APPENDIX 8.4: SUSTAINABILITY REPORT

Afro Development Planning

Sustainability Report – a synthesis of the impacts of the proposed powerships at the Port of Richards Bay, South Africa

Karpowership SA, Environmental Impact Assessment, 2022

May 16, 2023

DOCUMENT TITLE	Sustainability Report – a synthesis of the impacts of the proposed powerships at the Port of Richards Bay, South Africa
PROJECT	Environmental Impact Assessment and associated Atmospheric Emissions License for the proposed powerships at the Ports of Saldanha Bay, Richards Bay and Ngqura, South Africa
DOCUMENT TYPE	Final *(amended)* *Please note that any amendments to this final report are shown in blue italics font.*
CLIENT	Triplo4 Sustainable Solutions, Hantie Plomp, hantie@triplo4.com – lead EAP
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DECLARATION	Triplo4 Sustainable Solutions (Pty) Ltd has been appointed by Karpowership SA (Pty) Ltd (Karpowership) to undertake an Environmental Impact Assessment (EIA) for an Environmental Authorisation for the proposed gas-to-power powerships. Three separate Environmental Impact Assessments have been undertaken per site location (Port of Ngqura, Eastern Cape, Port of Richards Bay, KwaZulu-Natal, and the Port of Saldanha Bay, Western Cape). The Competent Authority responsible for evaluating and deciding on the application for environmental authorisation is the Department of Forestry, Fisheries and the Environment. The same Environmental Impact Assessment will inform Karpowership SA's application for an Atmospheric Emission Licence. The licensing authority for the Atmospheric Emission Licence is also the Department of Forestry, Fisheries and the Environment, although a different branch within the branch. Afro Development Planning was appointed by Triplo4 Sustainable Solutions as an independent consultant. This report supplements the findings of the Environmental Impact Assessment(s) and the associated Public Participation Process.

Afro Development Planning

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Specialist Report Requirements as per EIA Regulations 2014 (as amended)

Table 1 outlines the requirements of the Specialist Reports as per the NEMA EIA Regulations, 2014 (as amended). According to Appendix 6 (1) "A specialist report prepared in terms of these Regulations must contain …" the information outlined in Table 1 below.

Table 1: Prescribed contents of the Specialist Reports (Appendix 6 of the EIA Regulations, 2014)

Relevant section in GNR. 982	**Requirement description**	**Relevant section in this report**
(a) details of—	(i) the specialist who prepared the report; and	Appendix C: Specialist CVs Appendix B: Declaration of independence
	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Appendix C: Specialist CVs
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix B: Declaration of independence
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Introduction
(cA)	an indication of the quality and age of base data used for the specialist report;	It is anticipated that the Powerships and associated operations will be ready to provide electricity within a year of obtaining all necessary permits and licences, as a timeline for completion of the required construction and assembly. While Karpowership SA will enter into a 20 year PPA with Eskom, it is important to note that the Powership will only operate when required. Karpowership SA

		will receive a dispatch instruction from the buyer for the Powership to generate electricity, to initiate energy generation. Methodology and methods
(cB)	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Site description and findings
(d)	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	N/A
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	It is anticipated that the Powerships and associated operations will be ready to provide electricity within a year of obtaining all necessary permits and licences, as a timeline for completion of the required construction and assembly. While Karpowership SA will enter into a 20 year PPA with Eskom, it is important to note that the Powership will only operate when required. Karpowership SA will receive a dispatch instruction from the buyer for the Powership to generate electricity, to initiate energy generation. Methodology and methods

(f)	details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Site description and findings
(g)	an identification of any areas to be avoided, including buffers;	Site description and findings
(h)	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Site description and findings
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge; Note: Uncertainties should be qualified within the report – there will always be uncertainties due to ?? and gaps in knowledge should also be qualified – a gap is to record that not all knowledge can be obtained for a study.	It is anticipated that the Powerships and associated operations will be ready to provide electricity within a year of obtaining all necessary permits and licences, as a timeline for completion of the required construction and assembly. While Karpowership SA will enter into a 20 year PPA with Eskom, it is important to note that the Powership will only operate when required. Karpowership SA will receive a dispatch instruction from the buyer for the Powership to generate electricity, to initiate energy generation. Methodology and methods
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Site description and findings
(k)	any mitigation measures for inclusion in the EMPr;	N/A

	Note: We need to include whether these mitigation measures (excluding ongoing monitoring) can be practically implemented prior to commencement or not.	
(l)	any conditions for inclusion in the environmental authorisation;	Recommendations
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Recommendations
(n) a reasoned opinion—	(i) whether the proposed activity, activities or portions thereof should be authorised;	Concluding professional opinion
	(iA) regarding the acceptability of the proposed activity or activities; and	Concluding remarks
	(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan; Note: We need to include whether these mitigation measures (excluding ongoing monitoring) can be practically implemented prior to commencement or not.	Concluding remarks
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
(q)	any other information requested by the competent authority.	N/A
(2)	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

1. Introduction

This sustainability report forms part of the Environmental Impact Assessment (EIA) being undertaken for the proposed gas-to-power Karpowership SA Pty Ltd application at the Port of Richards Bay. Afro Development Planning (hereafter referred to as Afro) was appointed by Triplo4 Sustainable Solutions (Pty) Ltd (hereafter referred to as Triplo4 – the lead Environmental Assessment Practitioner or EAP), to provide a sustainability report to assist with providing a holistic and integrated perspective of the Powership project. This is in line with the understanding that sustainable development as per the National Environmental Management Act (NEMA) requires the integration of social, economic, and environmental factors in the planning, implementation, and evaluation of proposed projects, to ensure that development serves the needs of present and future generations.

Numerous specialist studies and discussion papers[1] were developed by professionals in preparation of the EIA. This broadly covers a host of ecological specialist assessments focusing on terrestrial, aquatic and marine ecology, including consideration of underwater and terrestrial noise impacts and thermal plume modelling; contextualising the energy crisis and the impacts of loadshedding; understanding the role that gas-to-power projects have to play in response to the energy crisis; the socio-economic impacts related to the proposed project, including the local community and small-scale fishers; an investigation of the visual impacts of the addition of the Powership in the active port; consideration of the local tourism industry and how this may be affected; and, understanding the major operational risks associated with the necessary operational processes of the Powerships; amongst others. This was done to assist with developing a robust understanding of the site, potential impacts of the proposed project, and adequately contextualise the need and desirability of the proposed project. The diversity of the required specialist assessments and discussion papers reflects the complexity of the proposed project and competing land uses or interests associated with the port environment.

Two matrices were developed to assist with synthesising the key findings of the specialist assessments, and highlighting critical variables, mitigation and management recommendations, and interconnections and overlaps in the specialist areas (see Appendix A: Matrix). The integration matrix presents the list of specialist studies across both axes. This matrix facilitates transdisciplinarity across all specialist studies. The strategic issues matrix provides a synthesis of the key findings from each specialist assessment undertaken for the relevant site, into one comprehensive table. This includes, where relevant, limits of acceptable change or ecological thresholds, mitigation or management recommendations and a final overall environmental significance risk rating. Collectively, these two matrices provide an overarching perspective of the key findings of the specialist assessments, and the interrelated nature thereof.

The second tool that this report presents is a systems map, which perceives the project site as a complex adaptive system derived from definitions and methodologies developed under Complexity Science and Systems Thinking. The systems map attempts to illustrate cause-and-effect relationships, and to understand complex systems and their interactions. In this instance, the complex system is the project site and how this system may shift with the addition of the proposed powership. Systems mapping is intended to provide a simplified conceptual understanding of a complex system that, for collective action purposes, is useful to illustrate causal relationships (cause-and-effect related actions and impacts). This understanding allows for enhanced perspective of the Karpowership SA project through the compound lens of the specialist assessment findings regarding how the site may be impacted. This perspective is further used for improved impact mitigation / management recommendations in the EIA, with a focus on strengthening of adaptive management related recommendations at construction and operation phase.

Lastly, cascading direct and indirect impacts of climate change, using the 1st to 4th order framework to assist with organising experiences of climate change into a logical framework of cause-and-effect related impacts, based on work done by the World Bank. This tool provides a valuable means to deepen the understanding of climate change, vulnerability, risk and impacts to communities. Some less obvious drivers include socio-economic and community-

[1] *Please refer to the EIA and the associated compendium of specialist studies for a comprehensive perspective of the supporting specialist reports, consultative engagements and public participation which was undertaken with the EIA.*

based factors, such as education, literacy, gender, poverty and access to public health care (amongst others). A key aspect in this regard is that communities and socio-economic systems are viewed as central to broader ecological, geographical and biophysical systems. This framework is therefore useful for decision makers and stakeholders to raise awareness and understanding, particularly of the less tangible drivers of climate vulnerability.

Overall, the addition of the powership in the Port of Richards Bay will result in biophysical and ecological changes - both positive and negative shifts will be experienced at the site level. Impacts on marine life have been identified ranging from low to medium impacts, with concerns around sensitive estuarine and marine habitats and the sensitive species that depend on them. In addition, the cumulative impacts in the port result in compounding disturbances for estuarine and marine ecology, including important bird species. There is also concern regarding increased cumulative impacts of collisions and electrocutions of larger bird species, associated with the transmission lines. *The specialist team carefully considered the anticipated impacts and means to ensure negative impacts are avoided. The specialist assessments and EIA has further provided mitigation strategies for remaining negative impacts. And, lastly, the inclusion of biodiversity offsets / ecological compensation has been included in the project, considering the residual negative ecological impacts.* C*onsidering the mitigation hierarchy, various alternatives were considered by the specialists, as outlined below:*

1. *Avoidance: Design lay-out - The Powership and associated infrastructure were located within the active Port side of the Port and outside (not on or within) the sands pit, the kabeljous flats or the mangrove areas. Development, e.g. road access was confined to existing development footprints;*
2. *Minimisation: Location, technology and scale of the project: Impacts such as noise and heat from the Powerships was minimised through design measures and engineered solutions, e.g. discharge at lower oceanic deep;*
3. *Rehabilitation: The wetland will be rehabilitated, resulting in a net overall improvement from 187.7 hectares of wetlands (current state) to 206.6 hectare equivalent (after rehabilitation). This will improve the functional area of wetlands by 18.9 hectares.*
4. *Biodiversity offsets: Following all the measures taken and recommendations by the Coastal, Estuarine and Marine and Avifaunal Specialists to avoid, minimise and rehabilitate, a residual negative impact of medium and medium high impact remained for Avifauna Specialist Report, and the Coastal, Estuary and Marine Ecology Report in the Estuarine Bay/Port of Richards Bay. The specialists' reports responded to the confidence of predicted negative impacts and gave considerations to uncertainties and the precautionary principles. Please refer to the Avifauna Specialist Report (Section 4) as well as the Coastal, Estuary and Marine Ecology Report (Section 8) and the Impacts and Mitigations as per the EIA Report (Chapter 7). As per EKZNW, the 2022/23 environmental impact assessment (EIA), reviewed by EKZNW and other specialists, determined that the maximum impact of the Project on the biodiversity values to be 'moderate' which may be offset or compensated for, or both, to achieve the requirement of a 'no net loss' (or enhancement) of biodiversity rendering the Project ecologically sustainable. Consequently, Biodiversity offsets, as a conservation measure to remedy the residual negative impacts of the development on biodiversity and ecological infrastructure in the Richards Bay Port, have been agreed to with EKZNW. Karpowership has committed to minimise and remedy any identified material loss of biodiversity resulting from the project and both an "In-Kind" (like for like) and "Out of Kind" Biodiversity Offset / Ecological Compensation. This will ensure increased protection with appropriate management to duly compensate for residual environmental impacts that could potentially occur by following the implementation of the mitigation hierarchy. The following offsets have been agreed to: Like-for-Like (In-Kind): uMhlathuze Estuary or equivalent; and Out-of-Kind: Madaka Game Ranch with management.*

Further detail *is provided later on in the assessment section of this report and* in the relevant specialist studies and discussed in this report. However, it is important to note that all specialists have acknowledged that the site is an active port and industrial zone, *as well as an ecologically sensitive bay*, and that with mitigation and management recommendations, the project should proceed. There is also further opportunity to apply an adaptive management approach through research and monitoring programmes, to improve our understanding of these dynamic ecosystems, and the importance of this habitat relative to others – *further recommendations in of this nature are provided in the chapter titled 'Concluding remarks' in this report.*

A host of socio-economic positive impacts are also anticipated as a direct result of investments by Karpowership SA, in line with the local content requirements of its contract with DMRE under the RMI4P (job creation (low impact)), corporate social investment, supplier development, enterprise development, (medium-low impact)), and as indirect impacts associated with local economy stimulation and increased economies of agglomeration. While nationally, the country will benefit from the contributions that the Powership will provide in the form of electricity, thus reducing the effects of loadshedding (high positive impact), and cascading positive impacts associated with economic growth and development.

2. Project description[2]

2.1. RMI4P contributions

The proposed project arose in response to the Request for Proposals for new generation capacity of 2000 megawatts of dispatchable power from a range of technologies, under the Risk Mitigation Independent Power Procurement Programme (also referred to as RMI4P). This request was issued by the Department of Mineral Resources and Energy (DMRE) on 07 July 2020, to alleviate the immediate and future capacity deficit and the limited, unreliable and poorly diversified provision of power generating technology with its adverse environmental and economic impacts, as identified in the Integrated Resource Plan (2019).

As described in the discussion paper titled '*The economic impact of rolling blackouts in South Africa: Shaping the context*' (Steenkamp & Weaver, 2022a) the power procurement under the RMI4P is different to that of the Renewable Energy Independent Power Producer Procurement Programme (REI4P), and the wider development of the electricity generation in South Africa. The RMI4P was established to address the current, and critical shortfall in electricity supply which has resulted in South Africa's energy crisis. As such the procurement seeks to address the short-term deficit in electricity supply – rather than determining the future energy mix - and therefore the speed at which projects can come online after financial close is a critical consideration. It is part of an attempt by government to procure a net increase of more than 23 900 megawatts (MW) of energy over the next eight years (i.e., short term) during which time, and as assumed in the IRP 2019, Eskom will decommission 8000 MW of power from its coal fleet (Steenkamp & Weaver, 2022; Futuregrowth, 2021). The RMI4P is to satisfy the short-term electricity supply gap, ease the current electricity supply constraints and reduce the wide-scale usage of diesel-based peaking electrical generators using alternative energy technologies ((Steenkamp & Weaver, 2022; DMRE, 2021a).

The request for proposal stipulated stringent environmental, social and economic criteria, the shift from coal and liquid petroleum gas to natural gas as a cleaner and more cost-effective resource, BBBEE criteria and skills development. In particular, the request for proposal contained the following economic mandatory criteria: 1. Economic development requirements (for enterprise development and local procurement); 2. Value for money defined to mean that "*the new generation capacity project results in a net benefit to the prospective buyer or to the Government having regard to cost, price, quality, quantity, risk, transfer, or a combination thereof*".

[2] *This project description was obtained from the EAP provided via the project method statement and the relevant scoping report and plan of study for the EIA process in the Port of Richards Bay and, as per emails sent on the 10th October 2022. This has been further developed with additional details from the specialist assessments.*

The value for money requirement involved an assessment of several issues and considerations, none of which are dominant or pre-eminent to another. All issues and considerations were of importance in the assessment but might not necessarily bear equal weight. The outcome of the consideration, as to whether a project delivers value for money, was required to produce an assessment that the project is in the best interests of- and delivers an acceptable outcome to the buyer, being Eskom and the Government (acting on behalf of and in the best interests of the people of South Africa, including electricity users).

Strategic Integrated Project

The energy crisis has had a significant impact on the South African economy over the past 15 years and is anticipated to continue well into the future without an emergency risk response such as the RMI4P. Therefore, the RMI4P has been declared a Strategic Integrated Project in terms of the Infrastructure Development Act 23 of 2014, by the Presidential Infrastructure Coordinating Commission Council on 24 July 2020 under SIP 20, as set out in Government Gazette 43547.

Please refer to the various Economic Reports that have been prepared for this EIA process for further information on this topic, and the important energy crisis context to which this project responds (see the Appendix of Specialist Studies associated with the EIA).

Karpowership SA Pty Ltd was announced by the DMRE, as one of the eight successful bids, on 18 March 2021. Karpowership SA is a South African company that is 49% owned by a local Black Empowered Company and 51% owned by Karpowership, a member of Karadeniz Energy Group (Istanbul, Turkey) which owns, operates and builds Powerships (floating power plants). Since 2010, 25 Powerships have been completed with total installed capacity exceeding 4,100 MW globally with an additional 4,400 MW of Powership either under construction or in the pipeline. Impressively, at the time of publication, no environmental incidents have been reported in any of the countries where powerships are operated.

The Karpowership SA will provide 1220 megawatts of the total 2000 megawatts of the RMI4P, for a contractual term of 20 years, as-and-when required to support the national grid. This electricity will be generated by fully integrated floating Powerships, fuelled by natural gas. These Powerships will be berthed or moored in three ports in South Africa with the contracted capacity of 450 megawatts in the Port of Ngqura in the Eastern Cape, 450 megawatts in the Port of Richards Bay in KwaZulu-Natal, and 320 megawatts in the Port of Saldanha Bay in the Western Cape.

The proposed technology to produce electricity through natural gas-fired reciprocating engines and heat capture steam engine turbines designed to improve efficiency of energy generation. Construction is limited to transmission and gas supply lines as the ships are built internationally and arrive fully equipped in the Port, ready for operation.

In the South African context, and as presented in the IRP 2019 provision has been made for gas in the energy mix, this coupled with the urgent need to respond to the energy crisis makes it clear that due consideration is to be made for the Karpowership SA project. The Karpowership SA project has significant relevance given the following, as described by the report by Steenkamp and Weaver (2022a) on *The economic impact of rolling blackouts in South Africa*:

- The Karpowership fleet can be deployed immediately, and Karpowership project can reach commercial operation in 12 months given the infrastructural requirements on the landside. This allows for additional generation capacity coming online timeously, given the urgency to resolve loadshedding.
- Karpowership can provide baseload, mid-merit and peaking power and because Karpowership provides flexible electricity generation, it can respond in minutes when the energy supply is under strain.

- Given the nature of the RMI4P, and the associated purchase agreements, Karpowership will only generate electricity after being issued a dispatch instruction by the system operator. In other words, Karpowership will operate only when required to do so.
- The Karpowership project has a contract duration of 20-years, as per the standard stipulation of the RMI4P, and will therefore be a temporary power generator in the energy mix in South Africa.
- Because Karpowership is a floating power, there is little risk of stranded assets or lengthy decommissioning timeframes.
- The Karpowership SA project will create thousands of new jobs over the construction and operational phases of the project. During the operational phase the Karpowership will also contribute to skills and capacity development which will benefit locals and contribute to South Africa's just transition.
- The Karpowership SA project will produce less than half the GHG emissions, and a fraction of the particulate and other emissions to that of coal and diesel. It is therefore expected to directly result in more emissions avoided (from coal-fired plants) than it will contribute to the global stock of greenhouse gas emission, and will have a positive climate change impact by supporting the deployment of renewable energy in the country (Promethium Carbon, 2022).
- The Powerships should not be considered a replacement of renewable energy, but rather a complementary technology to renewable energy, which supports the transition away from coal. A full transition to renewable energy will require a significant increase in battery manufacturing and deployment – a 44 times increase internationally by 2030 (IEA, 2022) is required to achieve renewable energy providing baseload. This significant increase in demand is highly likely to see developed, richer countries, out bidding and securing battery capacity ahead of developing countries. The Powerships provide a highly feasible alternative through its ability to provide rapidly electricity generation which can make up any shortfalls in renewable energy's intermittent electricity production which might arise.
- Development of a gas industry in South Africa is already underway, and will continue, and thus the skills, supply, and enterprise development undertaken by Karpowership will further contribute to establishing a more efficient and viable domestic industry. Ultimately this will lead to increased job creation activities.

