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Our ref: Karpowership/Ngqura

Dear Sirs

RE: SUBMISSIONS ON PROPOSED GAS TO POWER POWERSHIP PROJECT AT THE PORT OF NGQURA AND COEGA SEZ, NELSON MANDELA BAY METROPOLITAN MUNICIPALITY, EASTERN CAPE (REF 14/12/16/3/3/2/2005)

These submissions are made by the Biodiversity Law Centre and Green Connection, supported by the Centre for Environmental Rights, in response to the 2022 Draft EIA report (“DEIAr”) published for comment by Karpowership SA (Pty) Ltd for the Gas to Power Via Powerships Project for the port of Ngqura.

The Biodiversity Law Centre is a non-profit organisation and law clinic, registered in 2021. Our vision is flourishing indigenous species and ecosystems that support sustainable livelihoods in Southern

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Africa. Our mission is to use the law to protect, restore and preserve indigenous ecosystems and species in Southern Africa. By supporting civil society organisations, and local and indigenous communities in their efforts to safeguard their environments, the Centre seeks to advance its vision of flourishing indigenous species and ecosystems that support sustainable livelihoods in Southern Africa.

The Green Connection is a non-profit company whose aim is to contribute to the sustainable development goals, providing practical support to both the government and non-government and civil society sectors, which are an integral part of sustainable development. Green Connection believes that empowering people to participate in decision making about their environment is the only way that truly sustainable development can take place. It believes that our environmental resources are limited and not ours to squander but to protect for future generations, and that economic growth and development, improvement of socio-economic status and conservation of natural resources can only take place within a commonly understood framework of sustainable development.

We thank you for the opportunity to submit comments on the abovementioned application.

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I. THE ECOLOGY OF ALGOA BAY IS CRITICALLY IMPORTANT

Algoa Bay, in which the Port of Ngqura is located, is an area of rich biodiversity and ecological sensitivity:

- i. it includes the Addo Elephant National Park Marine Protected Area, which was declared in 2019 for the purpose of protecting a linked system of shore, estuarine, bay, island and shelf ecosystems and their associated biodiversity and ecosystem processes, to facilitate fisheries management, for the protection of threatened species and the physical features and ecological processes on which they depend and finally to protect and regulate a scenic area and its marine wildlife to support sustainable nature-based tourism;¹
- ii. it includes the Algoa to Amathole (Offshore of Port Elizabeth) Ecologically and Biologically Significant Area,² designated as such for its unique ecological features including rare habitat types, an important benthic and pelagic area that supports important ecological processes, seabird breeding and foraging areas, fish spawning and nursery areas and areas used by endangered leatherback turtles. The Port of Ngqura is located within this EBSA;³
- iii. it comprises the Algoa Bay Islands and Addo Elephant National Park Important Bird Areas,⁴ where fourteen seabird, several shorebird and 33 terrestrial bird species have been recorded, and where eight seabird species currently breed;⁵
- iv. more than 70 fish species inhabit Algoa Bay comprising species endemic to South African coastal waters and fish with wider distributions. These species include pilchard, anchovy and red-eye round herring, which are important food resources for their common predators, e.g., piscivorous seabirds, dolphins etc.⁶
- v. it was declared a Hope Spot⁷ by Dr Sylvia Earle in 2014;⁸ and
- vi. in 2021, Algoa Bay was declared a Whale Heritage Site. Since 2018, an annual Welcoming of the Whales Festival is celebrated in June when the first Humpback whales arrive on their migration route from Antarctic feeding grounds. The importance of these beautiful animals for the communities and the need for their conservation in the wild are at the heart of these celebrations. Marine tour operators, conservation projects, private companies, educational institutions, and NGOs come together to engage with and educate the public about the whales living off their coasts, as well as all the other marine life and addressing issues like plastic pollution.
- vii. the Port of Ngqura provides a sheltered coastal environment with artificial reefs (the breakwaters and concrete dolos) along an otherwise high energy sandy coastline and it is an

¹ GN 757 in *Government Gazette* 24278 of 23 May 2019.

² <https://www.cbd.int/ebsa/>.

³ DEIAR, page 139. On page 138 of the DEIAR, it is noted that the proposed development occurs adjacent to the EBSA. This is an important inconsistency and should be corrected.

⁴ DEIAR, page 130.

⁵ <https://www.birdlife.org.za/iba-directory/algoa-bay-islands-addo-elephant-national-park/>.

⁶ DEIAR, page 144.

⁷ Hope Spots are marine areas of ecological and biodiversity significance around the world.

⁸ [Algoa Bay Hope Spot - Sustainable Seas Trust \(sst.org.za\)](https://www.sst.org.za/).

- important habitat for both juvenile and adult fish (Dicken 2010). While the marine waters of the Port are utilized as a feeding area by coastal bird species such as cormorants (Phalacrocoracidae), including the Endangered Cape Cormorant, gulls and terns (Laridae), including the Critically Endangered Damara Tern (mostly during January/February), the density of feeding birds is generally similar or only marginally greater than in the adjacent coastal areas.⁹
- viii. the Port of Ngqura was developed at the mouth of the Coega Estuary and commenced operations in 2009. The estuary itself has seen extensive modifications and environmental degradation from its natural condition due to its historical conversion into a commercial saltworks, and consequently very little natural estuarine habitat remains. Given the highly modified nature of the Coega Estuary, the Port now functions as an important nursery area for many fish species and is an important habitat and activity zone for juvenile and neonate dusky shark. This is likely due to the relatively calm and sheltered environment provided by the Port compared to the surrounding coastline.¹⁰ For adult specimens, the area also acts as a refuge from recreational fisheries.¹¹
- ix. in terms of megafauna, six species were recorded between June 2008 and May 2011 (Melly et al. 2017). These include Indo-Pacific bottlenose dolphin, the Indian Ocean humpback dolphin, the long-beaked common dolphin and the Bryde's whale, which were observed year-round, and the southern right whale (*Eubalaena australis*) and the humpback whale (*Megaptera novaeangliae*) which were observed from May to December.¹² The Indo-Pacific bottlenose dolphin was the most commonly seen species, where individuals were observed throughout the shallower areas of the Bay in waters from 8 to 20 m deep. Most observations were in the south-west of the Bay. However, some were observed in the vicinity of the Port of Ngqura. Several sightings of southern right whales and Bryde's whales were recorded in shallow waters near the Port of Ngqura, with some of these occurring in ship anchoring areas within the Port. Mother-calf southern right whale pairs were observed inshore of St Croix Island. Several marine mammals thus utilise the area surrounding and perhaps within the Port of Ngqura.¹³
- x. critically, Algoa Bay provides habitats for endangered African Penguins (*Spheniscus demersus*), as well as other endangered seabirds, cetaceans and seals.¹⁴ Two groups of islands in Algoa Bay, the St Croix Island group and the Bird Island group, together support globally important populations of the endangered African Penguin and Cape Gannet (*Morus capensis*).¹⁵ In 2015, Algoa Bay supported 54% of South Africa's population of African Penguin. St Croix Island was the largest colony of this species by a significant margin, contributing 40%

⁹ DEIAr, page 131.

