology.pdf)
    - It was further clarified that, within the SEA, desalination is considered more feasible and affordable in the context of a large-scale green hydrogen development roll-out.
- A WG member asked whether plant biodiversity had been assessed, noting that the agenda did not explicitly mention flora.
    - It was clarified that vegetation is addressed within the Integrated Ecology Chapter.
- A WG member commented on the extent of Medium to Very High ecological sensitivity within the proposed port zone, noting that approximately 66% of the area shows elevated sensitivity.
    - It was explained that WP1 outlines the elements relevant to Port Development and the SEZ and provides guidance on what must be considered and there are clear recommendations for the development to proceed.
        - It was further clarified that the SEA is not a decision-making tool and does not determine whether the port should or should not proceed. WP1 recommendations apply if development proceeds, including avoiding sensitive areas, placing infrastructure in disturbed areas, managing shifting sands, considering biodiversity offsets, initiating early monitoring, applying best-practice EIAs, consulting with local communities, avoiding sensitive ecological and cultural areas, and supporting local skills development.
- A WG member commented that trucking associated with mining exports would have serious impacts along the R382 via Steinkopf and Port Nolloth.
- A WG member noted the importance of considering the Northern Cape PSDF 2025 and shared the link in the chat (http://www.northern-cape.gov.za/index.php/psdf/psdf-review/final-psdf).
- A WG member highlighted that FPIC must be obtained before activities commence, including the right of communities to say no, as recognised in recent COP30 UNFCCC just transition text.
- A WG member asked how the specialist felt about comments in the chat suggesting that approval of the project was a foregone conclusion.
    - It was explained that this is not the case and that green hydrogen represents a significant opportunity only if correctly undertaken; otherwise, it risks serious negative consequences, making the SEA process critical.

- It was further clarified that EIAs and meaningful community participation are still required. It was emphasised that Indigenous Peoples and local communities must be involved, and agreement must be reached, including the possibility of not proceeding with development.

- A WG member commented that the conceptual rail alignment to the port was developed to link the Northern Cape mining belt to a closer export port, linking to the OREX line.
- The WG members were reminded that the SEA is not a decision-making process, and the SEA does not result in a decision for any development proposals to proceed or not. The SEA aims to develop an integrated decision-making framework to guide the planning based on current knowledge and understanding.

4) <u>Closure and Next Steps:</u>

- CSIR to draft and distribute the WG meeting notes (these notes) and action items via the project website (Boegoebaai Port | CSIR).
- The full draft SEA WP2 chapters/reports will be released for a 45-day public review period (~January – February, exact dates to be confirmed).
- WP2 chapters availability will be communicated to all registered stakeholders and WG members. Stakeholders encouraged to share broadly within their networks.
- During the review period, in-person meetings and an online public and WG briefing will be held, offering more detailed engagement as stakeholders will have full sight of the SEA WP2 chapters.
- WP1 chapter updates and the comments-and-responses document are being finalised.
  - Final WP1 SEA outputs will be published in December 2025.
- Specialists to incorporate relevant feedback from the session into the draft chapter content.

The meeting was closed at 12:55 PM: appreciation was expressed to the specialists for their presentations on draft findings and to the WG for their valuable and constructive inputs.

Appendix A: Public Briefing Webinar attendance

Note: *The register below includes participants whose names and/or organisations were visible during the meeting. Some attendees appeared as "unverified," missing identification details, or joined using a single shared account and were thus not identifiable by name or organisation. A total of 62 participants were recorded, although actual attendance may have been higher.*

Organisation	Name and Surname
Council for Scientific and Industrial Research (CSIR)	Paul Lochner
	Greg Schreiner
	Luanita Snyman-Van der Walt
	Babalwa Mqokeli (Project Manager)
	Abulele Adams (Chairperson)
	Rinae Tsedu
	Johan Maritz
	Jabulani Jele
	Nonjabulo Malinga
Northern Cape Economic Development Trade and Investment Promotion Agency (NCEDA)	Napo Ramabina
	Shawn Modise
South African National Energy Development Institute (SANEDI)	Anza Tshirame
	Richmore Kaseke
	Phumlile Kunene
Transnet National Ports Authority (TNPA)	Motlatso Molapo
	Jabulani Maluleke
	Tauqeer Ahmed
	Aphelele Tomsana
	Nosicelo Biyana
Transnet Freight Rail (TFR)	Thabo Matsebele
	Zanele Manyathi
Transnet Corporate	Nonkululeko Hadebe
	Khathutshelo Tshipala
DFFE: Oceans and Coasts	Gerhard Cilliers
DFFE: Integrated Environmental Authorisations (IEA)	Sindiswa Dlomo
DFFE: Marine Protected Areas Unit	Ntombovuyo Madlokazi
DFFE: Aquaculture Development and Freshwater Fisheries	Michelle Pretorius
DFFE: Appeals & Strategic Environmental Instruments	Simon Moganetsi
Department of Trade, Industry and Competition (the dtic)	Shaun Moses
Industrial Development Corporation	Rob Adam
	Avik Singh
Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL)	Louise Geldenhuys
Namakwa District Municipality	Gareth Cloete
Khai-Ma Local Municipality	Alfredo Green
South African National Biodiversity Institute (SANBI)	Hlengiwe Mtshali

Conservation South Africa	Christopher Ovies
Trans-Caledon Tunnel Authority (TCTA)	Dawid Bosman
Liz Day Consulting	Liz Day
Viridus	Hendrik Louw
SRK Consulting	Simon Lorentz
South Africa Wind Energy Association (SAWEA)	Santosh Sookgrim
AfriAvian Environmental	Albert Froneman
	Lizandé Kellerman
World Wide Fund for Nature (WWF)	Katherine Forsythe
Endangered Wildlife Trust (EWT)	Zanne Brink
Natural Justice	Lauren Nel
University of Stellenbosch	Links Calumet
EcosolGIS	Philip Desmet
ASHA Consulting	Jayson Orton
Karoo Development Foundation (KDF)	Doreen Atkinson
Conservation Strategy Tactics & Insight	Mark Botha
Bios Diversitas Consultants	Corné Niemandt
WoMin African Alliance	Alexandria Hotz
Alliance for Law in Development	Henk Smith
Environmental Traits	Bronwyn van Neel
GEOSS	Zita Saal
Moyses Business Service	Dee Moyses
Alliance for Law in Development	Hendrina Smith
Environmental Management NDM	Unspecified
Local community member	Willem Cloete