2.2. Overview of the proposed project activities

The proposed project includes the mooring, deployment, and operation of two gas engine powerships (one Shark and one Khan Class vessel) and associated infrastructure in the Port of Richards Bay, for a contracted 20-year lifespan. In summary, the key activities associated with the proposed project will include:

- Mooring, deployment and operation of two gas engine powerships (Khan Class vessel and Shark Vessel)
- Mooring facilities for the Liquefied Natural Gas (LNG) carrier.
- LNG supply, storage and regasification on-board a Floating Storage Regasification Unit (FSRU).
- Distribution of the natural gas to the powership via subsea gas pipeline infrastructure.
- Berthed powerships – a ship and barge, which have been reconfigured to incorporate elements for the generation of electricity using natural gas. The natural gas is supplied to the engines. The 27 reciprocating engines in operation drive the generator shaft to generate electricity, and the heat generated by the engines in operation is captured and used by additional steam turbines for increased efficiency.
- On-board High Voltage substation for the conversion of the generated power.
- Overhead lines for the evacuation or transmission of the generated electricity to transmission connection points onshore and onward to the substation that is connected to the national grid.

An LNG carrier will periodically supply LNG to the FSRU (approximately once every 20 to 30 days) and will temporarily stay (1-2 days) in the location in a ship-to-ship configuration to offload the LNG cargo. The LNG remains on the FSRU and is regasified to natural gas. It has been confirmed that the system is closed and requires no

uptake or discharge of water). The natural gas will be transferred to the powerships through a connecting pipeline as indicated above.

The two powerships will have a combined total electrical output capacity of 540 MW. The powerships use reciprocating engines (GEN-SET) that run on gas. These can run in a simple cycle configuration or a combined cycle with steam turbine generators (STG) that utilise exhaust heat from the engine. The on-board high voltage substation then converts the power generated from this. The electricity is evacuated via the 132 kV overhead transmission line that runs to the switching station. The powerships also have freshwater generators (FW GEN) to produce freshwater for operational purposes.

The operation of the powerships involves the abstraction of seawater for cooling of the power generators and the subsequent discharge of heated water back into the receiving environment. Total intake/outlet flow rates range from 2.4 to 11.4 m^3/s, and the increase in temperature (ΔT) ranges from 4 to 15°C (PRDW, 2020). For example, based on the modelled scenario detailed in PRDW (2022), in which the reciprocating engines, steam turbine generators and freshwater generators are in use with 100% loads (i.e. the worst-case scenario), the estimated total intake/outlet flow rate for both vessels (all generators combined) is 8.49 m^3/s. The increase in temperature is between 10 and 15°C (Table 2). The total flows will be discharged at depth (8 m) through multiple outlets on the vessel hulls. Discharges will operate continuously, and no other constituents, such as biocides or brine, will be added to the cooling water discharge.

Table 2: Discharge characterisation for the powerships moored in the Port of Richards Bay, based on the modelled scenario for the 100% load case (PRDW, 2022)

	Total flow (m3/s)			**Discharge temperature increases (ΔT)**		
POWERSHIP	GEN-SET	STG	FW GEN	GEN-SET	STG	FW GEN
Shark	1.25	0.50	0.13	14.0	10.0	15.0
Khan	4.38	2.00	0.23	13.0	12.0	14.0

The impacts of these activities, and associated direct and indirect impacts, have been assessed by professionals and documented in relevant specialist impact assessment reports. These findings have been synthesised and referenced in this document, and therefore significantly influenced the content of this report – see chapter 5. Please refer to the EIA document for further detail on the proposed project and associated key activities, and the impacts thereof.

2.3. Location of the Powership & FSRU

The Port of Richards Bay is South Africa's most northern port, located 160 km northeast of Durban on the east coast of South Africa. It hosts the Transnet operated Dry Bulk Terminal and Multipurpose Terminal and the privately operated Richards Bay Coal Terminal. Several other terminals are in operation, including wood chip export terminals and a bulk liquid terminal. In the port, the proposed project will be located in the far western portion of the bay, on the northern side of the sandspit that is adjacent to the area known as the Kabeljous Flats - ecologically-sensitive habitats.

Two layout options or mooring locations are proposed based on vacant space, existing and planned port operations, depth considerations, and adequate space for mooring, navigation and operations. The sandspit area has been identified as sensitive, so a minimum offset distance of 200 m from the low water mark and 170 m from the base of the sandspit to the moored FSRU will be maintained; while the closest mooring legs will be approximately 120 m of the base of the sandspit.

In Alternative Layout 1 (preferred option), the proposed Khan Class and Shark Class powerships (450 MW combined contracted output) are positioned within the dead-end 600 Berth basin adjacent to the break bulk quay

/multi-purpose terminal. The Khan powership will be approximately 81 m and 175 m off the main land promontory along its starboard side and from the stern, respectively, and the Shark powership approximately 192 m off the water line of the sandspit along its starboard side. The powerships are positioned “in-line” and connected to the FRSU by approximately 1 400 m of subsea gas pipeline (see Figure 2).

In Alternative Layout 2, the powerships are positioned roughly 900 m further seaward (closer to the FSRU) and side-by-side and connected to the LNG/ FRSU mooring facility by approximately 500 m of subsea gas pipeline. In Alternative Layout 2, the marine infrastructure (ships, mooring, and gas pipeline, etc.) is in closer proximity to the sensitive sandspit and without the “buffer” afforded by the promontory, and is thus the least preferred alternative from an ecological perspective, but also engineering perspective. Although this alternative presents a shorter gas pipeline, the position of the powerships in relation to the shore is not supported from an engineering design perspective, and consequently the position of the associated gas pipeline is also not supported. Therefore this report focuses on the Alternative Layout 1.

The impacts of these activities, and associated direct and indirect impacts, have been assessed by professionals and documented in relevant specialist impact assessment reports. These findings have been synthesised and referenced in this document, and therefore significantly influenced the content of this report – see chapter 5. Please refer to the EIA document for further detail on the proposed project and associated key activities, and the impacts thereof.

2.4. TNPA Port limits & fishing rights

The location of the Karpowership SA proposed project, and all associated infrastructure in the Port and on land, was discussed at length with Transnet National Port Authority, South African Maritime Safety Authority, Department of Forestry, Fisheries and the Environment, affected landowners, and others.

The Richards Bay Port limits can be found in Gazette No. 32873 (22 January 2010) on page 32, and a PowerPoint presentation by Transnet titled ‘National Ports Plan 2019’ dated May 2019 (Figure 1). It should be noted that fishing is not permitted in the jurisdiction of the Port.

Figure 1: Richards Bay Port limits

2.5. Transmission lines

The proposed transmission line will comprise piled monopoles. The span lengths between towers will vary. Average spans lengths will be approximately 200 m, however, based on the ground profile shorter spans of less than 100 m or larger spans of greater than 300 m can be constructed.

There are two options for the proposed overhead transmission lines. In both route options, the transmission lines will link to the first land-based connection, that is the terminal tower (monopole design), positioned atop the promontory adjacent to the large mangrove stand (Figure 4) and ultimately link into the Eskom National grid via a new switching station (17 542 m²) in the northwestern corner of the former Bayside Aluminium Smelter site.

Alternative 1 route (preferred route) runs westwards, joins into the existing power servitude through open grassland/scrubland and unchanneled valley bottom wetland, thereafter, running north along the existing power servitude along the Manzamnyama Canal, before heading around the northern property boundary of the smelter site to the endpoint at the switching station. The route is the preferred overhead transmission line from the powerships to the proposed switching station, as it offers a shorter route to the end point, covering approximately 3.6 km with estimated 16 towers (31 m working servitude, 111 600 m^2). In addition, the majority of the Alternative 1 route is located in areas of low to moderate ecological sensitivity and will not be traversing highly sensitive wetland and swamp forest. The location of the route is in transformed areas or in highly degraded areas adjacent to transformed areas, and a large portion of this alternative follows the route of the existing powerline servitude. The existing servitude will be used for access for the majority of this route, and an additional access / working servitude will be required for the construction of tower(s) in the area between the port and the Manzamynama Canal as well as from the start point to the Harbour Arterial Road (the first four towers).

From the same starting point as Alternative 1, the Alternative 2 route joins the harbour arterial road servitude, and before the lower Bhizolo Canal, it cuts west passing through the mangroves and across the lower Manzamnyama Canal, traversing the smelter site, before heading north through mixed mangrove and wetland habitat on the western boundary of this site. The route is approximately 4km long, requiring 19 towers (31m working servitude, 124 000m2). This alternative route traverses' areas that have been historically transformed. However, these areas are still considered highly sensitive due to the unique flora and fauna that resides within these environments. Furthermore, a substantial length of this proposed transmission line route is located within wetlands, and it traverses two Critically Endangered vegetation types, namely Mangrove Forest and Swamp Forest. These have extremely high sensitivity and as such, can be considered as a fatal flaw and therefore this alternative route is not supported. Consequently, this route was found not to be acceptable and is therefore not supported. This report, therefore, focuses on Alternative 1 route for the transmission line.

The impacts of these activities, and associated direct and indirect impacts, have been assessed by professionals and documented in relevant specialist impact assessment reports. These findings have been synthesised and referenced in this document, and therefore significantly influenced the content of this report – see chapter 5. Please refer to the EIA document for further detail on the proposed project and associated key activities, and the impacts thereof.

2.6. Gas lines

Gas will be transferred between the FSRU and the powerships in sequence via flexible risers attached to a pipeline end manifold (PLEM) (containing necessary valves, connections, etc.), one for each vessel installed on the seabed next to the respective vessel, and onward via the subsea steel pipeline with concrete weight coating installed on the seabed between vessels The subsea pipeline will be installed according to international best practice, along the existing dredged slopes between the powerships and FSRU and will have a servitude of approximately 50m either side of the pipeline.

Please refer to the EIA document and compendium of specialist assessments for further details, including the impact assessment of this facility and related activities.

2.7. Contractor facilities

The contractor facilities include a site office and concrete coating yard, a material laydown area, the stringing yard and the load out berth, and there are no alternative locations for these facilities. These areas were carefully selected from areas within the port that have been previously disturbed and with sufficient space to accommodate the construction and pipe assembly activities.

Please refer to the EIA document and compendium of specialist assessments for further details, including the impact assessment of this facility and related activities.

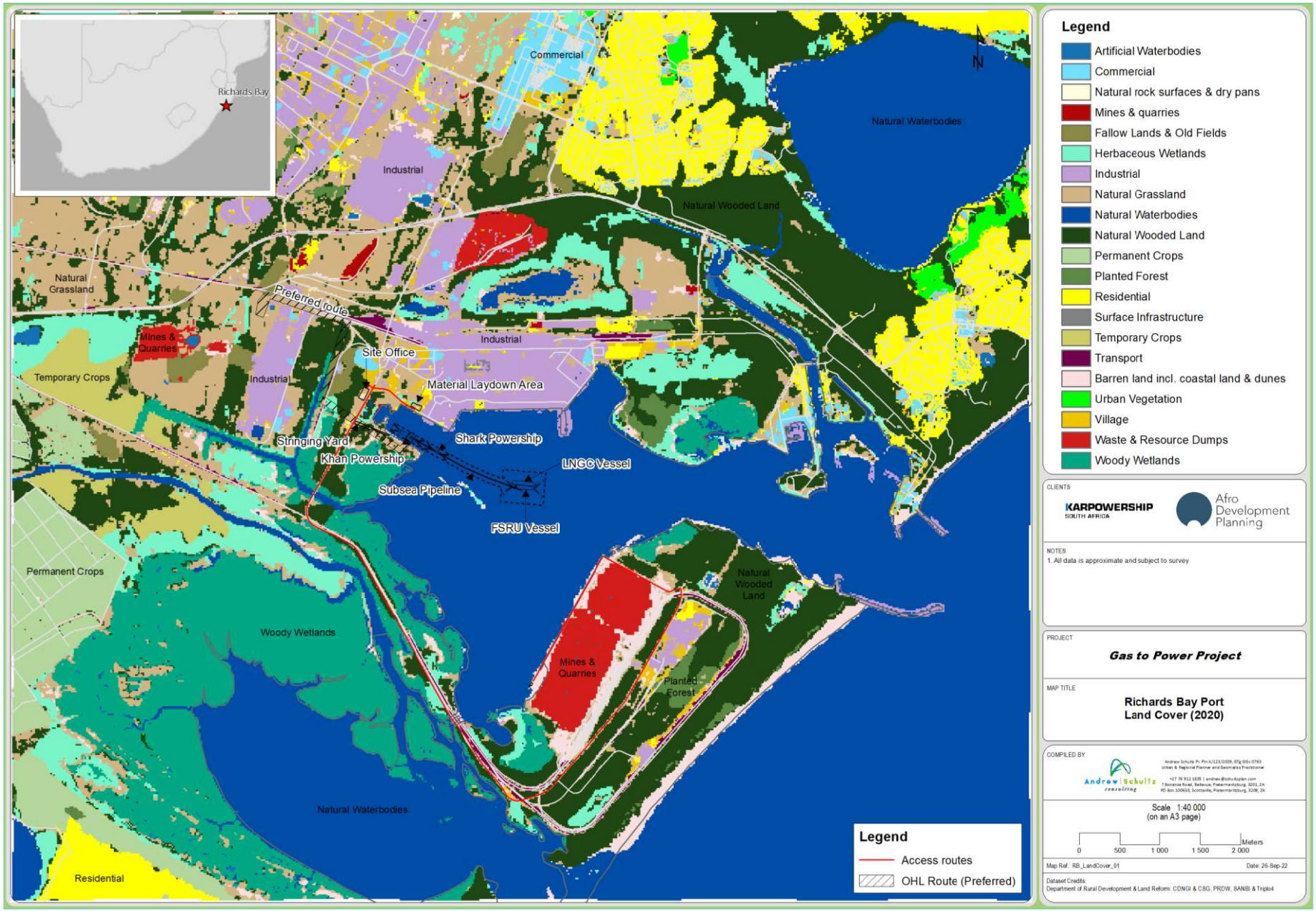


Figure 2: Location of the powerships and associated infrastructure, presented against the land cover for the area

2.8. Assembly / construction

The Powerships are assembled off-site and will be delivered fully equipped and functional to the Port of Richards Bay.

The land-based infrastructure will need to be constructed. While transformed sites have been considered as far as possible, several route alternatives have been proposed and assessed by in specialist assessments. Please see Figure 2 for the proposed routes and the various specialist studies for detailed assessments of the routes.

2.9. Operating times

It is anticipated that the Powerships and associated operations will be ready to provide electricity within a year of obtaining all necessary permits and licences, as a timeline for completion of the required construction and assembly.

While Karpowership SA will enter into a 20 year PPA with Eskom, it is important to note that the Powership will only operate when required. Karpowership SA will receive a dispatch instruction from the buyer for the Powership to generate electricity, to initiate energy generation.

3. Methodology and methods

3.1. Overview

As mentioned in the Introduction, the intention of this Sustainability Report is to support the findings of the EIA with a focus on facilitating transdisciplinarity in a manner that assists with understanding holistically the dynamics of the Karpowership Projects and the associated impacts. Furthermore, this approach enables the development of appropriate mitigation and management recommendations.

A polycentric approach to the proposed project requires the holistic consideration of all relevant factors, inclusive of potential impacts that the proposed project could have on the local as well as the broader community. Section 2(4)(b) of NEMA states that *Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in* the *environment by pursuing the selection of the best practicable environmental option.* Sustainable development as per NEMA requires the integration of social, economic, and environmental factors in the planning, implementation, and evaluation of proposed projects, to ensure that development serves the needs of present and future generations.

This specialist assessment therefore considers both the positive and negative impacts of actual and potential impacts on the geographical, physical, biological, social, economic, and cultural aspects of the environment in a polycentric and holistic approach that:

- Acknowledges that this environment is a complex and dynamic system
- Acknowledges the interrelated socio-ecological and socio-economic relationships
- Identifies the risks and consequences of alternatives and options for mitigation of activities, to minimise negative impacts, maximise benefits, and promote compliance with the principles of environmental management as set out in section 2 of NEMA.

3.2. Transdisciplinary specialist integration

To facilitate co-learning and co-creation of knowledge amongst the specialist team, towards the development of holistic specialist assessments the following approaches were employed:

- ***Specialist integrative workshop*** and weekly meetings were held during the EIA process where specialists raised matters to be considered by the team and verified technical information to prevent any discrepancies and where relevant, to co-ordinate approaches. This approach assisted with addressing gaps in specialist reports and the development of a holistic assessment of the project – thus allowing for a polycentric assessment of environmental and socio-economic impacts. Critically, this enabled the identification of appropriate mitigations and recommendations for potential negative impacts, the maximisation of positive impacts and the value of the project to society.
- ***Thematic specialist engagements*** were encouraged amongst the specialist team to share information (co-learning) and debate various applicable topics, potential connections and cross-sectional issues, and the related impacts and potential mitigation and management recommendations. Specialist contact details were shared openly amongst the team, and specialists were encouraged to set-up their own meetings, preferably including the Environmental Assessment Practitioner. Meetings which the author for the Sustainability Report attended of this nature included thematic discussions regarding:
    - Corporate social investments, job creation and capacity development, enterprise development and supplier development.
    - Vulnerable communities, including small scale fishers, and the potential impacts (positive and negative) associated with the powerships.
    - Links between the visual assessment and socio-economic impacts, including tourism
    - Links between the impacts on marine ecology and local mariculture and fisheries.
    - Various discussions with the team regarding the matrices and the systems map, and the integrated representation of the impact of the project.
- ***Integration of specialist findings*** where overlaps and connections were identified, and/or considered applicable, specialists reviewed each other's reports and integrated findings into their own work. Please refer to the EIA document and associated appendices for the list of specialist studies.

Critically, for this report, the findings of the specialist assessments were used to inform three methods that assist with synthesizing and conceptualizing technical information for decision making purposes, namely: 1. Matrix of strategic issues and thresholds, 2. Systems maps, and 3. 1st to 4th Order Framework. These methods are described in the sub-chapters that follow, and the findings are discussed thereafter. The specialists assisted in some instances with providing input directly to each tool, review and comment, and engagement at team strategic integration workshops. The outcomes of these methods have assisted with strengthening of impact mitigation / management recommendations, and the inclusion of adaptive management principles from a transdisciplinary perspective (see recommendations chapter).

3.3. Matrix of strategic issues and thresholds

Two matrices were developed to assist with summarising the key findings of the specialist assessments, and highlighting critical variables, mitigation and management recommendations, and interconnections and overlaps in the specialist areas. This is a valuable tool for any project, and especially so for this EIA because of the numerous specialist studies that were undertaken.