¹⁰ Marine Ecology Report, page 38.

¹¹ DEIAr, page 114.

¹² DEIAr, page 145.

¹³ DEIAr, page 146.

¹⁴ Pichegru et al "Maritime traffic trends around the southern tip of Africa – Did marine noise pollution contribute to the local penguins' collapse?" Science of the Total Environment 849 (2022) page 1.

¹⁵ Pichegru et al, page 2.

of the South African population. Since then, the Algoa Bay population has decreased from 10,906 pairs to 2,821 pairs¹⁶ and now constitutes 28% of the South African population, with the St Croix colony now being the fourth largest colony in South Africa.

In addition to the important ecological functions Algoa Bay in general, and the Port of Ngqura in particular, play, five commercial fisheries currently operate within Algoa Bay and may potentially be affected by the proposed project. These are the small pelagic, traditional linefish, squid jigging, shark longline and small-scale fisheries.¹⁷

Given the sensitive and unique biodiversity of Algoa Bay, it is all the more important that the DEIAr consider relevant biodiversity planning documents. As discussed below, however, the DEIAr fails to adequately do so.

II. THE DEIAr FAILS TO IDENTIFY AND CONSIDER ONE OF SOUTH AFRICA'S PRIMARY PLANNING TOOLS FOR COASTAL AND MARINE DEVELOPMENT, IN VIOLATION OF NEMA EIA REGULATIONS, 2014

The NEMA EIA Regulations, 2014 require environmental impact assessments to provide “a description of the policy and legislative context within which the development is proposed,” which includes identifying “all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity.”¹⁸ Further, the assessment must describe “how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.”¹⁹

The DEIAr fails to discuss one of South Africa's main marine biodiversity spatial planning tool: the National Coastal and Marine Spatial Biodiversity Plan (“NCMS Biodiversity Plan”). Further, the DEIAr fails to describe how the proposed activity complies with and responds to the NCMS Biodiversity Plan, in violation of NEMA regulations.

The NCMS Biodiversity Plan is the product of a presidential initiative that “aims to consolidate several past and present spatial planning assessment and planning initiatives ...to provide a coherent map of the coastal and marine biodiversity priority areas in South Africa.”²⁰ One of the main purposes of the NCMS Biodiversity Plan is to inform and streamline environmental decision-making, including Environmental Impact Assessments, such as this one.²¹

The Plan is comprised of a map of South Africa's EEZ and coasts that divides areas into use categories, and associated sea-use guidelines that help inform how the various land-use categories should be managed. Specifically, the Plan identifies three priority areas: Protected Areas, Critical Biodiversity Areas, and Ecological Support Areas, which are “are jointly ‘important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape

¹⁶ Makhado et al “The ongoing decrease of African penguins globally and in South Africa” (2022) page 7.

¹⁷ DEIAr, page 147.

¹⁸ NEMA Regs Section 3(1)(e)(i).

¹⁹ NEMA Regs Section 3(1)(e)(ii).

²⁰ National Coastal and Marine Spatial Biodiversity Plan, Nelson Mandela University, <https://cmr.mandela.ac.za/Research-Projects/EBSA-Portal/South-Africa/National-Coastal-and-Marine-Spatial-Biodiversity-P>.

²¹ Id.

[and seascape] as a whole.”²² Areas not identified in one of these three categories are either Other Natural Areas (where intensive land-use planning can be extended without undue impacts on biodiversity) or Areas with No Natural Habitat Remaining (where natural habitat has been irreversibly modified, and which have low biodiversity importance).²³

The Project Site, at the Port of Ngqura, is located in an Ecological Support Area, one of the three biodiversity priority areas that are “important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape [and seascape] as a whole.”²⁴ The Biodiversity Plan explains that Ecological Support Areas like the Project site are “important for marine biodiversity patterns, ecological processes, and ecosystem services,” and directs planners to preserve Ecological Support Areas as much as possible, stating “further deterioration of ecological conditions must be avoided” within these areas.²⁵ The Project Site’s status as an Ecological Support Area is even more important here because the site is located within 1 km of Addo Elephant National Marine Protected Area.²⁶ The NCMS Biodiversity Plan explains that all areas within 5 km surrounding a Marine Protected Area must be either a Critical Biodiversity Area or an Ecological Support Area, to provide a buffer to the sensitive ecology within the protected area.²⁷

Although the DEIAR acknowledges that the Port of Ngqura is an Ecological Support Area and refers to a terrestrial biodiversity plan,²⁸ the DEIAR fails to discuss the definitions or framework laid out in the NCMS Biodiversity Plan. Furthermore, the DEIAR fails to explain how the Project “complies with and responds to” the NCMS Biodiversity Plan, in violation of NEMA regulations.²⁹ This omission is significant because the DEIAR predicts that further deterioration is expected due to the Project but fails to explain that this contradicts national biodiversity planning for the site.

III. THE DEIAR FAILS TO REMEDY ACOUSTIC GROUNDS FOR REJECTION OF ORIGINAL EIA

One of the DEIAR’s most critical flaws is its failure to adequately consider and assess the impacts of underwater noise at the site.

In her appeal decision for Karpowership’s first EIA, Minister Creedy strongly agreed with the Competent Authority’s decision to reject the EIA based on that report’s inadequate noise assessments. The Minister took up various concerns of the Competent Authority, technical experts and I&APs around noise in her decision. Perhaps most significantly are the Minister’s findings with respect to the second grounds of appeal related to the holistic assessment of the EA application:

²² Linda Harris et al., *National Coastal & Marine Spatial Biodiversity Plan Technical Report* (April 12, 2022) at i, https://cmr.mandela.ac.za/cmr/media/Store/documents/EBSA/CBA%20Map%20v1/NCMSBPV1.2_Technical-report.pdf [hereinafter NCMS Biodiversity Plan] (alteration in the original).

²³ The South African National Biodiversity Institute, *Technical Guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systemic biodiversity planning* (June 2017), available at <http://biodiversityadvisor.sanbi.org/planning-and-assessment/technical-guidelines-for-cba-maps/>.

²⁴ NCMS Biodiversity Plan at i.

²⁵ NCMS Biodiversity Plan at 277.

²⁶ See DEIAR at i.

²⁷ NCMS Biodiversity Plan at ii.

²⁸ DEIAR at 128.

²⁹ NEMA Regs Section 3(1)(e)(ii).

In my holistic assessment and consideration of the activities of the proposed Project, I found that the actual and potential impacts on the environment, as well as the socio-economic conditions; particularly in relation to small-scale fisheries, could not be determined due to gaps and inconsistencies in the various reports submitted. In particular, due to the lack of information in respect of the Underwater Noise Impact, the Marine and Ecology Study, as well as the Estuarine Impact Report, the actual and potential risks, and impacts on the geographical, physical, biological, social, economic and cultural aspects of the environment could not be predicted and evaluated in order to find the alternatives and options that best avoid negative impacts altogether, or where negative impacts cannot be avoided, to minimize and manage negative impacts to acceptable levels, while optimising positive impacts, to ensure that ecological sustainable development and justifiable social and economic development outcomes are achieved.³⁰

My findings on this ground of appeal are also confirmed by the independent expert appointed by the Department, in their recommendations, where they state as follows:

"we are in agreement that due to certain aspects, specifically the lack of a specialist Underwater Noise assessment, that there was insufficient and inadequate information available on which to make an informed and responsible decision."³¹

Other relevant concerns taken up by the Minister included:

- i. the lack of a qualitative Noise Impact Assessment on threatened African Penguin Species (Ngqura) and megafauna living, foraging, feeding or transiting nearby;³² and
- ii. the lack of Underwater Noise impact study to assess the impacts to fish and in turn the implication for small scale fisheries.³³

The limitation of various studies, including those that were undertaken in the wrong season, raised concerns regarding the validity of their findings.³⁴ Moreover, the Minister found that mitigation measures proposed were insufficient: "No mitigation measures are put forward for impacts on Marine Ecology by activities of the proposed operation that are in essence unavoidable. This includes not only noise, but effects of the thermal plume caused by the discharge of cooling water that may raise water temperatures and damage marine organisms, and entrainment. The only recommendations are for monitoring."³⁵

The proponent's second attempt to develop an EIA, under consideration here, shows that the proponent understood the important role that inadequate underwater acoustic monitoring and analysis had played in the rejection of the first EIA. The proponent hired an acoustician to undertake an Underwater Noise assessment, and greater efforts were made to incorporate the findings of this study into the Marine Ecology report.

³⁰ Port of Ngqura Appeal at 2.62.

³¹ Ngqura Appeal Decision at 2.63.

³² Ngqura Appeal Decision at 2.113.5.1.

³³ Ngqura Appeal Decision at 2.28.1.

³⁴ Ngqura Appeal Decision at 2.28.1.4.

³⁵ Ngqura Appeal Decision at 2.61.4.

However, a close review of the new DEIAr and its associated studies reveals that the acoustics analyses associated with the new study still fail to address the concerns voiced in the original refusal of the EIAr and in the appeal decision. Among those failings specifically called out from the appeal decision that have not been remedied are that the sampling of the underwater acoustic environment was not done across seasons, but rather only over two days, and the fact that consideration was not given to likely impacts on specific species of value to small scale fisheries or species of particular ecological value, such as endangered species.

Many other shortcomings of the studies, and inconsistencies and gaps within and across the Underwater Noise assessment, Marine Ecology study, and DEIAr result in an EIA that unfortunately suffers from the same meta deficiency as the Minister found with the first: “due to the lack of information...the actual and potential risks, and impacts on the geographical, physical, biological, social, economic and cultural aspects of the environment could not be predicted and evaluated in order to find the alternatives and options that best avoid negative impacts altogether, or where negative impacts cannot be avoided, to minimize and manage negative impacts to acceptable levels.”³⁶ In addition, the DEIAr once again proposes reducing impacts via mitigation measures that are wholly inadequate for addressing the full suite of harms that the project would generate for particular marine organisms.

The sections that follow detail just a few of these many shortcomings, showing how, despite the efforts of the proponent to include an underwater acoustics analysis, the methods used for this study provide little more useful information on how the ships will impact marine organisms than the original EIAr offered, and in fact result in underestimations of the harms of the project to marine organisms. These failings from the underwater sound assessment carry over to the Marine Ecology report and in the DEIAr.

Indeed, when it comes to the noise assessment in the DEIAr, it is a tale of two conflicting stories. On the one hand, the DEIAr’s marine ecology assessment finds that the additional Underwater Noise caused by the project could have behavioral and acute impacts on marine organisms of medium-high significance.³⁷ Yet the DEIAr, also contends, in contradiction, that the powerships will not increase sound levels at all above current levels in the local marine environment, and ultimately dismiss the significance of the project’s sound impacts, finding: “Based on this assessment, no significant impacts on fish or marine mammals are predicted as a result of the operation of the Powership in Port of Ngqura as it will not materially change existing underwater noise associated with the Port. **No additional noise mitigation is deemed necessary, and this project is thus supported from an underwater noise assessment perspective.**”³⁸ Yet, as explained below, this finding is deeply flawed because the Underwater Noise assessment has substantial and serious methodological shortcomings, which serve to underestimate the potential acoustic harms of the project to marine organisms. In addition, the DEIAr downplays any potential for significant harm from the powerships based on faulty reasoning that the port is a busy place with already high levels of noise.

Second, though the Marine Ecology studies and even the DEIAr address some of the gaps left by the underwater acoustics study, particularly by describing in greater detail the variety of sub-lethal “masking” effects that the noise of the ships would cause to nearby organisms, the DEIAr and EMPr fail to consider

³⁶ Ngqura Appeal Decision at 2.62.

³⁷ Ngqura DEIAr Appendix 9 B4 at 109.

³⁸ Ngqura DEIAr at 239.

these impacts seriously. The DEIAr suggests that these impacts are unlikely because the Underwater Noise assessment used a “worst case scenario”³⁹ and downplay the significance of the project noise by comparing it to noise of other vessels transiting through the port that are even louder.⁴⁰ The DEIAr then concludes that “the noise from the Powerships is of a similar level to that of existing ships using the port, and the FSRU much lower, so will not change the existing soundscape of the bay.”⁴¹ The DEIAr then downgrades the significance of the noise impacts from “Medium to High” to “Medium” based on the presumed implementation of voluntary mitigation measures.

A. Anthropogenic sound in the marine environment and its impacts on marine organisms

Soundwaves traveling through water act very differently than those on dry land. Sound typically travels much faster and further in the sea, even hundreds of kilometers.⁴² Like on land, its movement and concentrations are also heavily dictated by the local environmental context, including the substrate of the sea floor, topographic features of the seafloor, water depth, and any other prominent underwater features, including anthropogenic structures.⁴³ These features can lead sound to concentrate in specific locations, or spread out over long distances.