The integration matrix presents the list of specialist studies across both axes. This matrix is facilitated transdisciplinarity of specialist study understanding across all specialist studies, and identification of cascading impacts (see Appendix A).

The strategic issues matrix provides a synthesis of the key findings from each specialist assessment undertaken for the relevant site, into one comprehensive table. This includes, where relevant, limits of acceptable change or ecological thresholds, mitigation or management recommendations and a final risk rating in line with that provided under the NEMA Overall Environmental Significance Impact Rating[3] (see Table 3). These issues have been arranged into overarching themes for ease of reference, namely: physical, ecological, socio-economic and heritage (natural, cultural, tangible, intangible).

Table 3: Scoring of impacts associated with the NEMA EIA impact and risk rating methodology

Scoring of Impacts	
Consequence	
Severity the degree to which the project affects or changes the environment	1 – Insignificant / Non-harmful 2 – Small / Potentially harmful 3 – Significant / Slightly harmful 4 – Great / Harmful 5 – Disastrous / Extremely harmful
Duration a measure of the lifetime that the impact will be present	1 – up to 1 year 2 – 1 to 2 years 3 – 2 to 20 years 4 – Beyond 20 years 5 - Permanent
Spatial Scale the extent / size of the area that may be affected	1 – Immediate, fully contained area / within the site 2 – Surrounding area (< 2km) 3 – Within farm / town / city 4 – Within municipal area 5 – Regional, National, International
Overall Consequence = (Severity + Duration + Extent) / 3	
Likelihood	
Frequency how often the impact will occur	1 – Once a year, or once or more during operation 2 – Once or more in 6 months 3 – Once or more a month 4 – Once or more a week 5 – Daily or hourly
Probability the likelihood or the chances that the impact will occur	1 – Almost never / almost impossible 2 – Very seldom / highly unlikely 3 – Infrequent / unlikely / seldom 4 – Often / regularly / likely / possible 5 – Daily / highly likely / definitely

[3] *The NEMA EIA Regulations (DEA, 2014a) provide guidance for describing the significance of environmental impacts considering the consequence of the impact and the likelihood of the impact occurring. The consequence of an impact is the sum of the severity of the impact, the duration of the impact and spatial scale of the impact. The rating of these parameters is based on the findings of the assessment and professional judgement of specialists. The likelihood of an impact is the sum of the frequency of the activity causing the impact and the probability of the impact occurring. This was, however, not relevant as a methodology for all specialist assessments.*

Overall Likelihood = (Frequency + Probability) / 2	
Overall Environmental Significance = Overall Consequence X Overall Likelihood	
Overall Environmental Significance:	
0 - 2.9	Very Low
3 - 4.9	Low
5 - 6.9	Medium - Low
7 - 8.9	Medium
9 - 10.9	Medium - High
11 and above	High
Reversibility	
Reversibility degree to which the impact t can be reversed	Reversible – the impact is reversible Irreversible – the impact is not reversible
Irreplaceable Loss of Resources	
Irreplaceable Loss of Resources degree to which the loss of resources can be replaced	Yes – the impact causes a loss of resources that cannot be replaced No – the impact causes a loss of resources that can be replaced
Fatal Flaw	
Fatal Flaw degree to which the impact is a fatal flaw	Yes – the impact results in a fatal flaw No – the impact does not result in a fatal flaw

3.4. Mapping system dynamics

Drawing from the findings of the specialist studies a systems map of the operational phase of the proposed project was developed drawing on knowledge from literature associated with social-ecological systems and complex adaptive systems (CAS). The systems map attempts to illustrate the complex human-environment dynamic at the site scale, with potential causal links or cause-and-effect relationships illustrating potential shift arising because of the Karpowership SA operating in the Port. This 'map' is intended to provide a simplified conceptual understanding of the site as a dynamic and complex system.

In applying this framework, the general organising principles of CAS as described in Table 4 is relevant to understanding the site.

Table 4: A summary of the general organising principles of complex adaptive systems, and implications for research and planning (adapted from Preiser et al 2022, pg. 35-38)

Organising principles of Complex Adaptive Systems (CAS)		**Conceptual implications for social-ecological systems (SES)**
Constituted relationally	• Complex adaptive systems are constituted relationally - complex behaviour and structures emerge because of the recursive and aggregate patterns of relations that	• The nature and structure of relationships in a SES have to be considered explicitly.

Organising principles of Complex Adaptive Systems (CAS)		Conceptual implications for social-ecological systems (SES)
	exist between the component parts of systems. • These relations usually give rise to rich interactions within the system, meaning that any element in the system influences and is influenced by many other ones either directly, or indirectly via positive (reinforcing) or negative (balancing) feedbacks.	• Diversity and redundancy is key and allows for different kinds of SES interactions to take place.
Adaptive	• CAS have adaptive capacities - they self-organise and co-evolve in relation to contextual changes. • Self-organisation happens when a system develops complex structures from unstructured beginnings without the intervention of an external designer or the presence of some centralised form of internal control. • Coevolution describes the recursive patterns or relations of influence that result from ongoing exchanges between components of evolving systems, practices, knowledge, beliefs and values, and the biophysical environment that mutually influence one another.	• The function and structure of SES changes with temporal and spatial changes. • Multiple modes of reorganisation are possible when systems undergo change. • Adaptive capacity results from a system's ability to learn and have memory. • Change happens through adaptation, evolution and transformation. • Control is not located in one isolated element of the system but is spread throughout the nodes and relations of the system.
Dynamic	• CAS are characterised by dynamic relations - the relationships in a system are constantly changing in rich and unexpected ways. • These relations are mostly non-linear. • Non-linearity can be the result of feedbacks, path dependencies, time lags or multiple time scales, which suppress or magnify processes and interactions, both internally and between the system and its environment. • Non-linear dynamics also arise because the relations between variables constantly change, which renders them uncertain and unpredictable and makes these systems difficult to predict. • Change and not stability is the norm in CAS, shifting the focus from analysing stable states to analysing transient processes (the behaviour of the system in between equilibria), and from analysing outcomes to	• System behaviour is amplified or dampened by feedback loops and can lead to tipping points and regime shifts. • Feedback structures are responsible for the changes we experience over time. • Structures are responsible for the changes we experience over time. • SES are characterised by inherent unpredictability and uncertainty.

Organising principles of Complex Adaptive Systems (CAS)		Conceptual implications for social-ecological systems (SES)
	focusing on the trajectories or processes of the system.	
Radically open	• Complex adaptive systems are radically open – the activity of the system in relation to the environment that constitutes the system itself. • We cannot clearly discern the boundary between the system and its environment because the environment co-constitutes the identity of the system. • Our definitions of systemic boundaries are the product of physical properties (e.g. a watershed boundary that signals a system boundary), mental constructions (i.e. where we choose to draw the line between the system and the environment or the problem or research question we want to address (including the temporal and spatial scales of interest).	• Delimiting SES problems and systems is challenging as real-world problems have no natural boundaries. • External variables could have important influences on system behaviour but cannot be included in the models of the system. • Any modelled system is embedded in a larger system.
Contextual	• CAS are context dependent - the function(s) of CAS are contingent on context. • Changing the context will have an impact on the function of the system, i.e., the environment suppresses or enhances possible systemic functions and are contingent on the level of analysis that we employ to understand a system.	• SES are context sensitive. • SES components have multiple functions that change when the context changes. • Context is not passive backdrop to a system, but an active agent in itself, which enables or inhibits systemic agency. • Many contested problem definitions exist simultaneously and the various stakeholders involved in a SES will have different mental models or beliefs that inform values and understandings of both the causes and the possible actions that could be taken to find possible pathways for action.
Complex causality and emergency	• CAS are characterised by complex causality and emergence. • Cause-and-effect interactions in CAS are not unidirectional or linear but marked by complex recursive causal pathways that are non-linear and dynamic. • Emergence occurs when entities are observed to have systemic properties that are different and non-reducible to the properties of the constituent elements. It is not that the sum is greater than the	• Cause-and-effect cannot be traced in linear causal trajectories • Emergent phenomena arise from multiple recursive patterns and unintended outcomes.

Organising principles of Complex Adaptive Systems (CAS)		Conceptual implications for social-ecological systems (SES)
	parts, but rather that the system's effects are different from those of its parts. • Emergent phenomena have causal agency and are real, i.e. they have ontological status.	

Given the CAS organising principles as described in Table 4, it is important to highlight the following associated with the application of this method to the proposed project:

- As an active port there is a strong and complex relationship between the community for livelihoods in a variety of ways, e.g. subsistence and commercial fishing, jobs associated with the industrial zone and the nearby tourism industry.
- The Port is zoned as industrial, and therefore includes associated infrastructure and activities on the landside and associated maritime activities in the Port.
- This is a complex ecological transition zone considering the Port is an interface of the terrestrial habitat, the riparian, estuarine and lagoon environments, and the ocean.
- For the systems maps generated for the Karpowership projects it is important to acknowledge that the boundary of the map will be set at the site scale.
- The maps were developed to consider the operational phase of the proposed project, and the likely consequences in system shifts related thereto.
- Each map is developed considering an imposed change to the environment. In this instance the change to the environment will be the addition of the powership, and its operations associated with the provision of peaking power in line with the 20 year contract.
- These maps synthesis and illustrate the socio-ecological and socio-economic shifts (positive and negative) that the Karpowership SA projects will likely bring about at each site. But will also anecdotally acknowledge wider system impacts, e.g. to nearby protected and/or sensitive natural environments, local communities, and tourism activities.
- The operation of the Powerships is in response to the country's energy crisis, and therefore the provision of electricity generated by the Powership(s) influences a greater system associated with the country's energy stability and the consequences for the economy – although this important trend is acknowledged, this will, however, not be mapped here.
- The operation of the Powership(s) will result in greenhouse gas emissions, which will contribute to global stock of emissions — although this important trend is acknowledged, this will, however, not be mapped here.

Overall, the map presents an understanding of the site as a CAS, as a holistic transdisciplinary perspective of shifts to the system that may be realised because of the Powership. The systems map represents both positive and negative shifts. In addition, it attempts to highlight the significance of these anticipated shifts with alignment of the impact ratings provided by the specialist team (Table 3). This impact and risk rating further informed the development of the systems map, providing perspective on the likelihood and significance of the impacts and/or system shifts.

3.5. Cascading impacts of climate change

The 1st to 4th Order Framework assists with organising our experiences of the cascading impacts of climate change into a logical framework of cause-and-effect related impacts, based on work done by the World Bank. It is a conceptual framework based on the findings in the Climate Impact Assessment Report and influenced by other specialist findings and specialist team discussions.

It is critical to note that this tool is presenting the modelled projections of potential climatic changes to a particular region and attempts to understand how the cascading direct and indirect impacts of climate change may impact on the site. These projections do not make causal links to the presence of the Powership influencing climate change, in a positive manner through any rehabilitation of natural habitats of social investments, or negatively through emissions, etc. It is therefore based on climate change projections, as well as the anecdotal inputs of specialists, and is anticipated to be associated with global climatic shifts.

The framework presents four 'orders' or categories of interrelated direct and indirect impacts of climate change (see Figure 3 for the framework and Figure 4 for an example). The first order summarises the anticipated or modelled direct impacts that are anticipated for the general area. For example, increase in average temperatures and number of hot days. The second order explains the cascading physical impacts that may arise because of the first order basic climatic changes, e.g. water scarcity. Third order impacts are experienced as impacts to ecosystem health and functioning, including the consequences for human activities that rely on these ecosystem goods and services. Examples may include decreased agricultural yield. Lastly, the fourth order impacts relate to social and economic systems, e.g. local community decline in health because of reduced access to adequate nutrition and clean drinking water sources; this may further have an impact on productivity. Each of these orders are interrelated, and therefore are likely to have numerous interconnections and cascading systems impacts between the orders. This may also include consideration of adaptive practices or what may be described as 'positive' such as advances in technology, pharmaceuticals, farming practices, etc.

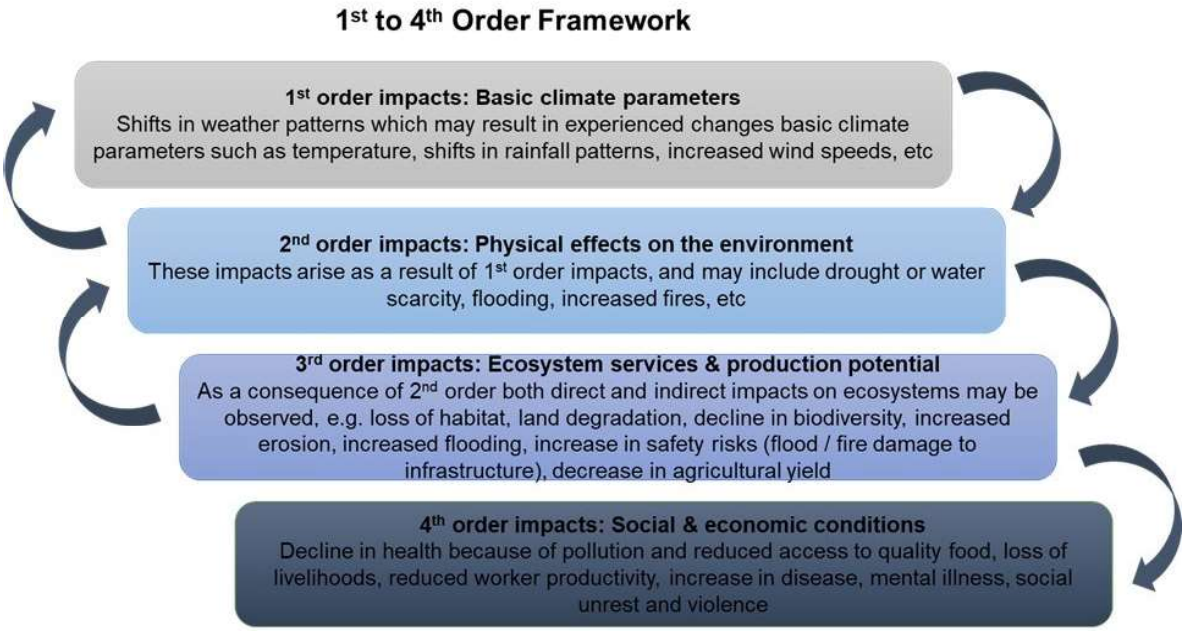


Figure 3: Description of the 1st to 4th order framework

As a conceptual framework, this tool provides a valuable means to deepen the understanding of climate change, vulnerability, risk and impacts to communities by making the connections between potential direct and indirect environmental pressures and the link to societal impacts. Some less obvious drivers include socio-economic and community-based factors, such as education, literacy, gender, poverty and

access to public health care (amongst others). A key component of this framework is that communities and socio-economic systems are viewed as central to broader ecological, geographical and biophysical systems. This framework is therefore useful for translating technical information in a means that informs our understanding of how impacts may be experienced on the ground. It therefore enables decision makers and stakeholders and raises awareness and understanding of particularly of the less tangible drivers of climate vulnerability. The foresight provided by identifying how we may indirectly and directly experience climate change influences how we prepare, thus enabling more appropriate decision making for infrastructure, adaptive management, disaster risk response and preparedness.

These insights are useful for the Karpowership SA projects because it provides an understand of the site and potential changes because of climate, for which Karpowership SA can ensure that it considers in design and disaster risk management – this may be for the Karpowership SA related infrastructure and operations, as well as the investments that are made in local communities.

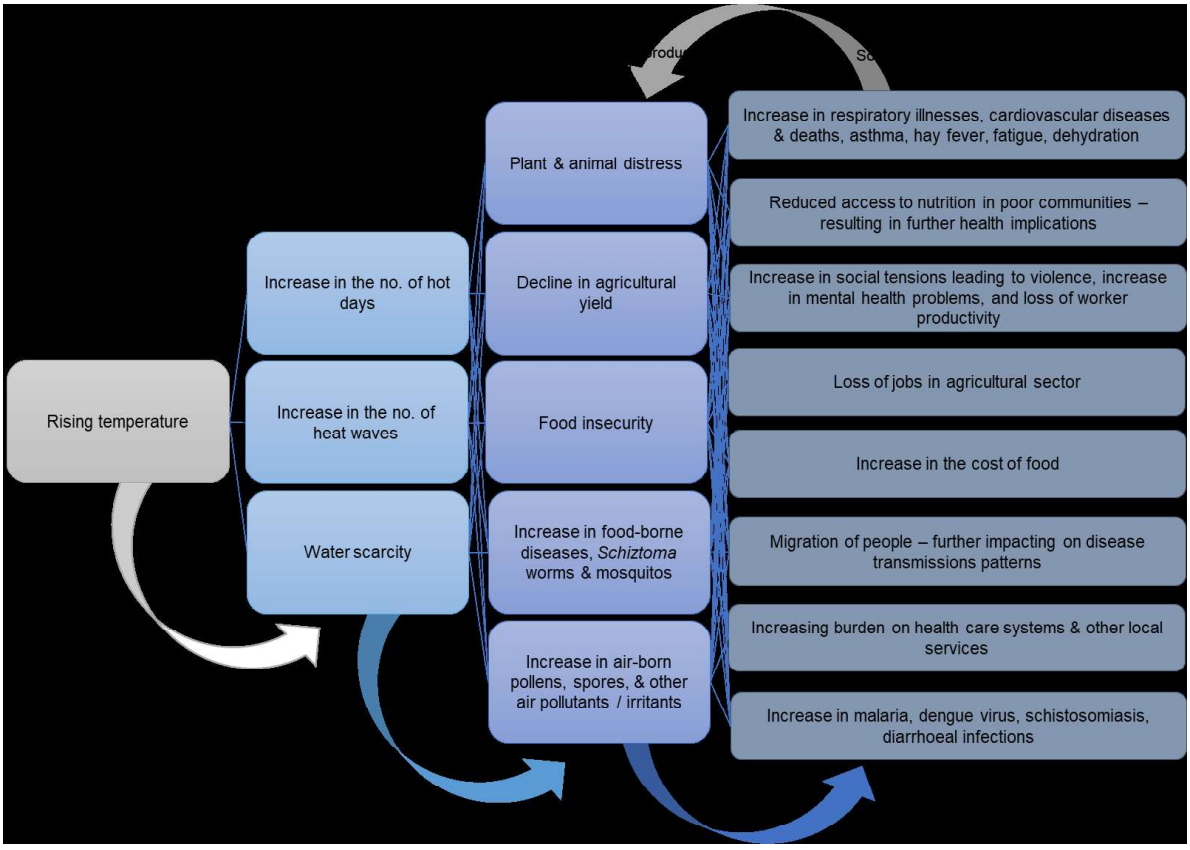


Figure 4: Example of cascading impacts of climate change on a region experiencing an increase in average temperature and an increase in the number of hot days

3.6. Assumptions and limitations

It is important to note that there are several assumptions and limitations that have influenced this study. These have been described below:

- This report relies on the findings of the specialist team. This includes not only the written findings in the specialist reports, but also discussions focused on building team understanding and integration of findings.