Two primary characteristics of sound help to explain how audible it is: amplitude (or “loudness”) and frequency (or “pitch”).⁴⁴ The amplitude or “loudness” of sounds are typically measured in decibels, which refer to the height of the sound pressure wave. These decibels are measured on a logarithmic scale, so every 10 db increase in sound signifies that the sound is 10 times more intense (i.e. 40 decibels is 100 times more intense than 20 decibels). Because sound travels differently in air than water, the same decibel reading in water corresponds to a lower decibel reading on land. On land, humans are pained when sound exceeds 130 decibels.⁴⁵

Marine organisms are highly affected by sound in their environments. The specific impacts they experience vary based on the species and the season in which they experience it, the frequency and amplitude of the sound, and the local environment. Many marine species use sound like humans typically use sight, guiding them through their world, so they are very sensitive to it. In her report attached (**Appendix A**) Dr. Michelle Fournet, an Underwater Noise specialist, provides examples of the importance of sound to various species: “Social cetaceans including whales and dolphins rely on sound for communication and pod cohesion,”⁴⁶ while, “larval invertebrates and fishes use sound to know when and

³⁹ Ngqura DEIAr p. 236.

⁴⁰ Ngqura DEIAr at 260.

⁴¹ Ngqura DEIAr at 259.

⁴² Urick, R. J. *Principles of underwater sound. Third Edition* (McGraw-Hill Ryerson, 1983). doi:10.1029/2003JD004173.Aires.

⁴³ Urick, R. J. *Principles of underwater sound. Third Edition* (McGraw-Hill Ryerson, 1983). doi:10.1029/2003JD004173.Aires.

⁴⁴ NOAA. *Understanding Ocean Acoustics*, <https://oceanexplorer.noaa.gov/explorations/sound01/background/acoustics/acoustics.html>

⁴⁵ NOAA. *Understanding Ocean Acoustics*, <https://oceanexplorer.noaa.gov/explorations/sound01/background/acoustics/acoustics.html>

⁴⁶ Dudzinski, K. M., Thomas, J. A., Gregg, J. D. Communication in marine mammals. in *Encyclopedia of marine mammals* (eds. Perrin, W. F. & Wursig, B.) 260–269 (Academic Press, 2009).

where to leave their open water life stage and settle into adulthood.”⁴⁷ As a result, anthropogenic noise, particularly noises that “mask” or hide the sounds that organisms use to communicate or that guide them, can have serious consequences for these organisms. As Dr. Fournet explains, “anthropogenic noise has been documented to limit acoustic communication, displace organisms, elicit changes in foraging behavior, alter predator-prey dynamics, induce physiological stress, and/or result in physical damage or death.”⁴⁸ All of these impacts can be caused by acoustic masking.

A sound does not need to be extremely loud to mask key noises for marine organisms and generate these harms. Rather, softer sounds that are in the frequency range that organisms in the vicinity use to communicate can also elicit changes in behavior that reduce a species’ fitness. This is because all organisms hear and communicate in different frequency ranges. Where cetaceans communicate in particular frequency ranges, for example, anthropogenic noise in those ranges can be particularly disorienting for them (see Figure 1). Notably, the knock-on effects of sound go beyond affecting an organism at a particular frequency, but also can include cascading effects across trophic levels as a result of this organism’s behavioral change.

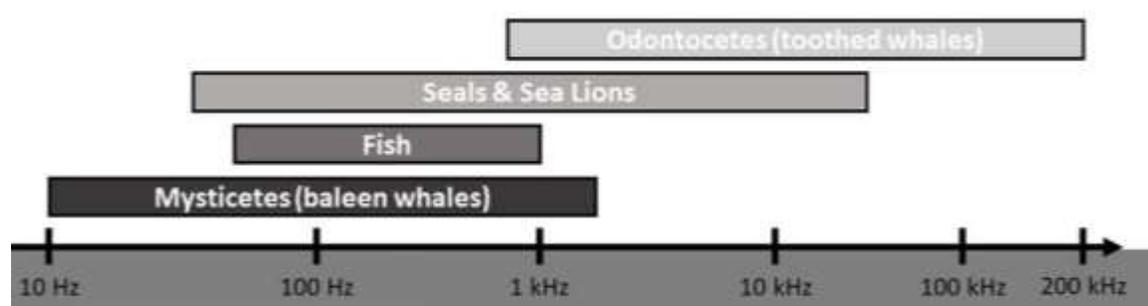


Figure 1. Example of the frequency ranges for calls of different marine organisms. Different species within each type of organism may call at different frequencies within this range.

⁴⁷ Lillis, A., Eggleston, D. B. & Bohnenstiehl, D. R. Oyster larvae settle in response to habitat-associated underwater sounds. *PLoS One* **8**, (2013); Gordon, T. A. C. *et al.* Habitat degradation negatively affects auditory settlement behavior of coral reef fishes. *Proc Natl Acad Sci U S A* (2018) doi:10.1073/pnas.1719291115.

⁴⁸ Finneran, J. J. Noise-induced hearing loss in marine mammals: A review of temporary threshold shift studies from 1996 to 2015. *J Acoust Soc Am* **138**, 1702–1726 (2015); Simpson, S. D. *et al.* Anthropogenic noise increases fish mortality by predation. *Nat Commun* **7**, (2016); Potvin, D. A., Parris, K. M. & Mulder, R. A. Geographically pervasive effects of urban noise on frequency and syllable rate of songs and calls in silvereyes (*Zosterops lateralis*). *Proceedings. Biological sciences / The Royal Society* **278**, 2464–9 (2011). Richardson, W. J. *et al.* *Marine Mammals and Noise. Marine Mammals and Noise* (2013). doi:10.1016/C2009-0-02253-3; Weilgart, L. S. The impacts of anthropogenic ocean noise on cetaceans and implications for management. *Can J Zool* **85**, 1091–1116 (2007); Rolland, R. M. *et al.* Evidence that ship noise increases stress in right whales. *Proceedings of the Royal Society B: Biological Sciences* (2012) doi:10.1098/rspb.2011.242; Achberger, C. *et al.* State of the climate in 2012. *Bull Am Meteorol Soc* **94**, (2013); Blair, H. B., Merchant, N. D., Friedlaender, A. S., Wiley, D. N. & Parks, S. E. Evidence for ship noise impacts on humpback whale foraging behaviour. *Biol Lett* (2016) doi:10.1098/rsbl.2016.0005; Erbe, C., Dunlop, R. A. & Dolman, S. J. Effects of Anthropogenic Noise on Marine Mammals. in *Effects of Anthropogenic Noise on Animals* (2018). doi:10.1007/978-1-4939-8574-6; Popper, A. N. & Hawkins, A. D. An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes. *Journal of Fish Biology* Preprint at <https://doi.org/10.1111/jfb.13948> (2019).

Importantly, but not surprisingly, soundscapes and their impacts on marine organisms change over time, including on diurnal cycles, weekly cycles, and seasonal cycles. Physical features of the marine environment can change with seasons, anthropogenic sources of sound may change depending on the time of day or season, and different marine organisms occupy areas at different times of the year and have different sensitivities to sound during different life stages. For example, migrating humpback whale mothers and calves may be particularly susceptible to anthropogenic noise as the mothers are attempting to teach the calves to sing.

As a result of all of these factors, understanding the anthropogenic underwater soundscape in a given place and its likely impact on marine organisms requires understanding the physical features of the marine environment, the organisms spending some portion of their lives in the affected area and their reactions to anthropogenic sound of different types, and the specifics of the anthropogenic sounds being produced in the area at varied temporal scales. This linking of these pieces of the underwater acoustic landscape together is the work of a bioacoustician.

B. Underwater sound assessment shortcomings

As Dr. Michelle Fournet details in her report, and as described further below, the Underwater Noise specialist study was fundamentally flawed and cannot answer the central question of whether the powerships, FSRU, and intermittent LNG Carrier will do significant harm to marine organisms from the Underwater Noise they produce over their twenty year lives. Dr. Fournet concludes,

The Underwater Noise Assessments and associated Baseline Underwater Noise Reports (studies) failed to adequately demonstrate that noise will not have significant ecological consequences at the three proposed locations. This is in large part due to (1) the failure of the studies to acknowledge that the anthropogenic noise associated with this project is chronic, (2) the failure of the study to adequately assess Underwater Noise conditions at meaningful temporal scales, and (3) the failure of the studies to consider impacts to the broader marine community, including benthic organisms and invertebrates. As such, the mitigation actions proposed in the associated EIAs are founded on an erroneous assessment of noise impacts, and they fail to meaningfully address the possible or likely impacts of anthropogenic noise to the marine environment associated with the powership projects.⁴⁹

Each of these failures, as well as others that Dr. Fournet addresses and some that were beyond the scope of her report, are detailed in the paragraphs that follow, making clear how each shortcoming has either rendered the true impacts of the project on marine organisms impossible to know, or, in some cases, led the studies to underestimate the harms of project noise on marine organisms.

First, the project proponent failed to commission a bioacoustics study, which would have interpreted the impact of the sounds from the powerships, FSRU, and LNGC on local marine ecosystems and marine organisms. Instead, they commissioned an acoustician to undertake the most rapid assessment of sound levels around the study site possible, presumably to keep costs down and/or to more quickly complete the specialist study. The rapid assessment falls far short in what it *should* provide to understand acoustic impacts of the project on marine species.

⁴⁹ Fournet report, page 2.

Second, the rush to complete the study led to the use of inadequate sampling methods. Dr. Fournet notes “The acoustics studies quantified ambient baseline noise levels at two temporal timescales: 10-second spot recordings were made at multiple locations throughout each region, and a 48-hour continuous recording was made at one location in each region. All recordings were made in the month of October or November.”⁵⁰ She concludes that these recordings are too short in duration and lack the temporal variation necessary to capture the effects of the project’s continuous and chronic noise over its twenty-year life. Among other things, this sampling fails to capture soundscape variation across seasons, which is critical for understanding the impacts of the projects to marine organisms that use the Bay in different seasons.

Third, the study misleadingly uses a highly altered soundscape in the port as the acoustic “baseline” for the project, seemingly to suggest that the project would only add a relatively small amount of sound to that baseline. This is misleading in three respects

- i. Even the addition of the project sound atop that altered soundscape baseline is significant. At the Port Nqgura, the Project increases sound by 2 to 3 decibels. While this may not seem like a lot, this means that the *loudness of sound experienced by marine organisms is 23% more intense with the addition of the powerships, FSRU, and LNGC.*
- ii. To understand the significance of the impacts of the project, it would have been useful to compare the natural baseline, that is, the baseline without the additional anthropogenic noise, to that of the noise with the project. If the natural background noise of the bay were 80 decibels, for example, the contributing noise of the project alone, which reaches as high as 134.5 decibels in the Port of Nqgura, would have been nearly *one million times more intense for marine organisms than natural background levels.* This alone would cause acoustic masking in most marine organisms. The addition of still more background noise only raises this impact and threats to marine species further.
- iii. The combination of the sound levels without regard to the *times* as which these sounds are occurring prevents us from knowing of whether the anthropogenic soundscape assumed to be the baseline in the study will in fact generally be the noise occurring in time with the powerships. If the powerships are run alone without the other activity in the port, the soundscape would look different than if they are always being run at the same time as these other activities. This lack of temporal information also hides whether marine organisms are likely to be experiencing harmful sound levels around the clock, or only during certain periods of the day, which can make a difference to how they react.

Fourth, the study only considers sound reaching the lower bound of a “temporary threshold shift” (TTS) for a given species worthy of consideration as “significant.” The TTS is when a species experiences temporary hearing loss at a particular level of sound exposure. However, there are many other ecologically significant harms that noises lower than a TTS level can cause. As noted above, acoustic masking, is particularly harmful. Dr. Fournet explains that harms from masking include changes in behaviors that are critical for species fitness, such as the “cessation of feeding in multiple cetacean

⁵⁰ Fournet report, page 11.

species⁵¹ the cessation of foraging activity in invertebrates and fishes,⁵² and the cessation of egg laying and reproduction in invertebrate and fish species.”⁵³ It is unclear why these harms are not considered as “significant” within the Underwater Noise study.

The Marine Ecology study and DEIAr do, in contrast, raise concerns about masking, stating that the powerships will generate sufficient sound to cause masking and associated behavioral changes. The Port of Ngqura DEIAr states, for example, “Based on these qualitative criteria, it is assumed that most fish species will experience a high effect of masking and at least moderate levels of behavioural change within hundreds of metres of the Powerships” (Appendix 9 B4 at 105). The DEIAr finds that the significance of noise to marine organisms is **medium to high**. Despite this finding, however, the DEIAr then concludes that “the noise from the Powerships is of a similar level to that of existing ships using the port, and the FSRU much lower, so will not change the existing soundscape of the bay.”⁵⁴

Fifth, the Underwater Noise study fails to distinguish between sound wave frequencies in a manner that would be considered best practice – namely, as Dr. Fournet explains, “it is both possible and likely that given the very wide bandwidth over which noise was calculated (1 Hz – 32 kHz) that ecologically significant increases in ambient noise occurred in certain bandwidths but would have been ‘averaged out’ when considering noise across such a wide spectrum. This sort of averaging therefore erases ecologically significant information.” The analysis of sound frequency within more narrow decadal bands is critical for understanding how the noise will affect organisms that communicate within a given frequency range, or are sensitive to particular frequencies. Instead, sound frequencies are aggregated into a 1Hz-32 kHz band for analysis, which means that there may be significant impacts of the project on marine organisms sensitive to particular frequencies that are not captured by the study.