- Many specialist studies were undertaken, which needed to be completed under tight timeframes. This created a great deal of complexity in terms of team coordination and timing and placed constraints on the team's ability to integration findings based on a deep learning experience and co-creation of knowledge.
- In some instances, the data simply does not exist when it comes to cause-and-effect relationships. We have therefore strongly relied on the experience of the professional team, and transparently of their reports in terms of methodology applied, acknowledgment of the quality of data available and the confidence therein, as well as the professional opinion of these experts.
- Each method applied in this assessment has its own benefits and shortcomings. These have been described in the methodology section. It is however worth noting here that there is no 'one-size fits all' methodology or approach that can be applied. However, these tools were applied to provide different lens through which to understand the site and the proposed project. Collectively, with the specialist assessments and the EIA, it is intended that a holistic and polycentric view of the proposed project can be understood.

4. Site description and findings

4.1. Overview of the site and its complexities

4.1.1. Competing land uses

Numerous specialist studies and discussion papers[4] were developed by professionals in preparation of the EIA. This broadly covers a host of ecological specialist assessments focusing on terrestrial, aquatic and marine ecology, including consideration of underwater and terrestrial noise impacts and thermal plume modelling; contextualising the energy crisis and the impacts of loadshedding; understanding the role that gas-to-power projects have to play in response to the energy crisis; the socio-economic impacts related to the proposed project; an investigation of the visual impacts of the addition of the Powership in the active port; consideration of the local tourism industry and how this may be affected; and, understanding the major operational risks associated with the necessary operational processes of the Powerships; amongst others. This was done to assist with developing a robust understanding of the site, potential impacts of the proposed project, and adequately contextualise the need and desirability of the proposed project.

The diversity of the required specialist assessments and discussion papers reflects the complexity of the proposed project and competing land uses or interests associated with the port environment. Comparing the land cover map presented under the project description chapter in Figure 2 and the compound ecological sensitivity map illustrated in Figure 5 shown on page 24, a perspective of the competing land uses can be established. This is not a greenfields project - the project site is an active port which is also an Industrial Development Zone, in line with land use planning and zoning the project will be in an appropriate location for the proposed activities. This understanding of land use planning does not overlook the ecological importance of the site, and the impacts of the proposed project thereon. As highlighted by the specialist assessments, there are several ecologically sensitive habitats and species associated with the port and the immediate surrounds (terrestrial and dynamic coastal environment). This must be further contextualised by acknowledging that this project has arisen in response to the energy crisis and the RMI4P, as described earlier in this report. In summary, four overarching themes could be used to frame the competing interests and sensitivities associated with the site and the project:

[4] *Please refer to the EIA and the associated compendium of specialist studies for a comprehensive perspective of the supporting specialist reports, consultative engagements and public participation which was undertaken with the EIA.*

- ***Energy Crisis*** - The Karpowership SA proposed project has directly arisen from the tender put out by Department of Mineral Resources and Energy (DMRE) on 07 July 2020, under the Risk Mitigation Independent Power Procurement Programme (RMI4P), to procure electricity from new independent power producers to assist with alleviating loadshedding. Considering that the country has experienced 15 years of loadshedding for a variety of reasons[5], the RMI4P is a critical programme responsible for responding to the energy crisis. The technology provided by Karpowership SA, just one of the preferred bidders identified by DMRE, requires the Powerships to be berthed or moored in a port, with accompanying land-based infrastructure such as a pipeline and transmission line, etc.
- ***Active Port and Industrial Zone*** – the Port of Richards Bay was established in the 1970s, facilitating freight between the mining heartland of South Africa to the coast, via rail links. Today it is both an active port and industrial development zone. It handles more than 80 million tons of cargo annually – 55% of South Africa's seaborne cargo, making it the country's largest port in terms of volumes handled. The port includes the Richards Bay Coal Terminal, which is the largest coal export facility in Africa. It is a premier bulk port, handling other dry bulk in addition to coal, and liquid bulk, and breakbulk cargo. This includes timber and granite exports from the Eastern Cape and Northern Cape. It is therefore an important economic hub for the country.
- ***Environmental*** - The port and its surrounds are sensitive estuarine and terrestrial ecosystems with a host of terrestrial, aquatic and marine habitats and species to be considered. This includes critical biodiversity areas considered to be irreplaceable which are currently in a natural or near natural state. Richards Bay Game Reserve, located just 1km to the southwest of the site, is also considered an Important Bird Area. Enseleni Nature Reserve is 10km of the site. These areas include important vegetation types, Subtropical Alluvial Vegetation and Maputaland Coastal Belt, encompassing Swamp Forest and Mangrove Forests, upon which several protected species are reliant. The project site and its immediate surrounds also considered an important region for important bird species or species of conservation concern, based on the Birdlife South Africa Regional and Global Red List Categorisation, the IUCN Red List and the South African Red Data Book of Birds. This includes a range of habitats, primarily estuarine but also freshwater wetlands, marine, coastal and limited terrestrial environments. In direct vicinity of the proposed project this includes several habitats of great importance for bird species - the uMhlatuze estuary, Richards Bay estuary, sand spit, Kabeljou flats, Thulazihleka Plan, Lake Mzingazi, amongst others. See the Avifauna Report, Marine Ecology Report, Terrestrial Ecology report and Wetland report for a full perspective of the environmental sensitivities.
- ***Fisheries and mariculture*** – there are plans to establish aquaculture in the area, based on successful experimental studies previously undertaken. This is an important economic activity which will contribute significantly to job creation. Fortunately, low impacts are anticipated, if any, that will negatively impact of this economic activity. In addition, there are both commercial fisheries in the area, and small-scale fishers who fish along the coastline. The fish populations are already overexploited and may be further impacted by the negative impacts that juvenile fish may experience because of the Powership. Because of the importance of the port as a sheltered environment and nursery for juvenile fish, this impact is anticipated to be of medium negative significance (see the Marine Ecology Assessment and Socio-economic Supplementary report for further detail).

These are challenging competing land uses to manage given the importance of each consideration at the local scale and for the country. Furthermore, within these overarching themes are a host of interrelated and complex relationships, which cannot be considered in isolation. There are also cross-cutting issues related to the history of South Africa, cultural heritage, sustainable livelihoods, local community dynamics, economic conditions and poverty (see Figure 7 and Figure 8 for education levels

[5] *Please refer to the discussion paper on 'The economic impact of rolling blackouts in South Africa' (Steenkamp & Weaver, 2022a) for further details.*

and household income brackets as a proxy) and climate change impacts that influence our understanding of the proposed project, and what might be appropriate responses to anticipated impacts. Consequently, a plethora of potential impacts have been investigated to understand socio-economic impacts, impacts associated with terrestrial and underwater noise, water temperature changes, air quality issues, greenhouse gas emissions and climate change impacts, amongst many other areas of concern at both the construction and operational phase of the project (please see the EIA and supporting specialist studies). Furthermore, a polycentric approach was applied to further consider the interconnectivity of these relationships, and further anticipated direct and indirect impacts of the proposed project. To assist with understanding these dynamics, the next chapter presents additional tools as lenses through which the project can be understood, and the potential shifts to the system (positive and negative).

4.1.2. Biodiversity offsets

As mentioned in the introduction chapter, following the application of the Mitigation Hierarchy, it became apparent that biodiversity offsets are necessary to compensate for the residual negative impacts associated with the biodiversity and ecosystem functioning of the Richards Bay Port and estuary. Through various engagements with specialists and EKZNW, the best type of offsets where determined – refer to the EIA report for a description of the process followed, desired outcomes and consideration of alternatives. The following offsets were agreed to be the preferred options:

- **Like-for-Like (In-Kind): uMhlathuze Estuary or equivalent –** suitable estuary rehabilitation and management will continue to be researched, and it will be implemented through agreement with EKZN and consultation with relevant stakeholders, during the operational phase of the project.
- **Out-of-Kind: Madaka Game Ranch with management** - Karpowership SA will support EKZNW with the purchase and management of the Madaka Game Reserve. This will increase biodiversity targets (elephants, black and white rhino populations) and contribute to national strategic conservation programmes.From a priority species perspective, securing this property and incorporating it into Ithala Game Reserve (dropping existing fence) will contribute towards (1) elephant range expansion (a national priority) and reducing the need for culling in the short term; (2) it will expand the range of an existing black rhino population, thereby allowing the Ithala black rhino population to grow from an ecological carrying capacity of 43 to 48 (growing the national population by at least 5 animals). This will bring Ithala close to a Key 2 rhino population and improve genetic viability, while contributing to national black rhino range expansion and population targets; (3) will increase the habitat and carrying capacity of white rhino by a minimum of 10 animals, at a time when the provincial white rhino population is declining due to poaching pressure; (4) protection of an important population of Barberton Mountain Sugarbush (Protea comptonii) (Vulnerable); and (5) catchment of the endangered Southern Barred Minnow, and protecting an important water supply for Ithala Game Reserve and nationally important catchment. The property would add important altitudinal diversity thereby contributing climate change resilience for Ithala Game Reserve. A larger protected area would be more resilient to climate change impacts. The property falls within a provincial macro-ecological and climate change mitigation corridor. Securing the property will also avoid the opportunity cost of the property changing from the current compatible land use to settlement or crop or livestock agriculture, which would be an immediate and long-term threat to an existing important protected area. The Madaka offset is thus located in a recognised offset receiving area, with high level of success in the long term, given the proposed incorporation of the site into the existing Ithala protected area, and the management thereof by EKZNW in accordance with the management plan.

These biodiversity offsets will act as Importantly, the Out-of-Kind biodiversity offset will commence prior to the project implementation, allowing for mitigation of negative biodiversity impacts before construction commences. The In-Kind Biodiversity Offset will commence during the operational phase,

once agreement is reached with EKZNW. Both Offsets will continue through each year of the project. Thus, providing significant valuable long-term investment in the socio-ecological and economic systems in the area.

In particular, the following desired ecological outcomes have been identified:

1. That biodiversity is secured in the long term through the protection and appropriate management of ecosystems, species, habitats and ecosystem pattern and processes.
2. That efforts to secure biodiversity in the long term contribute to the expansion of South Africa's protected area network, and are focused in areas identified as biodiversity priorities, with particular emphasis on the consolidation of priority areas and securing effective ecological links between priority areas.
3. That ecological infrastructure and the services and benefits it provides are maintained and where necessary restored and/or improved.
4. That the cumulative impact of the authorised activity, or activities, and land and resource use change does not –
    - Result in the loss of irreplaceable biodiversity or jeopardise the ability to meet biodiversity targets;
    - Lead to any ecosystem with a threat status of Vulnerable or Least Concern becoming Endangered, or any Endangered ecosystem becoming Critically Endangered;
    - Cause an irreversible decline in the conservation status of species and the presence of special habitats; and
    - Cause a significant loss in ecosystem services.

Please refer to the EIA report for further detail on these offsets, their selection and implementation.

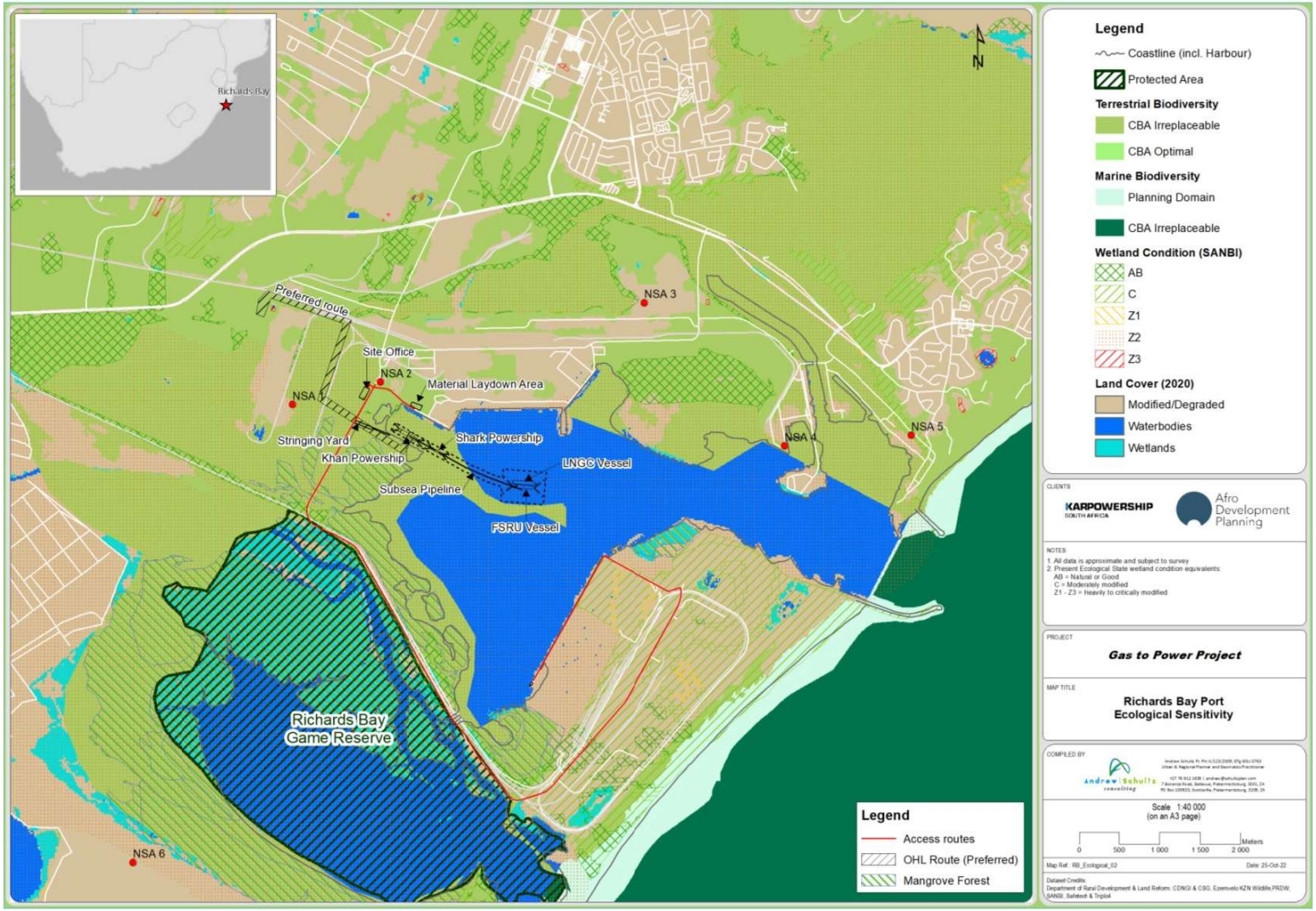


Figure 5: Compound map illustrating the ecological sensitivities of the project site

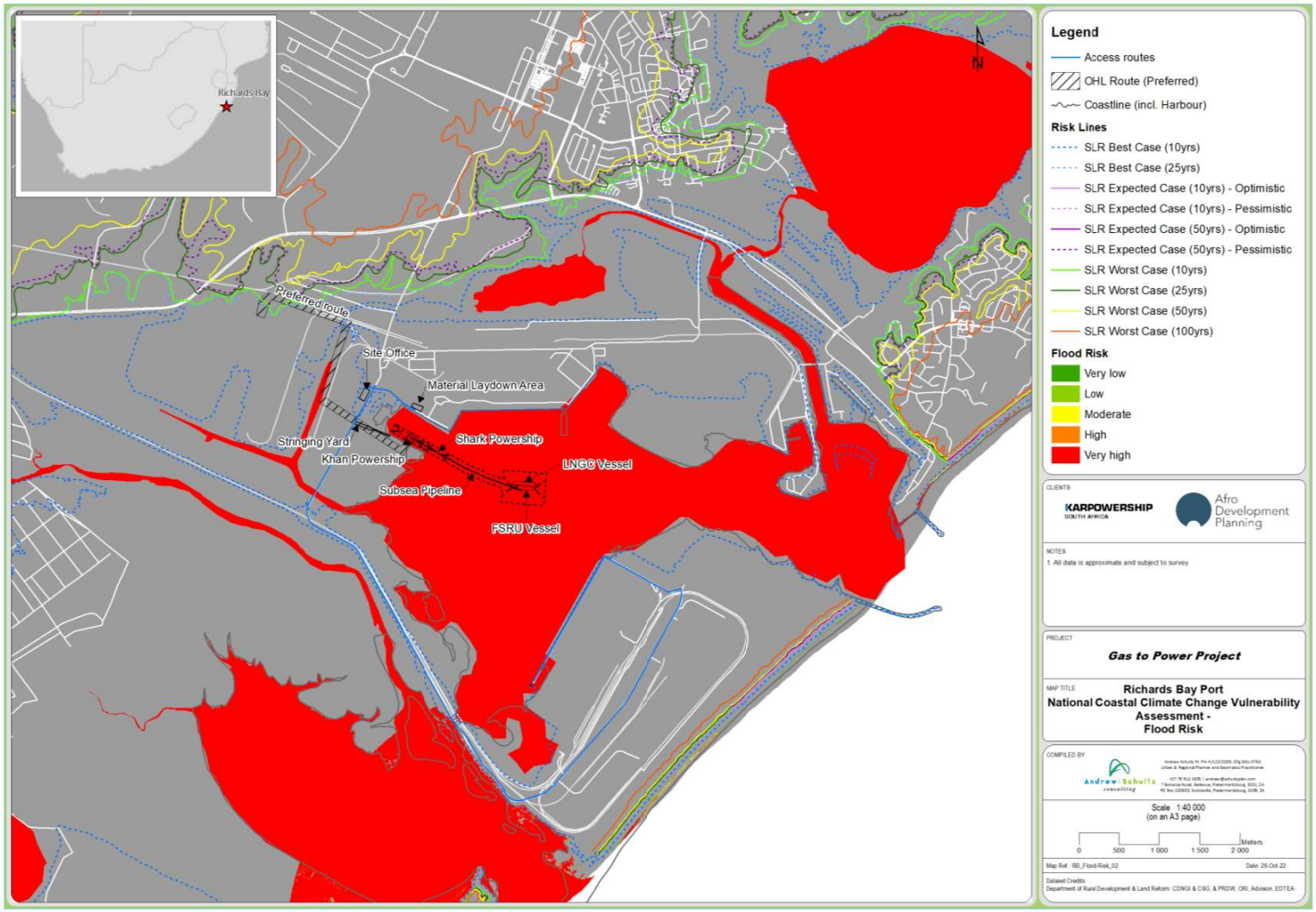


Figure 6: Modelled flood risk areas for the next 30 years and modelled risk associated with Sea-level Rise anticipated over the next 20, 50 and 100 years