Sixth, the study neglects to analyze the long-term chronic noise of the powerships and FSRU, even though these could be run for 16.5 hours a day for 20 years. The studies were undertaken only to look at the effects of one day, not the lifetime of the project. Moreover, the Underwater Noise Assessment relies on two peer-reviewed articles to assess how the addition of the project to the soundscape will affect marine organisms. Both of these articles, Southall et al. 2019 and Popper et al. 2014 (Underwater Sound Assessment, Port of Ngqura, page 14), explicitly state that their findings cannot be used to assess impacts from chronic noise, yet that is exactly what the specialists do. This is significant failing, as chronic noise has specific and serious impacts on marine species. Dr. Fournet explains, “In marine mammals, chronic

⁵¹ Blair, H. B., Merchant, N. D., Friedlander, A. S., Wiley, D. N. & Parks, S. E. Evidence for ship noise impacts on humpback whale foraging behaviour. *Biol Lett* (2016) doi:10.1098/rsbl.2016.0005; Wisniewska, D. M. et al. High rates of vessel noise disrupt foraging in wild harbour porpoises (*Phocoena phocoena*). *Proceedings of the Royal Society B: Biological Sciences* (2018) doi:10.1098/rspb.2017.2314.

⁵² Popper, A. N. & Hastings, M. C. The effects of human-generated sound on fish. *Integr Zool* **4**, 43–52 (2009); Voellmy, I. K. et al. Acoustic noise reduces foraging success in two sympatric fish species via different mechanisms. *Anim Behav* (2014) doi:10.1016/j.anbehav.2013.12.029; de Soto, N. A. Peer-reviewed studies on the effects of anthropogenic noise on marine invertebrates: From scallop larvae to giant squid. in *Advances in Experimental Medicine and Biology* (2016). doi:10.1007/978-1-4939-2981-8_3.

⁵³ Hawkins, A. D. & Popper, A. N. Effects of Man-Made Sound on Fishes. in 145–177 (2018). doi:10.1007/978-1-4939-8574-6_6; Popper, A. N. & Hawkins, A. D. An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes. *Journal of Fish Biology* Preprint at <https://doi.org/10.1111/jfb.13948> (2019).

⁵⁴ Appendix 9 B4 at 106.

noise is associated with elevated stress levels,⁵⁵ various internal and external organ injuries,⁵⁶ long term displacement from breeding and foraging regions,⁵⁷ shifts in migratory pathways,⁵⁸ and permanent hearing loss.⁵⁹ Chronic noise could have lasting ecosystem effects through these long term displacements, but are nowhere considered in the EIA documents.

Finally, while the study measured noise from the other vessels transiting through the Bay (Underwater Noise Assessment, Ngqura, p. 6), such noise was not considered in the baseline noise or total combined levels of noise modeled across the port (on p. 20). Rather, the study simply asserts, “Based on measurements taken during the baseline monitoring exercise at Port of Ngqura, it is demonstrable that the noise levels shown (that represent the effect of Powership operations) will be exceeded any time a container or bulk carrier vessel transits into or out of the port, since noise levels from those existing operations were measured to be higher.” (p. 20 of underwater noise assessment). Thus, rather than quantifying the cumulative noise impacts of the transiting vessels within the project, and analyzing the ecological implications of these cumulative impacts, it is simply stated that the total combined noise levels modeled would actually be lower than the noise will be in reality when these vessels are passing. The DEIAr, as the next section shows, then misinterprets the loudness of these other vessels as cause for downplaying the significance of the project’s sound, rather than considering the cumulative impacts of these sounds. While the assessment considers the sound produced by the LNG carrier when docked, it does not include an assessment of the sound the LNG carrier might contribute to the soundscape when in motion through the port.

In summary, all of these shortcomings means that the DEIAr and its supporting studies were incomplete, as they were unable to identify, assess, and mitigate harms to marine organisms from the project. The studies likely vastly *underestimate* the potential harm to marine organism from the cumulative noise impacts of the project in combination with other port activity and transiting vessels, and the powerships’ chronic and long-term noise.

C. The DEIAr’s conclusions about noise harm do not align with the significance of noise impacts

⁵⁵ Rolland, R. M. *et al.* Evidence that ship noise increases stress in right whales. *Proceedings of the Royal Society B: Biological Sciences* (2012) doi:10.1098/rspb.2011.2429.

⁵⁶ Nabi, G. *et al.* The possible effects of anthropogenic acoustic pollution on marine mammals’ reproduction: an emerging threat to animal extinction. *Environmental Science and Pollution Research* vol. 25 19338–19345 Preprint at <https://doi.org/10.1007/s11356-018-2208-7> (2018).

⁵⁷ Bryant, P. J., Lafferty, C. M. & Lafferty, S. K. Reoccupation of Laguna Guerrero Negro, Baja California, Mexico, by Gray Whales. in *The Gray Whale: Eschrichtius Robustus* (2012). doi:10.1016/B978-0-08-092372-7.50021-2; Morton, A. B. & Symonds, H. K. Displacement of *Orcinus orca* (L.) by high amplitude sound in British Columbia, Canada. *ICES Journal of Marine Science* **59**, (2002).

⁵⁸ Richardson, W. J., Würsig, B. & Greene, C. R. Reactions of bowhead whales, *balaena mysticetus*, to seismic exploration in the canadian beaufort sea. *Journal of the Acoustical Society of America* **79**, (1986); Malme, C., Miles, P. & Clark, C. Investigations of the potential effects of Underwater Noise from petroleum industry activities on migrating gray whale behavior. *Beranek and Newman report* (1984).

⁵⁹ Stevens, P. E., Hill, H. M. & Bruck, J. N. Cetacean acoustic welfare in wild and managed-care settings: Gaps and opportunities. *Animals* vol. 11 Preprint at <https://doi.org/10.3390/ani11113312> (2021).

Despite its shortcomings, the Underwater Noise assessment still finds that the powerships will increase the noise in the port significantly, by as much as 3 decibels. We maintain, however, that even this finding underestimates the true harm, for the reasons explained above. The Marine Ecology study, as noted above, did attempt a more logical review of the behavioral impacts of the project based on these increased sound levels. It found the project could produce significant impacts on a variety of species, including seabirds.⁶⁰ These impacts were then mentioned in the DEIAR and form part of its conclusion that the noise impacts of the project would be of medium to high significance.

However, the DEIAR then downplays the significance of these impacts, noting that “Based on the measurements of the noise produced by other large vessels in Ngqura, it is evident that the noise levels resulting from the introduction of the Powerships will be exceeded by a transiting container or bulk carrier vessel moving into or out of the port, since noise levels from those existing operations were measured to be higher at equivalent distances.”⁶¹ This presence of louder vessels, rather than being included as a cumulative noise impact atop the powership project, forms the basis for then repeatedly downplaying noise impacts from the project.⁶²

The argument that the powership’s noise impacts should be downplayed because there is other noise from ships in the port is fundamentally flawed. First, and most critically, instead of downplaying the powership’s noise contribution because other sources of noise exist, the DEIAR should have ***integrated these sources of greater noise into a cumulative noise assessment with the project***. This cumulative assessment would have resulted in still higher acoustic impacts than those described in the study, and still higher impacts on marine organisms as a result, as the combined sounds would be greater than even the louder vessel sound. The downplaying of the powerships relative to the vessel noise misleadingly makes it seem as though the powership noise itself will somehow be hidden by the vessel noise, rather than being added to it and further intensifying noise in the port. Additionally, the project will have chronic noise impacts because it is operating up to 16.5 hours daily for 20 years, while other ships will likely be intermittent. Chronic noise presents unique ecological harms different than intermittent noise sources, and they cannot be readily dismissed as the DEIAR attempts. Finally, it is quite possible that the powerships will operate at hours of the day that other noise in the port has been less prevalent, which also means that organisms will have less of a break from noise as a result of the addition of the project – an impact that is nowhere considered in the studies. This is problematic because one coping mechanism of animals to dealing with humans is to shift the timing of their activities.⁶³ The intermittent presence of other vessels, whose temporal presence in the soundscape is not described certainly does not remedy the powerships’ potential contribution to making port noise more constant around the clock than it was in the past.

D. Mitigation measures proposed are inadequate

The DEIAR assumes that with mitigation measures in place, the effects of the project noise can be downgraded from “Medium to High Significance,” to “Medium Significance”.⁶⁴ However, the mitigation

⁶⁰ Appendix 9 B4 at 107.

⁶¹ Appendix 9 B4 at 101.

⁶² See e.g, DEIAR at 259; 269; Appendix 9 B 4 at 106; 107; 113; 122

⁶³ Kaitlyn M. Gaynor *et al.*, *The influence of human disturbance on wildlife nocturnality*, 360, *Science*, 1232–1235 (2018), <https://www.science.org/doi/10.1126/science.aar7121>.

⁶⁴ Appendix 9 B4, page 109-111.

measures⁶⁵ are all voluntary and there are no metrics or enforcement mechanisms in place to ensure that they are followed. The strongest mitigation measures are to prevent the ships from running more than 16.5 hours a day and more than 450 MW. While there is an assumption throughout the EIA that this will be the case, the history of overworking of coal plants in the country, and failing to meet environmental commitments in doing so, does not bode well for these mitigation measures to be met. Moreover, 16.5 hour maximum runtimes do not help to mitigate masking, which will be occurring for some species at all times the powerships are operating, even at 450 MW. One can expect the behavioral effects of masking, described above, to continue even with this mitigation measure in place, then.

Another mitigation measure that states that “In the case that a marine mammal, especially a baleen whale, is in the near vicinity *i.e.*, within hundreds of metres of the Gas to Power project, the Powerships should not operate at maximum power output, to reduce the noise level produced and thus the chances of disturbing the animal.”⁶⁶ This implies that someone within the powership is constantly on the lookout for marine mammals, and that the company will be permitted to not fulfill its commitment for provision of maximum power output, if demanded by the grid operator, in order to avoid the most significant of harm to any marine mammal they observe. This seems a doubtful prospect, at best.

Finally, the mitigation measures conclude with the need for someone to undertake noise impact monitoring “to validate the predictions made of the impacts of the noise produced by the Gas to Power project on the Marine Ecology.”⁶⁷ It is unclear, however, who is responsible for undertaking this study, and how it will be used. If it finds that the acoustic impacts of the project are far greater than the studies originally predicted, will this have any impact on their continuation or operation?

E. Conclusion

In sum, then, the assessment and mitigation of acoustic impacts of the project within the new EIA process does not stand up to scrutiny, as evidenced by the failings of the Underwater Noise Assessment and DEIAr, and the inconsistencies and gaps in interpreting the significance of noise impacts to marine organisms across the Underwater Noise Assessment, Marine Ecology Study, and DEIAr. The failure of the project once again to develop a robust underwater acoustics study that can be used reliably to understand the impacts of the project, in combination with all other noise in the port, on marine organisms, is a fatal flaw of this new DEIAr.

IV. THE DEIAR’S FAILURE TO ADEQUATELY ASSESS THE IMPACTS FROM UNDERWATER NOISE IS ESPECIALLY PROBLEMATIC FOR THE ENDANGERED AFRICAN PENGUIN

As noted above, the proposed project site occurs in very close proximity to Jahleel Island, and relatively close proximity to St Croix Island, both of which are recognized for their importance in providing habitat to endangered seabirds, particularly the African Penguin.

The findings of the Underwater Noise Assessment suggest that the noise from the Powership operations is not anticipated to leave the Port (because it is shielded by the breakwater), and African Penguins are

⁶⁵ Appendix 9 B4, page 110.

⁶⁶ Appendix 9 B4, page 110.

⁶⁷ Appendix 9 B4 At 79

not seen foraging in the Port. Therefore, underwater noise produced by the Powership operations is unlikely to impact African Penguins.

However, Dr Michelle Fournet, noted several deficiencies in the noise impact assessment which imply that the findings of the Underwater Noise Assessment are inaccurate and unreliable. These deficiencies are described in the preceding section.