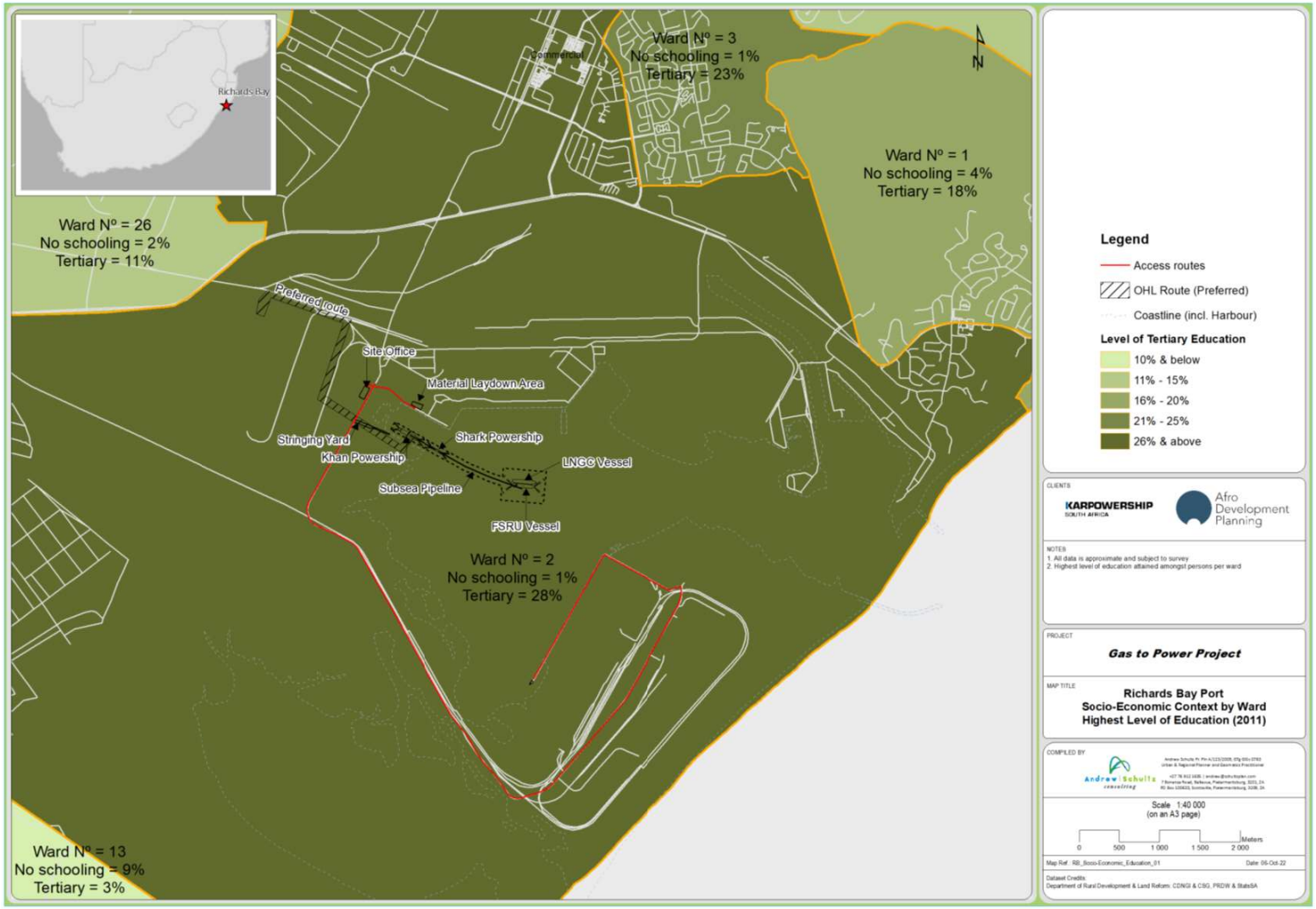


Figure 7: Education levels of the surrounding community

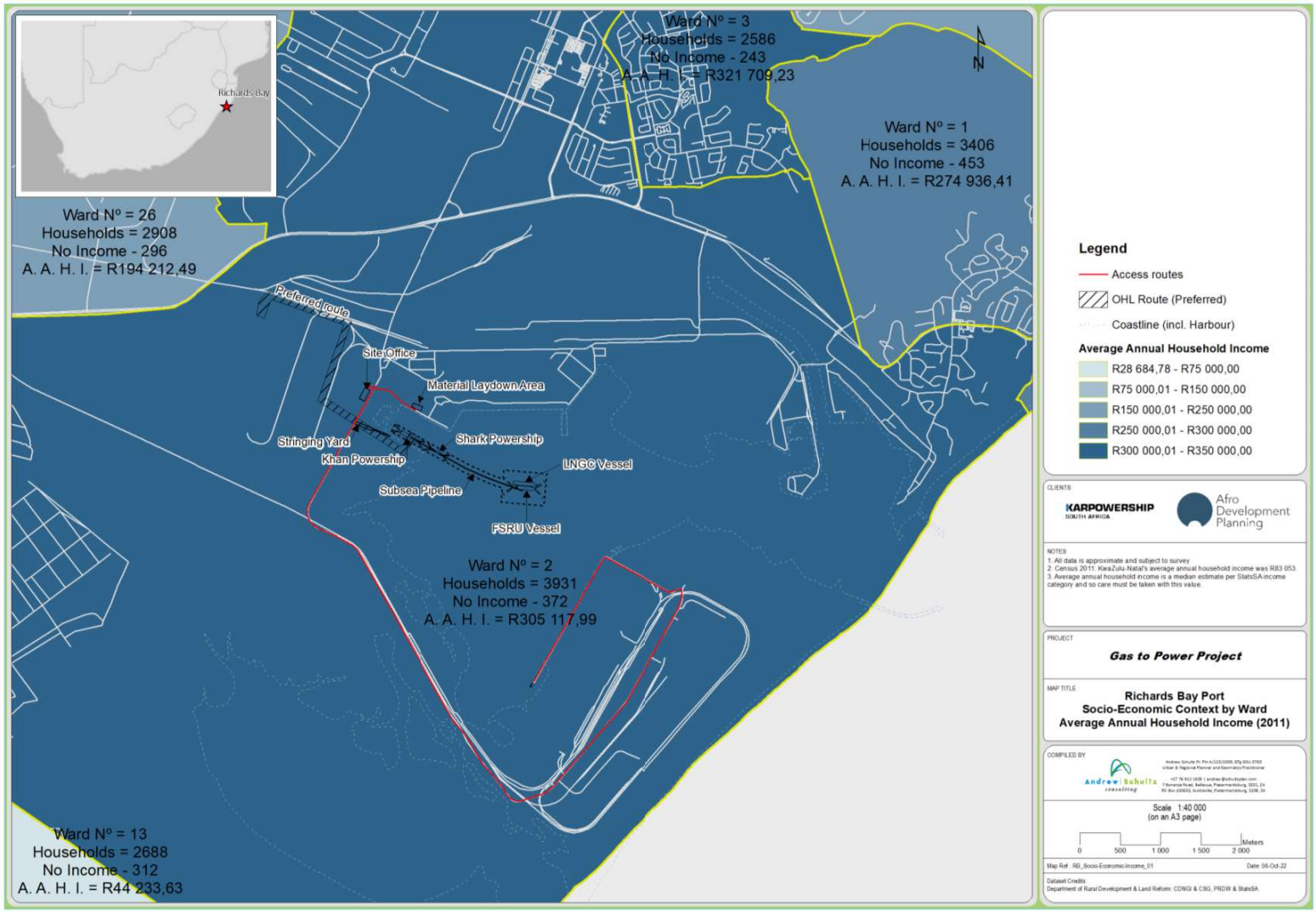


Figure 8: Household income brackets of surrounding communities

4.2. Potential shifts in socio-ecological system

Two matrices are provided in Appendix A which assist with synthesising the findings of the specialist assessments, providing an integrated perspective of these relationships and the cumulative impacts (negative and positive) of the proposed project at the Port of Richards Bay. As described earlier in this report, the integration matrix presents the list of specialist studies across both axes. This matrix facilitates a transdisciplinary understanding across all specialist studies. The strategic issues matrix provides a synthesis of the key findings from each specialist assessment undertaken for the relevant site, into one comprehensive table. This includes, where relevant, limits of acceptable change or ecological thresholds, mitigation or management recommendations and a final overall environmental significance risk rating. Collectively, these two matrices provide an overarching perspective of the key findings of the specialist assessments, and the interrelated nature thereof.

Furthermore, the systems map for the proposed project at the Port of Richards Bay illustrates key shifts in the socio-ecological ecosystem, because of the operation of the Powership operating in the port (see Figure 9). This understanding is based on fundamentals derived from definitions and methodologies developed under Complexity Science and Systems Thinking, which views the site and the proposed changes via the Karpowership SA project as a complex adaptive system. The systems map attempts to illustrate cause-and-effect relationships, and to understand complex systems and their interactions. The systems map provided in Figure 9 is intended to provide a simplified conceptual understanding of how the site may change because of the proposed project. This understanding allows for enhanced perspective of the proposed project through the compound lens of the specialist assessment findings regarding how the site may be impacted. This perspective is further used for improved impact mitigation / management recommendations, with a focus on strengthening of adaptive management related recommendations at construction and operation phase.

Key findings from the matrices regarding identified impacts, and the systems map regarding anticipated system shifts, include:

- The key contribution that the proposed project will provide, is to reduce the burden of loadshedding on the country. There are several consequences of this, including opportunities for economic recovery and transition to the energy mix as proposed in the IRP 2019. Please see the Economic Impacts of Loadshedding discussion paper and the Socio-Economic Impact Assessment Supplementary report for further details.
- There is opportunity for the small-scale fishers and the rest of the community to benefit from corporate social investments, skills development, and supplier and enterprise development because of Karpowership SA's local content commitments (medium-low impact). In addition, there will be jobs created associated with the construction and operational phases of the project (low impact). Please see the Socio-Economic Impact Assessment Supplementary report and the Enterprise and Supplier Development report for further details.
- There is industrial and value chain development potential for the gas industry through increased economies of agglomeration. Please see the Economic Impacts of Loadshedding discussion paper and the Socio-Economic Impact Assessment Supplementary report for further details.
- There are several important habitats near the proposed project site that fall within the estuarine, marine, aquatic and to a limited extent terrestrial environments. While it is acknowledged that the site is an active port and industrial zone, the cumulative impacts of port activities and the impacts of the powership operations is anticipated to negatively impact of medium significance on estuarine and marine ecology, including important bird species. Consequently, this will affect fish populations that fishers (commercial and small-scale) depend on, and which are already under strain from over-fishing.
- *The wetland will be rehabilitated, resulting in a net overall improvement from 187.7 hectares of wetlands (current state) to 206.6 hectare equivalent (after rehabilitation). This will improve the functional area of wetlands by 18.9 hectares.*

- *Biodiversity Offsets (In-Kind and Out-of-Kind) will provide further critical opportunity for enhancement of ecological functioning and biodiversity.*
- Construction and maintenance of the gas pipeline, transmission line and switching stations is anticipated to result in a loss of important fauna and flora. Mitigation recommendations and rehabilitation have been proposed to limit the overall environmental significance.
- The terrestrial noise caused by the Powership during electricity generation, should not extend into residential areas and therefore is not anticipated to affect local communities. Limited impacts on fauna and flora are expected.
- Tourism is not anticipated to be negatively affected by the presence of the Powership, and associated infrastructure. This is largely because the Powership will be located in the port and will blend in with other ships and port infrastructure. The tourism sector may further benefit from peaked interest in the Powerships, yielding 'energy tourism'. This may further stimulate maritime recreational themed economic opportunities.
- Tropical cyclones are typically high impact low probability hazards and are generally quite difficult to manage due to their unpredictable nature. This has been considered in the design of the project and impacts are anticipated to be low and not to affect core operations. However, these storms can have detrimental impacts as an environmental disaster that will impact surrounding communities and ecosystems.
- Operation of the Powerships will contribute only marginally to the global GHG stock. Operation of the Powership cannot directly be tied to the experience of climate change impacts at this site, as this is a dynamic function of the global climate system and GHG stock.
- Major hazards were identified around fire risks associated with gas leaks - which was also found to be normal, and operation can continue with appropriate mitigation and emergency responses. This could also provide opportunity for skills development in the area relating to monitoring and evaluation as well as emergency risk response.
- It is not anticipated that ambient SO_2 and NO_2 particulate concentrations will exceed NAAQS, and therefore is not anticipated to impact on the local community.
- Underwater archaeology will not be affected if underwater archaeology mitigation measures are followed in the case of an archaeological find. It is however, not anticipated that there will be a find. However, an archaeologist should be on site during the construction phase.
- Riparian zones provide a range of ecological goods and services to communities, fortunately no impact is anticipated on any watercourse because of the Powership.
- No heritage and palaeontology impacts are anticipated.
- No significant findings were noted regarding impacts to geohydrology and hydropedology.
- There is potential for the Karpowership SA project to contribute positively to natural habitats through creation of habitats and rehabilitation, although marginal. This could include removal and management of alien invasive plant species; and mooring structures may provide hard structures for benthic communities to colonise. There is also further potential that may be identified through corporate social investment programmes.

Please see the matrices in Appendix A for greater detail. Only key discussion points have been listed here. Please also refer to the relevant specialist assessment reports.

Note: the systems map as shown on the next page has been updated.

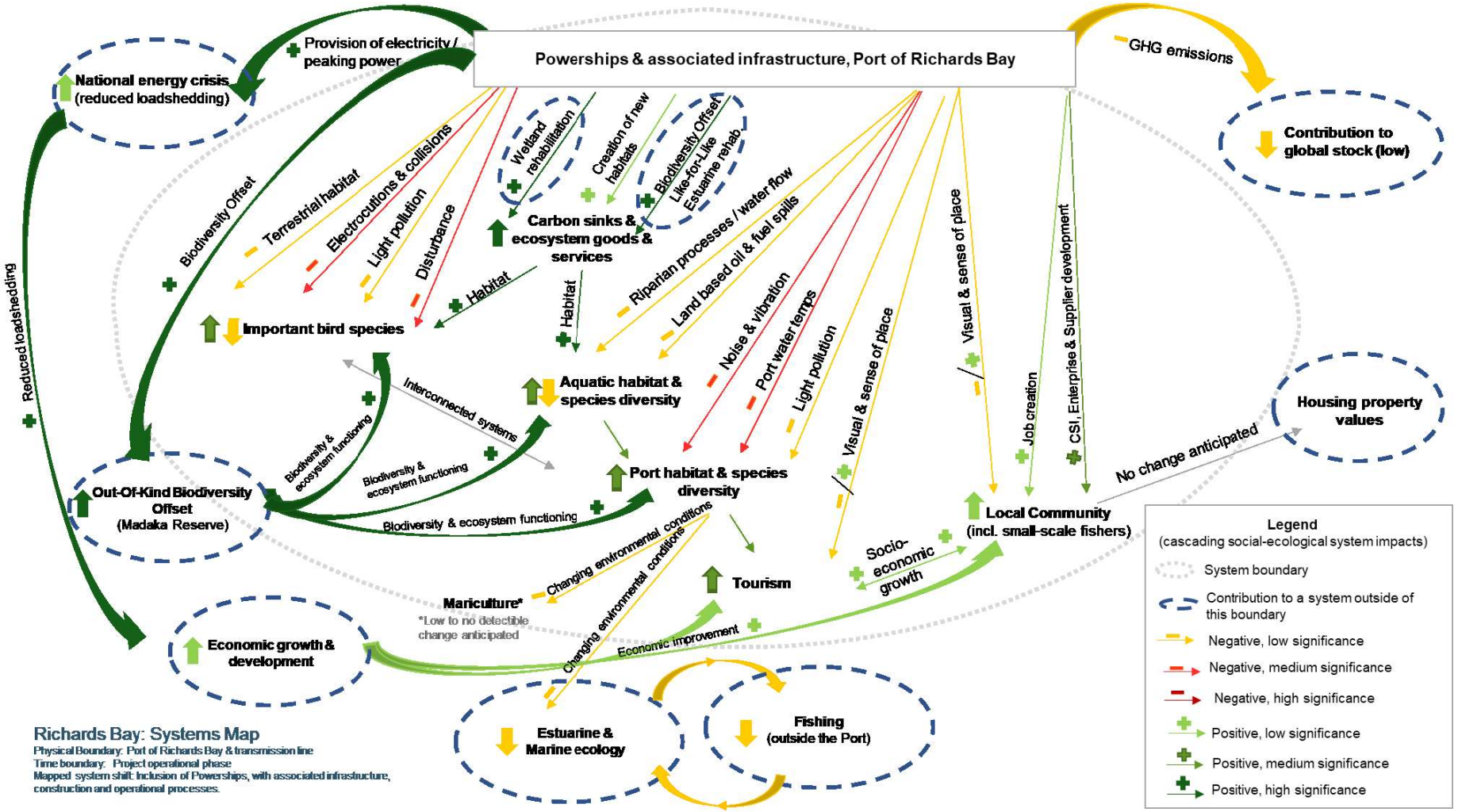


Figure 9: Anticipated shifts to the socio-ecology system because of the Powerships and associated infrastructure in Richards Bay

4.3. Cascading impacts of climate change

The Climate Impact Assessment report prepared by Promethium Carbon (2022) illustrate how the project will emit 1.5 million tCO_2e/year during the operational phase and 31 million tCO_2e over its lifetime. This will contribute to the global stock of greenhouse gas emissions, although the contribution is understood to be low. It is, however, worth noting that operational emissions of the Powership for 5 years will result in less emissions than running a coal fired plant for a year. This highlights the role of LNG as a transition fuel, that will enable the move from heavily polluting coal plants to a full renewable future (Promethium Carbon, 2022; Steenkamp & Weaver, 2022).

The Promethium Carbon report (2022) concludes that this project will assist in alleviating the socio-economic pressures caused by South Africa's electricity supply crisis, and the benefit associated with this outweighs the contribution of the project to global GHG emissions. The assessment of the climate change impact of this project has been done on the impact of the project on climate change, the resilience of the project to climate change, as well as the options for mitigation of the impacts. The Climate Impact Assessment should be referred to for further detail. However, this chapter provides a supplementary discussion to this assessment, providing a lens through which direct and indirect cascading impacts of climate change can be understood at the project site.

A direct causal relationship between the proposed project and climate change impacts that will be experienced in the Port of Richards Bay cannot be established. This is because of the transboundary nature of greenhouse gases, and the fact that climatic systems are global systems. Therefore, it is the global stock driving the climatic changes that are being experienced in a range of ways across the world. However, this chapter illustrates how we may understand these cascading impacts at the site scale to further interrogate the climate readiness of the proposed project, and better inform management and mitigation recommendations.

Key aspects that the Climate Change Impact Assessment report highlights for this chapter include anticipated climate shifts that are expected to be experienced in Richards Bay over the next 30 years, based on climate change modelling (Promethium Carbon, 2022):

- Mean annual temperature is expected to increase by at least 0.5° C over the next 30 years whilst very hot days is likely to increase by up to 18 days per year.
- Despite mean annual precipitation increasing in small amounts, there does not appear to be an increase in extreme rainfall days. Although, this is not to suggest that rainfall amounts during storms will not increase, increasing the potential for flooding.
- By 2050, drought and coastal flooding risks are classified as extreme relative to the current/near-historic baseline, whilst the fire risk are classified as medium.
- With regards to storm surges and wave height, Richards Bay is vulnerable to tropical storms and cyclones, with data showing increasing intensity and westward movement of these low-pressure systems. In combination with sea level rise, the risk of storm surges and intense wave action increases (see Figure 6). These risks are difficult to quantify and require further research to elaborate on the risks to region, or the site. However, this has been considered in the project design and impacts are anticipated to be low and will not affect core operations. Although, this may still affect the surrounding environment and local communities.
- Ocean pH levels have consistently declined since at least the middle of the 20th century and will continue to do so. This will not have a material impact on the project but could impact marine biota. The impacts thereof should be informed by the relevant specialist(s).
- There is little information on changes in wind in under future climate scenarios. Research suggests generally stronger winds by small percentages over current speeds. Any increases in wind speeds will, however, amplify the impacts during storm events due to the interaction with waves and ocean currents.

- Sea level has increased by ±4.2 cm since the late 1970s and is likely to rise by 10-40 cm by the middle of the 21st century. Again, this is not likely to have a material impact on the project but could act to amplify storm surges during storm events (see Figure 6).
- Mean sea surface temperature has increased by ±0.89˚C since 1900 and is currently around 24.3˚C. This could increase to up to 25˚C by 2030 and 25.3˚C by 2050. The warming of temperatures in the Richard's Bay region and further north into the Mozambique Channel may result in more favourable conditions necessary for the formation of tropical cyclones.

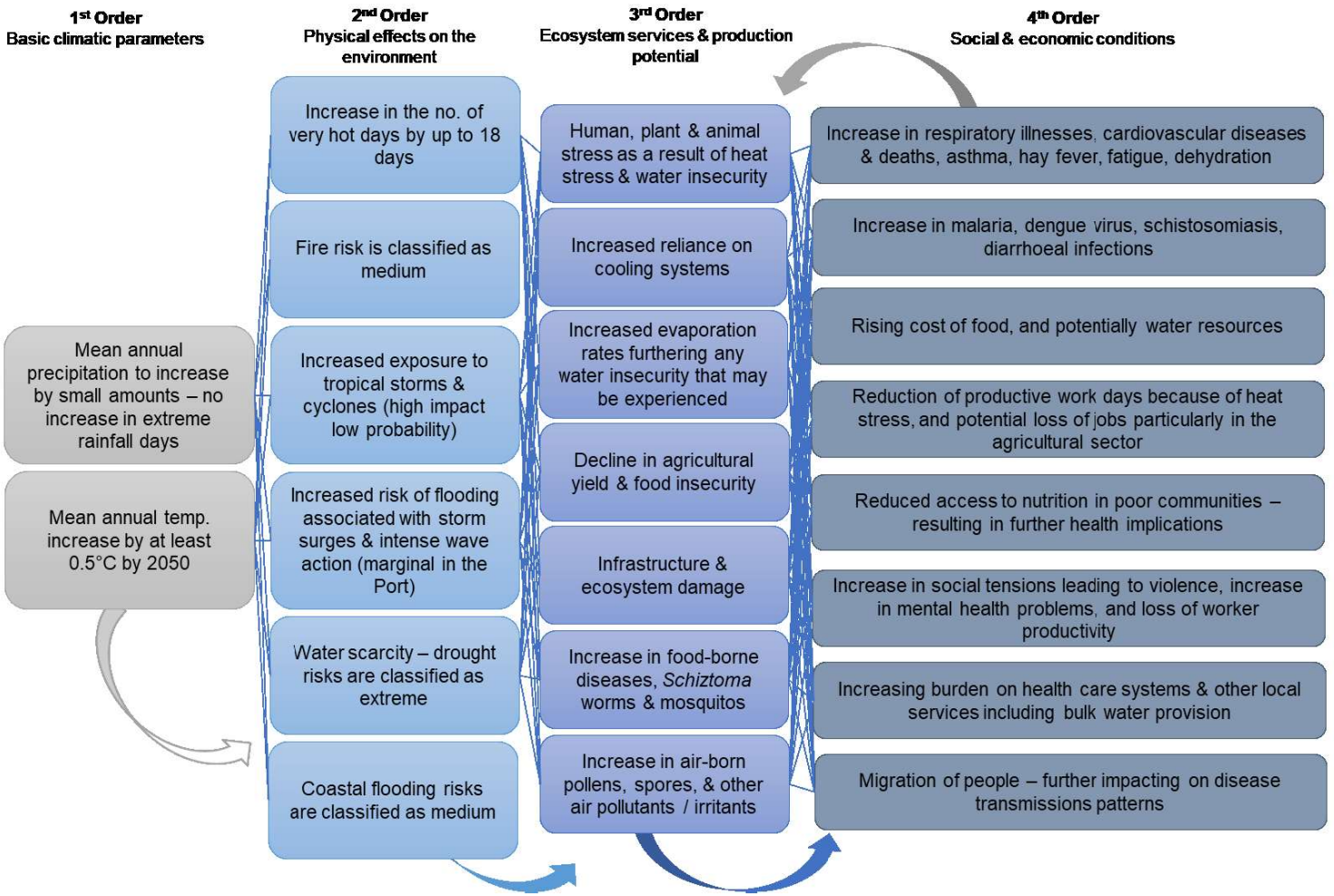
Based on the above-mentioned points, a 1st to 4th Order Framework was prepared for the Port of Richards Bay. As described in the methodology chapter this approach is based on work done by the World Bank and tries to categorise impacts in 4 groups: 1. Basic climatic parameters; 2. Physical effects on the environment; 3. Ecosystem services and production potential; 4. Social and economic conditions. Increase in mean annual precipitation and mean annual temperature were taken as the two most prominent changes that will be experienced as basic climatic parameters over the next 30 years. This influenced the understanding of the remaining orders, as shown in Figure 10.

Water scarcity and drought are anticipated to be an extreme risk because of reduced rainfall, and the increased number of very hot days by as much as 18 days. This is a risk to the municipality, local industry and local residents that will need to be managed with foresight and careful planning. This challenge is not unfamiliar to South Africa, with several towns and cities experiencing drought and day-zero scenarios over the past few years. These experiences, and responses thereto, can be drawn on in strategic planning for baseline conditions and emergency responses.

Increasing water scarcity and increasing temperatures increases the risk of fires, which is anticipated to be a medium risk in the region over the next 30 years. This risk has likely been compounded by the drought conditions and increased number of very hot days. Similar to the flooding response, this should be carefully considered in terms of disaster risk management and emergency responses. This may include early warning systems, and community preparedness programmes.

The Promethium Carbon (2022) report further found that there is potential for increased exposure to tropical storms and cyclones, with a high impact and low probability of occurrence. This risk may be further exacerbated if coupled with the increased risk of storm surges and intense wave action. This will also increase the likelihood of localised flooding events – this is anticipated to be marginal in the port because it is a relatively sheltered environment. While the proposed project has considered this in the design and operations, and therefore the impact is low and will not affect core operations, it is not clear to what extent the surrounding environment and community may be affected. This should be carefully considered in terms of disaster risk management and emergency responses. This may include early warning systems, and community preparedness programmes, which could be aligned with corporate social investment of the Karpowership project.

Cascading effects on ecosystem services and production potential will likely be experienced as heat and water security related stresses; enhanced evaporation rates, furthering the water security challenges; infrastructure and ecosystem damage, declining agricultural yield and consequently food insecurity; increase in food-borne diseases, worms and mosquitoes; increased air-born pollens, spores and other irritants; and increased reliance on cooling systems, furthering greenhouse gas emissions. This in turn could yield an increase in respiratory illnesses, cardiovascular diseases and deaths, increased malaria, dengue virus, schistosomiasis, and diarrhoeal infections; rising cost of food, water shortages and potentially a 'day-zero' scenario; reduced productive work days and job losses; reduced access to nutrition, particularly in the lower income households, resulting in further health implications; Overall, there is likely to be an increased burden on the various healthcare services, basic services and infrastructure; with increased social tensions leading to increased violence, mental health problems, and further loss of worker productivity. Through foresight in planning and service delivery this could be well managed. There is also potential for Karpowership SA to identify related specific community needs which they can invest in through its CSI projects.



Richards Bay (port & immediate surrounds): cascading impacts of climate change

- How do we anticipate to experience climate change at the Port over the next 30 years?
- How do we consider this environmental risk in the proposed project?
- How does the presence of the proposed project change this?

Figure 10: Anticipated cascading direct and indirect impacts of climate change

4.4. Cumulative impacts in the site area

The cumulative impacts of the proposed project have been considered in this report, taking into consideration the multidisciplinary specialist studies that have been undertaken. It is also important to note the cumulative impacts of the existing developments and new projects in the study area (see Table 5). Many of the environmental specialist assessments considered these cumulative impacts when undertaking the impact assessments, and therefore they have already been accounted for. However, it is also worth noting that given that the project site is the active port, which is also an industrial zone, in line with land use planning and zoning the project will be located in an appropriate site for the proposed activities. This is not to overlook the ecological importance of the site, and the impacts of the proposed project thereon. However, it must be noted that this is not a greenfields project, and that many of the impacts that will be associated with the project, such as light pollution, air pollution, underwater and terrestrial noise, and visual impacts should be carefully considered, as these will provide little cumulative impact to the existing industrial activities and port infrastructure.

Given the ecological importance of the site, numerous mitigation and management recommendations have been provided by the specialists for both construction and operational phases. These recommendations should be carefully considered and implemented. In addition, research and monitoring programmes will go a long way to informing improved port management, given the significant economic importance that the port holds for the country, and the future plans for expansion.

Table 5: Similar projects in Richards Bay

Name and description	***Applicant***	***Status in May 2023 (to Triplo4 knowledge)***
320 MW Emergency Risk Mitigation Power Plant (RMPP) and associated infrastructure near Richards Bay. *The Project site is to be located in Alton, near the Richards Bay Industrial Development Zone (IDZ). The facility will have an installed generating capacity of 320 MW, to operate with liquified petroleum gas (LPG) or naphtha as an initial source and will convert to utilising natural gas once this is available in Richards Bay.*	*Phinda Power Producers (Pty) Ltd*	*Environmental Authorisation was granted in July 2021, but the decision was challenged by NGO's by an appeal. The appeal was dismissed by Minister in November 2021. The NGO's have taken the matter on review to the Pretoria High Court.*
RBGP2 400 MW gas to power project at the RBIDZ 1F (proposed amendments to the existing Environmental Authorisation and EMPr). *The scope includes 6 gas turbines for mid-merit/peaking plant power provision, with 2 steam turbines utilizing the heat from the engineers in a separate steam cycle, as well as 3 fuel tanks of 2000m³ each for on-site fuel storage.*	*Richards Bay Gas Power 2 (Pty) Ltd*	*Environmental Authorisation was issued in 2016. Amendment was applied for in 2020, and in May 2022 a review application was launched in the Pretoria High Court challenging the reissued authorization.*

Name and description	Applicant	Status in May 2023 (to Triplo4 knowledge)
RBGP3 2000 MW gas to power project at the RBIDZ 1F, RBIDZ *The scope of the projects includes up to four Combined Cycle Gas Turbine (CCGT) power plants and associated infrastructure for the generation of electricity using natural gas of a combination of natural gas and hydrogen, and up to four Heat Recovery Steam Generators to generate additional electricity from the capture of heat from the turbine exhausts.*	*Phakwe Richards Bay Gas Power 3 (Pty) Ltd (PRBGP3)*	*Draft EIAR issued for comments on 4 Jun 2022 – 22 July 2022. EA was issued on 6 Dec 2022. An appeal was lodged in Jan 2023.*
Nseleni Independent Floating Power Plant (NIFPP) - Port/ old Bayside complex. *Floating gas powered power station made up of floating Combined Cycle Gas Turbine (CCGT) power plants and associated infrastructure for the evacuation of power from the NIFPP to the National Grid, in the Port of Richards Bay. Four Floating Power Barges generating a nominal 700 MW per barge resulting in 2800 MW generation capacity.*	*Nseleni Power Corporation (Pty) Ltd and Anchor Energy (Pty) Ltd*	*The proposed Nseleni Independent Floating Gas Power Plant in Richards Bay was refused of two of its licence applications by different regulatory authorities. Nseleni's application for an Environmental Authorisation (EA) was refused by the DFFE on 19 November 2021, and the project's application for a water use license was refused by the DWS on 25 November 2021. Nseleni have apparently appealed the refusals.*
Eskom 3000 MW CCPP and associated infrastructure on Portion 2 of Erf 11376 and Portion 4 of Erf 11376 within the RBIDZ Zone 1D. *The facility will operate with natural gas as the main fuel resource and diesel as a back-up resource.*	*Eskom Holdings SoC Limited*	*Environmental Authorisation was issued in December 2019, and in August 2022 a review application was launched in the Pretoria High Court challenging the authorization. Judgment was handed down by the Court on 6 October 2022. The Court dismissed the application brought by the NGO's and confirmed that the project's Environmental Authorisation is valid.* *Leave to appeal was declined on 18 January 2023.* *NERSA declined to concur with the determination of the Minister. NERSA has since changed its mind and brought an application to the North Gauteng High Court to review its own decision, which was heard on 25 April 2023.*

5. Concluding remarks

5.1. Need and desirability

It is important to understand that the Karpowership project has arisen in response to the need to address the current energy crisis experienced in South Africa. It is in response to a bid issued by DMRE as part of the RMI4P (as discussed earlier in this report). The energy generated through the Karpowership project will contribute towards alleviating the loadshedding burden by providing much needed electricity, as-and-when required. This is an important response to the energy crisis, and in line with the mandate of the state to provide services for the benefit of all of society.

In addition, the project will result in positive multiplier impacts on the local economy during both the construction and operational phases. Karpowership will play a positive role in the local economy through skills-, enterprise- and supplier development programmes. The direct, indirect, and induced economic impacts of the project on employment, income generation, new production and economic value will be positive. This will include skills development and capacity development towards the realisation of a just transition in South Africa. It is therefore anticipated that the Karpowership project will result in an overall positive socio-economic impact when considering the host of economic and environmental impacts.

It is worth reiterating that the Karpowership project is in an active port, and the Coega Special Economic Zone, which is considered a key growth node. In addition, several gas-to-power projects are currently earmarked for implementation in this special economic zone.

However, a responsible and sustainable approach to the proposed project is still required, in line with the requirements of NEMA and the strategic environmental management acts. Duty of care must be observed. Therefore, numerous multidisciplinary specialist impact assessments that have been undertaken as part of the EIA process, integration of specialist findings, and the application of a polycentric view to the impact assessment in the EIA. Negative and positive impacts have been identified, and as far as possible all negative impacts have been mitigated to reduce the impact, and further management recommendations provided for. There is further opportunity for scientific research and monitoring programmes to inform adaptive management to the life cycle of this project, and for similar port-based projects.

5.2. Fatal flaws

No fatal flaws have been identified by the specialist assessments, and therefore no fatal flaws are noted here.

5.3. Recommendations

The Karpowership SA is an important response under the RMI4P to the country's ongoing energy crisis and will provide much needed relief to industry and households alike. There are also numerous socio-economic benefits that will be realised at a site scale because of the local content requirements DMRE bid process, as described earlier in this report. There are further opportunities for enhanced scientific research and ecological monitoring of the port and the impacts of the operations of the Powership on the environment, which will enhance our understanding and management abilities relating to port dynamics and the associated estuarine ecology.

The addition of In Kind and Out of Kind Biodiversity Offsets to this project has provided further positive benefits by enhancing the ecological functioning of local wetlands and increased biodiversity in the general facility, with further positive knock-on effects such as enhanced ecological goods and services (including increased climate resilience and eco-tourism benefits), and opportunities for further research and job creation across a range of sectors.

Acknowledging the identified impacts, and the strong socio-ecological relationships associated with this site, the following recommendations relate to opportunities that can be taken forward by Karpowership SA as part of their corporate social investments, which align with issues identified in this report, to maximise their positive contribution to local communities and lessen the identified negative impacts on the environment. It is hoped that through these recommendations the legacy of Karpowership SA will *create* a socio-ecologically resilient, and economically thriving community.

Table 6: Recommendations for furthering investment in local communities

	Description	Opportunities for skills & capacity development, and job creation	Alignment with other programmes
Blue Ocean Economy	Rehabilitation of sensitive terrestrial, estuarine, freshwater aquatic and dynamic coastal environments. Areas identified of concern include Kabeljous Flats, namely the intertidal and subtidal sand and mudflats, the sandspit, and mangrove forests and marshlands. Benefits include: • These habitats act as carbon sinks, thus assisting with offsetting GHG emissions. • They also provide natural habitat, thus strengthening biodiversity targets, sense of place, recreation and eco-tourism. • Healthy functioning ecosystems provide a host of ecological goods and services, e.g. flood retention zones and buffers to storm surges, thus protecting communities and infrastructure, food and shelter resources, etc.	• Unskilled and low skills labour required for alien invasive plant removal, and planting • Plant nurseries may be required • Education centre • Monitoring and evaluation programme • There are further opportunities for research and scientific programmes associated with pilot studies and/or living labs, monitoring and evaluation, student thesis.	Align with EPWP, university research programmes, school education programmes, local protected area management programmes, Provincial Oceans and Coasts departments, Operation Phakisa Oceans and Coasts Working Group.
Scientific research and monitoring programmes	Research and/or monitoring programmes for local terrestrial, estuarine and marine environments, including birds, to assist with understanding the importance of these habitats, relative to other habitats; and inform better management practices.	Professional services and university graduates	University research programmes, school education programmes, local protected area management programmes, Provincial Oceans and Coasts departments, Operation Phakisa Oceans and Coasts Working Group.
Support for small-scale fishers	Provide supporting infrastructure and training aligned with activities already embedded in the communities. This could include further access to local markets.	The local community should be consulted to identify opportunities that they are interested in; and, to understand how these investments can be implemented, when,	Abalomi to facilitate access to local markets. Local government / business chamber initiatives. Note that land use planning and

	Description	Opportunities for skills & capacity development, and job creation	Alignment with other programmes
	However, care should be taken to acknowledge seasonality and subsistence value.	where and with whom. Some examples include: Training: • Bookkeeping, this could include some simple loan considerations (see examples from the International Slum Dwellers Association) • Packaging and storage • Market access • Hygiene • Assistance with permitting and registration of cooperatives • Understanding legislation and policy requirements Infrastructure: • Boats • Footpaths to fishing sites • Benches at fishing sites and surrounds • Shading • Safe parking • Ablution facilities • Security *(e.g. armed response, cameras, increased police presence, etc)* • Cold storage	development is the mandate of the local authority under the Spatial Planning and Land Use Management Act. Provincial Oceans and Coasts departments Operation Phakisa Oceans and Coasts Working Group.

	Description	Opportunities for skills & capacity development, and job creation	Alignment with other programmes
		• Market infrastructure / stalls and advertising • Fish cleaning • Fish smoking	
Aquaculture	Assist local communities with implementation of the proposed Aquaculture Development Zone. This may include business plans, funding, skills development, monitoring, etc.	Research has already been done on the potential for aquaculture, there is opportunity to assist the local community with implementation.	Operation Phakisa Oceans and Coasts Working Group. Local government / business chamber initiatives. Note that land use planning and development is the mandate of the local authority under the Spatial Planning and Land Use Management Act. Provincial Oceans and Coasts departments
Annual / Seasonal Cultural Heritage Events	Assist local communities and local tourism departments with establishing / hosting cultural heritage events – this has potential to have spin offs for local economic activities and enhanced sense of place (eco-tourism / tourism, hospitality, etc) and the associated positive impact on job creation and income for local households.	A range of direct and indirect job creation opportunities.	Any existing events in the area and/or local tourism department initiatives.
Support for vulnerable individuals / households	Reduce barriers to skills development / training and job access by providing: • Childcare (preferably registered Early Childhood Development centres) for trainees and workers • Counselling and talks / workshops on a variety of topics / themes (trauma, gender issues, work ethics, etc) • Transport or subsidies for transportation	There may be further opportunity to provide bursaries / sponsorship for teachers and management of these facilities.	Align with the Community Works Programme & Education Programmes in the area

	Description	Opportunities for skills & capacity development, and job creation	Alignment with other programmes
	• *Assistance with access to internet, computers and related infrastructure* • *Assistance with CV development and distribution* • *Assistance with job interview preparation* • *Assistance with improvement of verbal and written communication skills* Often it is the most vulnerable community members who are unable to access skills development / training opportunities, and job requirements because of a lack of support. These barriers may be as simple as not having access to safe, reliable childcare for their beneficiaries, access to transport or even counselling. By helping in this manner, gender mainstreaming (acknowledging a broad definition of this term) may be effectively introduced into any of the Karpowership initiatives.		
Disaster risk management	Assistance to local disaster risk management and relief services for local communities. There are a few areas identified in the Ports that are at risk of flooding – see maps provided in this report, as well as other climate change related impacts that are anticipated to be experienced in the region.	• Monetary contributions • Monitoring and evaluation • Training of Fire Fighters • Humanitarian relief response, including medical services and food resources	Existing disaster risk services
Support with local development	This may include a range of opportunities including flood and sea level rise mitigation measures, low-cost water treatment and distribution services, housing, motorised and	This will vary depending on the developmental proposal and agreement of roles with the municipality and local community.	Alignment with local municipality SDF and IDP

	Description	Opportunities for skills & capacity development, and job creation	Alignment with other programmes
	non-motorised transport routes, markets, schools, etc. This should include consideration of anticipated climate change impacts, sustainable land use planning, sustainable livelihoods, and innovative technology and infrastructure.		Partnerships with private sector and academia may include opportunities for living labs.
PV systems and solar water geysers	Provision of solar water geysers and PV systems to alleviate the reliance on the national grid.	Technical training associated with installation and maintenance.	Local government & business The dtic and GIZ are working on water stewardship programmes and 'eco-park' guidelines and standards for industrial parks. The Green Building Council of SA has also established certification for net zero (including ecological certificate).
Sponsorships, bursaries and mentoring	There are a range of opportunities for sponsorship, bursaries and mentoring at different education levels – this should be identified with local education centres		Local education centres, Local and Provincial education departments

5.4. Concluding professional opinion

Given that the professionals who undertook the specialist studies have supported the granting of the environmental authorisation, with various requirements for mitigation and management, I support that this project be granted the environmental authorisation, provided the necessary mitigation and management recommendations are upheld. The recommendations provided in this report offer further opportunity to reduce the negative impacts of this project on the environment and enhance the positive contributions and legacy that Karpowership SA can contribute to this community *and the country*.

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NB: In addition to this list, please note that the list of specialist studies undertaken for the EIA were consulted in preparation of the Matrices and the Systems Maps – these have not been listed here. Please refer to the EIA document appendix for the specialist studies.

7. Appendix A: Matrix

		Socio-economic cluster								Terrestrial biodiversity & ecosystems							Marine, coastal & estuarine biodiversity & ecosystems		
		Socio-Economic	Tourism	Visual	Major Hazards	Heritage & Paleontology	Underwater Archaeology	Air Quality	Climate Change	Hydrology	Wetland Delineation & Functionality	Hydropedology	Geohydrology	Terrestrial Ecology	Avifauna	Terrestrial Noise	Underwater Noise & Vibration	Marine Ecology, Coastal & Fisheries	Thermal Plume
Socio-economic cluster	**Socio-Economic**	Through the provision of electricity, Karpowership will alleviate some of the loadshedding experienced nationally. Locally, there is opportunity for the small scale fishers and the rest of the community to benefit from CSI investments, Job creation & skills development, and supplier and enterprise development as a result of KSA's local content commitments; and, economies of agglomoration may benefit the gas-to-power industry, and spin-offs thereof.																	
	Tourism	Tourism should not be negatively affected by the presence of the powerships. However, there is potential for enhancement through local community upliftment and socio-economic development.	Eco-tourism should not be negatively effected - the various specialist findings have shown marginal to low impacts, and construction impacts will be low with rehabilitation following.																
	Visual	No significant visual impact anticipated - powership will be in an active port & industrial zone and will be well screened with other port infrastructure. Beaches are also not well used by the public.	No visual impact to negatively affect tourism. Although the powership could add to local energy tourism	No significant visual impact anticipated - powership will be in an active port & industrial zone and will be well screened with other port infrastructure. Beaches are also not well used by the public.															
	Major Hazards	Could provide opportunity for local skills development	Will not affect tourism as this is in line with normal operations.	Will not affect visual dynamics under normal operating conditions.	Identified major hazards were identified around fire risks associated with gas leaks - which was also found to be normal and operation could continue with appropriate mitigation and emergency responses.														
	Heritage & Paleontology	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable													
	Underwater Archaeology		Might have a positive contribution if an archaeological find is made during the construction phase.	Will not be affected	Will not be affected	The terrestrial heritage zone intersects with the maritime heritage zone at the highwater mark. The maritime heritage landscape is part of both zones. intersecting issues have been dealt with in both reports and Mitigation is the same.	It is not anticipated that there will be a find. However, an archaeologist should be on site during the construction phase												
	Air Quality	Will not be affected	Will not be affected	Will not be affected	Will not be affected	Will not be affected	Will not be affected	Increase in ambient SO2, NO2 and particulate concentrations is not expected to result in exceedances of NAAQS											
	Climate Change	Climate change will affect socio-economic systems, including small scale fishing. But the addition of Karpowership in the port will not make socio-economic systems any more vulnerable to climate change.	Climate change will affect tourism. But the addition of Karpowership in the port will not make tourism any more vulnerable to climate change.	Will not be affected	Tropical cyclones are typically high impact low probability (HLP) hazards and are generally quite difficult to manage due to their unpredictable nature. This has been considerd in the design of the Powership project and impacts are anticipated to be low and not affect core operations. However, this could cause an environmental disaster that will impact surrounding communities and ecosystems.	Will not be affected as a direct consequence of the presence of the powerships	Will not be affected as a direct consequence of the presence of the powerships	Will not be affected.	Operation of the powerships will contribute only marginally to the global GHG stock. Operation of the powership cannot directly be tied to the experience of climate change impacts at this site, as this is a dynamic function of the global climate system and GHG stock.									

Terrestrial biodiversity & ecosystems	**Hydrology**	Not applicable / no watercourse at risk	No watercourses at risk	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Climate change will affect the hydrological systems. But the addition of Karpowership in the port will not make hydrological systems any more vulnerable to climate change.	Aerial extent of the floodline reveals that there is very little impact on developments or permanent structures along the river course. The proposed development falls outside of the 1:100 year floodline. Flooding damage risk is estimated to be zero, based on floodlines generated.									
	Wetland Delineation & Functionality	Riparian zones provide a range of ecological goods and services to communities - no impact is anticiapted on any watercourse as a result of the powership	No watercourses at risk	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Climate change will affect wetlands. But the addition of Karpowership in the port will not make wetlands any more vulnerable to climate change.	Aerial extent of the floodline reveals that there is very little impact on developments or permanent structures along the river course. The proposed development falls outside of the 1:100 year floodline. Flooding damage risk is estimated to be zero, based on floodlines generated.	Construction phase may cause a host of impacts related to removal of vegetation, erosion & sedimentation, increased surface runoff, reduced infiltation and soil permability, pollution (hydrocarbon input from construction vehicles, waste from chemical toilets, general waste, cement) - all of which can be managed, and rehabilitated.								
	Hydropedology	Not applicable	No significant impact found	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Climate change will affect the hydropedology. But the addition of Karpowership in the port will not makehydropedology any more vulnerable to climate change.	No significant impact found	No significant impact found	No significant impact found							
	Geohydrology	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	No significant impact found	No significant impact found	No significant impact found	No significant impact found						
	Terrestrial Ecology	Construction of the gas pipeline and transmission line have been limited to transformed sites, therefore avoiding further impact(s) on local communities. However, some loss of habitat is anticipated, which will be rehabilitated. Further activities associated with the construction phase may affect sense of place in the short term.	Livelihoods / socio-economic impacts is marginal at construction phase only	Construction phase of the transmission line will have a low impact in the short term, until rehabilitation takes place.	Not applicable	Not applicable	Not applicable	Not applicable	Climate change will affect the terrestrial ecological systems. But the addition of Karpowership in the port will not make terrestrial ecological systems any more vulnerable to climate change.	Aerial extent of the floodline reveals that there is very little impact on developments or permanent structures along the river course. The proposed development falls outside of the 1:100 year floodline. Flooding damage risk is estimated to be zero, based on floodlines generated.	Aerial extent of the floodline reveals that there is very little impact on developments or permanent structures along the river course. The proposed development falls outside of the 1:100 year floodline. Flooding damage risk is estimated to be zero, based on floodlines generated.	Not applicable	Not applicable	It is anticipated that there will be low to medium impacts associated with habitat loss, fragmentation and impacts to species of concern at construction and operational phases. While rehabilitation of habitats will contribute significantly to reducing significance of these impacts. However, human distrubance, noise, vibration and light impacts will need to be managed. This should include monitoring programmes to inform adapative management practices.					
	Avifauna	Not applicable	With the increased risk of bird collisions and electrocutions, it is anticipated that larger bird species populations will be affected. Consequently, there may be a low impact for eco-tourism	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Climate change will affect avifauna. But the addition of Karpowership in the port will not make avifauna any more vulnerable to climate change.	Aerial extent of the floodline reveals that there is very little impact on developments or permanent structures along the river course. The proposed development falls outside of the 1:100 year floodline. Flooding damage risk is estimated to be zero, based on floodlines generated.	Aerial extent of the floodline reveals that there is very little impact on developments or permanent structures along the river course. The proposed development falls outside of the 1:100 year floodline. Flooding damage risk is estimated to be zero, based on floodlines generated.	Not applicable	Not applicable	The assessement found that terrestrial noise would not significantly impact on the terrestrial ecosystem, including important bird species.					
	Terrestrial Noise	No significant impact(s) were noted that may directly affect local communities (including small scale fishers) or indirectly through impacts to the natural environment.	The assessement found that terrestrial noise would not significantly impact on the terrestrial ecosystem, including important bird species.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	The assessement found that terrestrial noise would not significantly impact on the terrestrial ecosystem, including important bird species.	The assessement found that terrestrial noise would not significantly impact on the terrestrial ecosystem, including important bird species.	The assessement found that terrestrial noise would not significantly impact on the terrestrial ecosystem, including important bird species.			

Marine, coastal & estuarine biodiversity & ecosystems	**Underwater Noise & Vibration**	The assessement found that underwater noise would not significantly impact on the estuarine / port / marine ecosystem, which includes the fish populations that the fishers depend on and important bird species.	The assessement found that underwater noise would not significantly impact on the estuarine / port / marine ecosystem, which includes the fish populations that the fishers depend on and important bird species.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	The assessement found that underwater noise would not significantly impact on the estuarine / port / marine ecosystem, which includes the fish populations that the fishers depend on and important bird species. Although there are important ecosystems in close proximity to the site such as the intertidal zones associated with the Kabeljou flats and sandsplit that are may be affected, and are important nesting, foraging and breeding sites - consequently it is anticipated that species will be affected by these distrubances, coupled with the cumulative impacts of human disturbances, noise, vibrations and light.	Not applicable			
	Marine Ecology, Coastal & Fisheries	Despite the low impacts of underwater noise and the thermal plume, and the localised nature of this impact, this shift in the environment could impact negatively on juvenile fish, which make use of the port as a nursery. Impacts on mariculture will be very low to low, while impacts for fishers including small- scale fishers will be medium. Furthermore there is opportunity to enhance mariculture.		There is no visual impact, as the powership will be in the industrial zone of the active Port, and mostly hidden amongst port infrastructure and other ships. Furthermore, the coastline is undulating further limiting visability of the powership from the beach.	Major hazards report identified gas leak related fire hazards as the in line with operations associated with the powership. This would be within acceptable operational limits and operations were recommended to continue with management recommendations. This risk is anticipated to be limited to the Port.	Not applicable	Not applicable	Not applicable	Climate change will affect estaurine and coastal systems. But the addition of Karpowership in the port will not make estaurine and coastal systems any more vulnerable to climate change. Impacts of increasing atmospheric temp & no. of hot days, SLR, increased storminess, tidal surges.	No watercourses at risk	No watercourses at risk	Not applicable	Not applicable	A limited impact is anticipated on marine ecology as a conseqence of the loss of terrestrial habitat.	There are important ecosystems in close proximity to the site such as the Forest mangroves, marshlands, Kabeljou flats and sandsplit, and a host of species of importance that depend on these habitats. These are important nesting, foraging and breeding sites - consequently it is anticipated that species will be affected by human distrubances, noise, vibrations, light, changing water temperatures, coupled with the cumulative pollution already experienced in the area.	The assessement found that terrestrial noise would not significantly impact on the terrestrial ecosystem, including important bird species.	Despite the low impacts of underwater noise and the thermal plume, and the localised nature of this impact, this shift in the environment could impact negatively on juvenile fish, which make use of the port as a nursery.		
	Thermal Plume	Temperature changes associated with the thermal plume were not found to be significant enough to impact on estuarine (port) marine mammals and fish species. However, juvenile fish make use of the port for shelter, and may be affected. This will potentially have a medium impact on fishers.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Climate change will affect estaurine and coastal systems. But the addition of Karpowership in the port will not make estaurine and coastal systems any more vulnerable to climate change. Impacts of increasing atmospheric temp & no. of hot days, SLR, increased storminess, tidal surges.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	

Thematic specialist study clusters	Specialist Report / Impact Assessments	Physical			Ecological			Socio-economic			Heritage (natural, cultural, tangible, intangible)			Concluding Specialist Overview	
		Strategic Issue	Limits of acceptable change or thresholds	Mitigation / management requirements	Strategic Issue	Limits of acceptable change or thresholds	Mitigation / management requirements	Strategic Issue	Limits of acceptable change or thresholds	Mitigation / management requirements	Strategic Issue	Limits of acceptable change or thresholds	Mitigation / management requirements	Mitigated overall significance rating	Specialist recommendation (Yes/No)
Socio-economic cluster	**Socio-Economic**	The project is in an industrial site, adjacent to the industrial development zone. Therefore no physical changes of significance are anticipated. However, the need for housing and social services such as health and education could increase.	N/A	N/A	The project site falls in the active port of Richards Bay which is an industrial zone, supported by existing port infrastructure and related activities. Land based infrastructure is to cross Transnet Properties as well as private properties, already transformed by similar infrastructure / activities. No major ecological impact is anticipated - please refer to specialist studies.	N/A	N/A	Positive contribution to electricity generation for the country. Job creation during construction and operations. Some attaction of labour into the area. Benefits to flow through including local employment quotas. Community ownership in projects. An opportunity for skills transfer in power generation through powership operation and maintenance supporting broad-based economic empowerment. Increased economic activity should drive increased revenue for the local municipality. Industrial and value chain development potential for gas industry through increased economies of agglomeration.	Given that KPS is located in a signficant and sophisticated urban node, the additional labour attracted into the area has a minior direct impact on the communites.	Skills and enterprise development opportunties exist - this must be fully developed in an Enterprise and Supplier Development plan that is geared for positive, long term impact with a focus on community upliftment, just transitions and sustainable livelihoods.	Access to the ocean and activities around fishing are seen as cultural heritage rights, as well as the right to a clean and healthy natural environment. However, it must also be noted that access to the port is restricted as it is an active port and industrial zone. No displacement or resettlement of communities is expected. No change to use or access is anticipated. Coastal access is therefore not highlighted as or rated as an impact.	N/A	N/A	Low (positive impact)	**YES - project can proceed**
	Tourism	Tourism should not be negatively affected by the presence of the powerships. There are no visual impacts, and the powership will be based in an active port and industrial zone - therefore no impact on sense of place. Other specialist findings also show low to negligible negative environmental impacts.	N/A	N/A	Eco-tourism should not be negatively effected - the various specialist findings have shown marginal to low impacts, and construction impacts will be low with rehabilitation following.	N/A	N/A	Eco-tourism should not be negatively effected. There is potential for energy tourism, enhancement of local recreation and even positive feedback through local community upliftment and socio-economic development.	N/A	N/A	Eco-tourism should not be negatively effected - the various specialist findings have shown marginal to low impacts, and construction impacts will be low with rehabilitation following.	N/A	N/A	Low	**YES - project can proceed**
	Visual	The powerships will be located in a busy industrial port & will visually be screened by other industrial elements. The landscape impact is therefore of low significance.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low	**YES - project can proceed**

	Major Hazards	Main risk identified is the possible rupture of one of the transfer hoses resulting in a fire risk.	N/A	Good housekeeping must always be observed on site. Only suitably qualified people must be used for all installation work. An accredited installer must conduct a pressure test & provide the relevant compliance certificates. There must be an operational manual for each operation. An emergency plan must be developed. Port fire depart will handle all firefighting & emergencies.	N/A	N/A	N/A	The risks were found to be acceptable for the port and normal port operations can continue at the other berths while LNG is being offloaded at the facility. Could provide opportunity for local skills development.	N/A	N/A	N/A	N/A	N/A	N/A	**YES - project can proceed**
	Heritage & Palaeontology	None	N/A	N/A	None	N/A	N/A	None	N/A	N/A	None	N/A	N/A	N/A	**YES - project can proceed**
	Underwater Archaeology	None	N/A	N/A	None	N/A	N/A	None	N/A	N/A	None	N/A	N/A	N/A	**YES - project can proceed**
	Air Quality	Emissions from LNG combustion will result in an increase in ambient SO2, NO2 and PM concentrations	The predicted increase is relatively small and as a result exceedances of the NAAQS are unlikely.	LNG is a clean fuel with very low SO2 and particulate emissions. No emission abatement will be installed for the control of these emissions. NOX emissions are controlled to the required concentration at source using selective catalytic reduction.	The SO2, NO2 and PM contributions are anticipated to be very low when considering the powerships alone, and low when considering cumulative impacts - no loss or impact of significance is anticipated to ecological habitats	N/A	N/A	There is no residential area in the Port and the nearest residential area is 3,9km away. Human exposure is limited to the industrial area and businesses. In addition air pollution limits are very low to low.	N/A	N/A	N/A	N/A	N/A	Very low	**YES - project can proceed**
	Climate Change	The GHG emissions from this project contribute to the global stock of GHG emissions. Whereas it is important for each project to mitigate as far as possible the contribution of this project to global GHG emissions is very low.	N/A	N/A	N/A	N/A	N/A	This project will assist in alleviating the socio-economic pressures caused by South Africa's electricity supply crisis, and the benefit associated with this outweighs the contribution of the project to global GHG emissions.	N/A	N/A	N/A	N/A	N/A	N/A	**YES - project can proceed**

Terrestrial biodiversity & ecosystems	**Hydrology**	Limited sedimentation and erosion for the drainage lines & streams associated with the site are anticipated	The 1:100 year flood line should be avoided (buffer area)	Construction should take place in dry months. During construction phase: use sandbags & temporary berms to manage stormwater runoff; temporary stormwater structures; minimise vegetation disturbance. Revegetate eroded areas. DEA generic EMP for substations & powerlines should be used. Water monitoring should take place.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Very low	**YES - project can proceed**
	Wetland Delineation & Function	Direct habitat destruction/ modification (Vegetation removal, Direct infilling and/or excavation, Establishment of AIPs, Modification of profile (e.g. beds and banks), Alteration in habitat types, New hard structures being introduced into wetland environment)	The transmission lines are maintained within the approved servitude and loss of wetland environments are rehabilitated as per the Wetland Rehab Plan. Similarly, laydown areas within wetland environments must be completed rehabilitated upon the conclusion of construction work and commencement of the rehabilitation phase. The proposed switching station to be maintained outside of the wetlands and associated buffers.	Appropriate construction EMPr to be implemented and monitored. Including rehabilitation.	Direct loss of integrity and ecosystem services of watercourses	The transmission lines are maintained within the approved servitude and loss of wetland environments are rehabilitated as per the Wetland Rehab Plan. Similarly, laydown areas within wetland environments must be completed rehabilitated upon the conclusion of construction work and commencement of the rehabilitation phase. The proposed switching station to be maintained outside of the wetlands and associated buffers.	Appropriate construction EMPr to be implemented and monitored. Including rehabilitation.	N/A	N/A	N/A	N/A	N/A	N/A	Very low to Low	**YES - project can proceed**
		Catchment modifications (land cover and surface runoff) (Vegetation removal, Erosion and sedimentation, Increased surface runoff volume and velocity, Reduced infiltration and increased permeability of natural surfaces, Alteration in habitat types).	Catchment related activities to occur only in terrestrial areas and not within watercourses and associated buffers	Appropriate construction EMPr to be implemented and monitored. Including rehabilitation.	Potential indirect reduction in integrity and ecosystem services being provided by the watercourses.	Catchment related activities to occur only in terrestrial areas and not within watercourses and associated buffers	Appropriate EMPr to be implemented and monitored. Including rehabilitation.	N/A	N/A	N/A	N/A	N/A	N/A	Very low to Low	**YES - project can proceed**

		Water quality impacts may result in sewage and chemicals entering the wetlands - pollution (including litter), rainfall events, hydrocarbon input from construction vehicles, incorrect positioning and maintenance of the portable chemical toilets and use of the surround environment as ablution facilities, excess sediment input as a result of the construction activities and associated soil displacement, cement entering the wetlands through incorrect batching procedure and/or direct disposal.	The construction activities, vehicles and personal can conduct their works within the applicable servitudes, however must try to remain outside of the watercourses and associated buffers, where possible. Existing access roads must be utilised as far as possible and heavy machinery must be limited within the wetland environment.	Appropriate construction EMPr to be implemented and monitored. Including rehabilitation.	Potential indirect reduction in integrity and ecosystem services being provided by the watercourses.	The construction activities, vehicles and personal can conduct their works within the applicable servitudes, however must try to remain outside of the watercourses and associated buffers, where possible. Existing access roads must be utilised as far as possible and heavy machinery must be limited within the wetland environment.	Appropriate construction EMPr to be implemented and monitored. Including rehabilitation.	N/A	N/A	N/A	N/A	N/A	N/A	Very low to Low	**YES - project can proceed**
	Hydro pedology	Hydropedological risks for construction and operational phase are anticipated to be low, and marginal after construction.	No impacts on hydropedological flow drivers are anticipated, i.e.. 'no change' in PES or EIS.	DEA generic EMPr for substations and powerlines. Mitigation & Management Plan implementation.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Very low	**YES - project can proceed**
	Geohydrology	Risks during construction phase are low and can be considered reversible.	N/A	All waste generated during the construction phase to be stored in designated areas with covers to prevent windblown dust / litter, & have isolated surface drains. Minimal exposed ground & stockpiles of building material. Stockpiles to be covered.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low	**YES - project can proceed**
		Marginal impacts associated with operational phase of the transmission lines, pylons & substations.	N/A	DEA generic EMP for substations & powerlines to be used. Water monitoring to be implemented.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Very low	**YES - project can proceed**

	Terrestrial Ecology	N/A	N/A	N/A	Loss of vegetation (Subtropical Alluvial Vegetation, Maputaland Coastal Belt, Swamp Forest and Mangrove Forest) during construction and operational phases, is anticipated to be low with mitigation. NB: Alternative route for the transmission line is not supported as it traverses sensitive critical biodiversity areas that are considered irreplaceable - this route is not supported.	N/A	No construction or storage of materials outside of defined construction site (with small footprint). Alien invasive plant species management plan. Site workers not to transgress into surrounding vegetation for any reason. Avoid clearing of linear footprints by erecting each individual pole. Construct berms around wetlands and reed beds to protect this habitat during construction. Indigenous vegetation to be used in open space management plans.	N/A	N/A	N/A	N/A	N/A	N/A	Low	**YES - project can proceed**
		N/A	N/A	N/A	Fragmentation, loss of species of concern and and enhanced invasion of alien species is anticipated as a result of both construction and operational phases - however this is anticipated to be very low.	N/A	Rehabilitation of sensitive habitats. Development and implementation of an alien invasive management plan.	N/A	N/A	N/A	N/A	N/A	N/A	Low	**YES - project can proceed**
	Avifauna	Collisions with transmission lines is anticipated to negatively impact larger bird species.	N/A	Align transmission lines with existing lines, and mark the lines for visibility - see Eskom guidelines and specialist management plan recommendations.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium-low	**YES - project can proceed**
		Large bird species are also more prone to electrocution as a result of transmission lines. Species that are anticipated to be impacted on crows, raptors, Egyptian geese, Hadeda Ibises - all of which are nesting on transmission towers or polls, increasing their risk of electrocution and collision.	N/A	Remove nests when not in use, hopefully discouraging reuse. See specialist management plan recommendations.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium-low	**YES - project can proceed**

		Noise and vibration disturbances associated with the ships will cumulatively contribute to the disturbances already associated with the port activities and industrial activities. A reduction in waterbird species has already been noted as a result of these disturbances, and further impacts are anticipated as the cumulative impacts of the ships.	N/A	There is no feasible mitigation other than to move the ships further from sensitive bird areas. Alternative 2 is not supported. See specialist management plan recommendations.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium	YES - project can proceed
		Illumination of the powership will range from 53.80 Lux to 322.80 Lux. The latter is brighter than a high-quality hunting or gamespotting spotlight. Lights will be pointed at work areas and will not be used to illuminate surrounding areas as they will be pointed towards the deck of the ship. However, if these spotlights are mounted up on masts, then this could disorient flying birds, especially those trying to navigate by the moon.	N/A	Only essential lighting should be used at night. Lumens must be kept to a minimum. Lights must be installed as low as possible. Lit up windowns must be shuttered at night. See specialist management plan recommendations.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low	YES - project can proceed
		Loss of important habitat as a result of the construction of the transmission lines and associated infrastructure will negatively impact on bird species. With mitigation alternative route 1 is anticipated to have very low impacts. While alternative route 2 is anticipated to have medium impacts - NB this route is not supported by the terrestrial ecology report.	N/A	Do not place transimission lines or access routes for their construction in functional natural habitat, and do not clear natural vegetation in the process of construction of project infrastructure. See specialist management plan recommendations.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Very low	YES - project can proceed

		Increased human disturbance at construction and operational phase is anticiapted to disturb foraging, roosting and breeding of birds. Frequent disturbances of Palearctic migrants during summer months is especially a concern, and African Fish Eagles who nest on site; as well as disturbances near the sandspit, considering the Karpowership infrastructure located in close vacinity.	N/A	Approach and general access to the ships should be from the north side. No activities (post construction) should occur between the ships and the sandspit, other than activities in direct contact with the vessels (e.g. maintenance). See specialist management plan recommendations.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium-low	**YES - project can proceed**
	Terrestrial Noise	With the Powership operating in excess of the maximum output proposed for the port, the background noise could increase by approximately 9 dB by the Powership (approximately 400 m from the ship). This is equivalent to a noise level of 127.6 dB SPL_{RMS} re 1 µPa (worse case scenario). The effect on baseline noise will be negligible where the Powership is operating at a low power.	N/A	N/A	Any risk to marine mammals will be negligible. Temporary threshold shift will only occur when marine mammals of the most sensitive species (VHF cetaceans, i.e. porpoises) remained within 700 m of the Powership operating at maximum capacity for a full 24 hours - an unlikely scenario. Noise from power generation could disturb the bird species, although this is not anticpated to be significant given the distance from breeding and feeding sites.	N/A	N/A	Given the proposed position of the powership in Big Bay, it is not anticipated that the local business or communities will be affected by the noise associated with power generation.	N/A	N/A	N/A	N/A	N/A	N/A	**YES - project can proceed**

Marine, coastal & estuarine biodiversity & ecosystems	**Underwater Noise & Vibration**	Background noise could increase by more than 10 dB directly adjacent to the ships, in the restricted section of the port by the Break Bulk quay. This is equivalent to a noise level of 1307.9 dB SPL_{RMS} re 1 µPa. This is a worst case scenario, with the Powerships unlikely to operate regularly at maximum capacity. The effect on baseline noise will be negligible where the Powerships are operating at a low power.	N/A	N/A	Any risk to marine mammals or fish will be negligible. The lower order of effect defined in the guidelines, temporary threshold shift, would only occur when marine mammals of the most sensitive species (VHF cetaceans, i.e. porpoises) remained in 850 m of the Powerships operating at maximum capacity for a full 24 hours. This condition of extended presence of marine mammals and/or most sensitive species of fish close to the ships in the harbour at maximum output is highly unlikely to occur in practice, especially due to the restricted space in the port at the proposed positions of the Powerships.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**YES - project can proceed**
	Coastal, Estuarine and Marine	Disturbance or loss of estuarine and marine fauna as a result of water-based construction activities. This includes important bird species.	N/A	Disturbance to benthic and littoral habitats and fauna is an unavoidable consequence of the development. Disturbance of sensitive havitats should be minimised, e.g. sandspit and assembly basin should be no-go areas.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium-low	**YES - project can proceed**
		Reduction in water quality as a result of a variety of flactuations in variables, because of construction activities, could negatively impact on marine species.	N/A	Disturbance must be kept to a minimum by confining the pipeline laying activity, working barage and or excavation and leveling in the project area only. Minimised construction timeframes. The sandspit must not be affected. Mooring of the FSRU must be a minimum of 230 m from the sandspit. A site specific EMPr must be developed, implemented and M&E must take place.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium-low	**YES - project can proceed**

		The noise produced by construction of the Gas to Power project is not anticipated to contribute meaningfully to the existing noise levels in the Richards Bay estuary. This will cause direct harm to marine organisms.	N/A	Equipment used should be similar or less powerful than the equipment used as a model by Subacoustech Environmental (2022). No unnecessary production of noise should take place, to minimise the exposure of the estuarine/marine biota to noise and help to avoid disturbances and potential harm to estuarine/marine organisms. If a marine mammal is observed in the near vicinity of the construction activity, construction should be halted until the marine mammal is outside the range of hundreds of metres from the noise source, as a precaution. A noise impacts monitoring programme must be in place.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium-low	**YES - project can proceed**
		Chemical spills associated with the construction phase is anticipated as a risk to fauna and flora.	N/A	An appropriate site specific EMPr must be implemented.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium-low	**YES - project can proceed**
		Impacts of solid waste pollution during the construction phase is anticipated to negatively impact on estuarine and marine species.	N/A	An appropriate site specific EMPr must be implemented.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low	**YES - project can proceed**
		Loss of important habitat as a result of the construction phase is anticipated to have low impacts on marine species. NB: transmission route 2 is not supported by the terrestrial ecology impact assessment.	N/A	See mitigation recommendations from the terrestrial ecology report.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Very low	**YES - project can proceed**
		As a result of uptake of seawater for cooling purposes, entrainment of small to medium bodied planktonic / pelagic organisms is expected (e.g. phytoplankton, larval stages of invertegrates and fish, juvenile and adults) , and impingment of larger organisms.	N/A	Intake velocities must be kept as close to 0.15 m/s to ensure that fish and other mobile organisms can escape. Intake velocities can be reduced through the use of footer values. Intake structure must not draw in water from the upper meter of the water column. Intake structures must ensure horizontal intake of water.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Medium-low	**YES - project can proceed**

		N/A	N/A	N/A	Given the relatively localised impact zone of the thermal plume and underwater noise from the powership, the impact of the project on mariculture is anticipated to be medium. It is not anticipated that mariculture will be impacted, and if so, this impact will be low.	N/A	Maximum power output of the powership should be avoided. When moving in and out of the port, LNGC should not move at maximum speed. A noise impacts monitoring programme must be implemented. Cooling water must be discharged at a depth of 8m, and horizontally away from the ship. A water quality monitoring programme must also be implemented.	N/A	N/A	The recommended monitoring progammes will provide insights to the importance of these habitats and the effects of changes in the port for these fish populations. This will inform better management practices. This should also be considered against growing mariculture practices, and the socio-economic impacts of this, including job creation.	N/A	N/A	N/A	Medium	YES - project can proceed
		During the operational phase, artificial light at night is anticipated to have significant impact on estuarine/marine ecology. Light pollution interferes with natural cycles of light and dark, and modifies the intensity, spectra, frequency and duration of light reaching and penetrating the natural water bodies, including the ocean surfaces and natural landscapes.	N/A	Only add light for specific purposes - no excess lighting. Restrict uplighting and water illumination. Adaptive light controls to manage light timing, intensity and colour. Light only the object or area intended. Use lowest intensity light appropriate for tasks. Use non-reflective, dark coloured surfaces, use reduced or filtered blue, violet and ultra violet wavelengths. Avoid high light intensity of any colour. Refer to specialist assessment for further recommendations.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low	YES - project can proceed
	Thermal Plume	Although water temperature increases are anticipated as a result of the cooling processes associated with the powership, this was not found to be significant (ito temp increase & distribution across the port).	N/A	N/A	Temperature changes associated with the thermal plume were not found to be significant enough to impact on estuarine (port) marine mammals and fish species. It is, however, noted that the port is used as a nursery by juvenile fish.	N/A	N/A	Temperature changes associated with the thermal plume were not found to be significant enough to impact on estuarine (port) marine mammals and fish species. It is, however, noted that the port is used as a nursery by juvenile fish.	N/A	N/A	N/A	N/A	N/A	Very low	YES - project can proceed

Overall Environmental Significance (for the strategic matrix):

0 - 2.9	Very low
3 - 4.9	Low
5 - 6.9	Medium - low
7 - 8.9	Medium
9 - 10.9	Medium - high
11 and above	High

(the above environmental significance ratings will not be applicable to all specialist studies)

8. Appendix B: Declaration of independence

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/14/12/16/3/3/2007
Date Received:	02 November 2020

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

The Proposed Gas to Power Powership Project at the Port of Richards Bay, Umhlathuze Local Municipality, King Cetshwayo District, Kwazulu-Natal.

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	Afro Development Planning Pty Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	
Specialist name:	Tasneem Steenkamp			
Specialist Qualifications:	MPhil Sustainable Development, Management and Planning, PGDip Sustainable Development, BSc honours Environmental Science, BSc Environmental and Geographical Science			
Professional affiliation/registration:	Pr.Sci.Nat Environmental Scientist			
Physical address:	3 Falls Nature Estate, Waterfall, Durban			
Postal address:	Same as physical address			
Postal code:		Cell:	060 521 7919	
Telephone:		Fax:		
E-mail:	tasneem@afrodevplan.co.za			

2. DECLARATION BY THE SPECIALIST

I, ***Tasneem Steenkamp***, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Afro Development Planning Pty Ltd

Name of Company:

15/05/2023

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Tasneem Steenkamp**, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Afro Development Planning Pty Ltd

Name of Company

15/05/2023

Date

PRINCE OOP 24463 7

Signature of the Commissioner of Oaths

2023-05-15

Date

SUID-AFRIKAANSE POLISIEDIENS
GEMEENSKAPDIENS SENTRUM
15 MAY 2023
COMMUNITY SERVICE CENTRE
SOUTH AFRICAN POLICE SERVICES

9. Appendix C: Specialist CVs

9.1. Name: Tasneem Steenkamp

9.2. Title

Sustainability Specialist

Managing Director of Afro Development Planning

9.3. Contact information

Cell: +27(0) 60 521 7919

Email: tasneem@afrodevplan.co.za

Website: www.afrodevplan.co.za

Current location: eThekwini, South Africa

9.4. Nationality

South African

9.5. Languages

English, Afrikaans

9.6. Year of professional experience

13 years of relevant professional experience

9.7. Education

Master of Philosophy in Sustainable Development Planning and Management (*cum laude*) (Sustainability Institute, University of Stellenbosch, 2018) (NQF 9)

Post Graduate Diploma in Sustainable Development (Sustainability Institute, University of Stellenbosch, 2015) (NQF 8)

Bachelor of Science (honours) in Environmental and Geographical Science (University of Cape Town, 2009)(NQF8)

Bachelor of Science in Environmental Science (Life Stream) (University of KwaZulu-Natal, 2008)(NQF7)

9.8. Professional registration, memberships & certification

South African Council for Natural Scientific Professionals (SACNASP): Professional Natural Scientist: Environmental Scientist, 400131/15 (11 March 2015 – current)

Environmental Assessment Practitioners Association of South Africa (EAPASA): Candidate EAP (awaiting confirmation)

Global Reporting Initiative GRI 3.1 (2013)

Member of the South African Affiliate for the International Association of Impact Assessments (IAIAsa)

Member of The Adaptation Network

9.9. Bio

Tasneem is the managing director and sustainability specialist at Afro Development Planning, a private consulting company, committed to the development of a socially- and environmentally just society – a society which is ecologically, economically, culturally vibrant and resilient.

Afro Development Planning's core services focus on research, planning, policy and governance, climate action, spatial transformation, sustainable land use planning, urban resilience, just transitions, strategic environmental assessments, environmental management, economic and financial feasibility assessments. Research, stakeholder consultation and participatory analysis form a significant part of the work that we do to ensure that our project outcomes are underpinned by facts and have the desired impact.

Tasneem is a professionally registered environmental scientist, with SACNASP, with twelve years of experience. She holds degrees in sustainable development and environmental science. She has experience in a wide range of projects. She specialises in sustainable development planning, climate change adaptation and mitigation, environmental planning and strategic environmental assessments. Her experience includes, but is not limited to feasibility assessments, climate change vulnerability assessments, policy and strategy development and implementation, monitoring and evaluation, Strategic Environmental Assessments, Spatial- and land use planning including Spatial Development Plans and Frameworks, Environmental Management Frameworks, State of Environment and Environmental Outlook reports, Sustainable Design Reports, Environmental Impact Assessments and stakeholder engagement. In addition, Tasneem is a competent project manager.

Interestingly, Tasneem has experience in design thinking, innovation and team facilitation, which she integrates into her project leadership style. During her MPhil thesis, she specifically focused on the intricacies of the success and failure of multidisciplinary professional teams in their ability to work in a transdisciplinary manner to achieve sustainable development and effective spatial transformation. This included studying the governmentalities and rationalities of project teams in practice as a case study. She conducted her analysis through the application of complexity theory, through a transdisciplinary research lens. Since then, Tasneem has been adapting project leadership and project approaches to ensure that barriers to the development of innovative, sustainable transitions can be over-come amongst professional research and planning teams.