As a result of the deficiencies in the Baseline Underwater Noise Assessment and the Underwater Noise Assessment, potential noise impacts on Jahleel and St Croix islands, and particularly the area around these islands that are used as foraging ground for endangered seabirds, including African Penguins, have not been properly assessed. It is quite possible that anthropogenic noise associated with not just the Powerships, but the FSRU and LNGC will have an impact beyond the confines of the Port, potentially reaching as far as Jahleel and St Croix Islands. It is important to note that even if the noise does not reach the islands themselves, the areas around the islands are important foraging grounds for African Penguins, which are noise sensitive and may be impacted by the noise generated by the Karpowerships, FSRU and LNGC. The Marine Ecology report concludes that sound will not travel beyond the breakwater, and consequently African Penguins will not be affected, as they are not found in the Port. However, Dr. Fournet finds that: “While it is likely that the presence of the breakwaters minimizes sound transmission beyond these features, not enough information was provided in the report to determine if this is accurate because a full frequency specific propagation study did not take place. Full propagation modeling, that accounts for frequency-specific sounds is essential for determining impacts. This is a failure throughout the studies.”⁶⁸

As the *Draft Biodiversity Management Plan for the African Penguin*⁶⁹ (Penguin BMP) records, the African Penguin is Africa’s only extant penguin and is endemic to both Namibia and South Africa. The species has suffered an enormous reduction from over one million pairs in the 1920s, to numbers of approximately 10 041 pairs in 2022.⁷⁰ It is currently classified as Endangered by the International Union for Conservation of Nature (“IUCN”) and under the Threatened or Protected Marine Species Regulations⁷¹ published under the National Environmental Management: Biodiversity Act, Act 10 of 2004.

Protecting African Penguins is not just important for the species itself, but for the whole ecosystem of which they are a critical part. As the Penguin BMP notes, African Penguins are considered sentinels of ecosystem health, playing an important role in the functioning of marine ecosystems. Thriving African Penguin colonies will give some indication of the status of other marine top predators that target the same prey and, more broadly, to the relative condition of the marine ecosystem.⁷²

⁶⁸ Fournet report, page 17.

⁶⁹ Draft Biodiversity Management Plan for the African Penguin, GN2302 in *Government Gazette* 47061 of 22 July 2022 (“Draft African Penguin BMP”).

⁷⁰ Makhado, Crawford, Sherley and Upfold “the ongoing decrease of African Penguins globally and in South Africa, 1989–2022”, Table 1, page 7.

⁷¹ GN 476 in *Government Gazette* 40875 of 30 May 2017.

⁷² Draft African Penguin BMP, page 7.

African Penguins face a variety of cumulative pressures, including food scarcity (due to competition with commercial fisheries), breeding habitat modification, human disturbance in colonies, oil spills, disease outbreak, predation, and maritime industries such as oil and gas exploration.⁷³

The Marine Ecology Report⁷⁴ acknowledges that African Penguin populations have plummeted, and concludes that considering their greatly reduced population status, any impact on the local populations should be avoided.⁷⁵ Two points are relevant:

- i. Despite this finding, the same Report also finds that there is little research on seabird sensitivity to continuous low-level noise underwater and more research on the impact of marine noise on diving seabirds is needed.⁷⁶ It recommends that an assessment of the distribution and behaviour of diving seabirds in the context of the Powerships should also be undertaken given the lack of information available.⁷⁷ This research is critical and should have formed part of the impact assessment process. Approving the Karpowership project in the absence of critical information regarding seabird sensitivity would be inconsistent with the risk averse and cautious approach required by the National Environmental Management Act, 1998.
- ii. When the above finding regarding the deficit in research is considered together with the deficiencies in the Underwater Noise Assessment identified by Dr. Fournet, the inescapable conclusion is that noise impacts on African Penguins, particularly on Jahleel and St Croix islands and in the vicinity thereof, have been **inadequately** assessed. This is simply not acceptable given the persistence of an Endangered species may be threatened should the project go ahead.

The EIA also fails to consider the cumulative impacts of vessel traffic on the marine ecosystem in general, and Endangered African Penguins in particular. In this regard, Dr. Fournet finds that:

“In several cases, it was clear that the spot samples were made during periods of high noise (e.g., RB spot samples were loudest near cargo ships), yet these values were used as the noise baseline against which disturbance was assessed. By the data included in the reports, the project regions are already somewhat altered by anthropogenic noise; however, no effort was made to consider the cumulative effect of adding the powership to the system. Rather, the altered soundscape, rather than the natural baseline soundscape, was erroneously used to infer that the powership would have no impact.” (our emphasis).⁷⁸

In addition to the failure to properly assess noise impacts on African Penguins, the various reports produced as part of the EIA fail to assess noise impacts on fish species which are important prey for

⁷³ Draft African Penguin BMP, pages 23 to 31.

⁷⁴ At page 42.

⁷⁵ Marine Ecology Report, page 107.

⁷⁶ Marine Ecology Report, page 107.

⁷⁷ Marine Ecology Report, page 124.

⁷⁸ Fournet Report, page 13.

foraging Penguins. This is a significant oversight, and indicates a failure to consider the impacts of the proposed powerships on the ecosystem as a whole.⁷⁹

V. THE DEIAR LIKEWISE FAILS TO ADEQUATELY CONSIDER OR ANALYZE TERRESTRIAL NOISE IMPACTS

Jahleel Island and St Croix Island are recognized as terrestrial noise sensitive areas⁸⁰ given their critical importance as African Penguin breeding colonies. Jahleel Island is approximately 1km away whereas the St Croix and Brenton Islands are situated approximately 6,5km away from the FSRU. These islands are situated within the Greater Addo Elephant National Park Marine Protected Area, which is situated immediately adjacent to the breakwater structure within the Port⁸¹. However, despite their importance, the DEIAR does not properly assess the impacts of terrestrial noise at these important sites, as no measurements of terrestrial noise are taken from either Jahleel or St Croix Island. In this regard, the DEIAR finds that:

“The other sensitive areas are too far away from the noise source to be of concern due to the attenuation of noise by distance. Access to Jahleel Island was not possible, therefore long-term measurements were taken at the harbour wall, which is close to the location of the proposed project. This point is a proxy for Jahleel Island as it is far enough from the current Port of Ngqura activities to approximate the residual noise.”⁸²

Given the importance of these islands to endangered sea birds, access to these islands should have been obtained in order to conduct more accurate noise recording, or at least measurements in closer proximity than the harbour wall to the islands, to assess whether the islands would be impacted by noise.

VI. THE DEAR FAILS TO ADEQUATELY CONSIDER IMPACTS FROM BUNKERING

Bunkering means the supply of fuel for use by ships and includes the shipboard logistics of loading fuel and distributing it among available bunker tanks and “ship-to-ship operations” means the transfer of liquid bulk cargo from one vessel to another.⁸³ Bunkering activities will consequently take place between the FSRU and the LNGC when the latter conveys LNG to the FSRU in order that it may be processed and used by the Karpowerships.

STS bunkering activities, if not properly performed, present serious safety, health and environmental risks, including explosions and spillage during transfer, resulting in pollution, loss of biodiversity and ecological disturbances and loss of efficient functioning of the port. Bunkering activities have in particular been shown to have a devastating impact on endangered seabirds in Algoa Bay, especially in relation to African Penguin populations, whose numbers have declined from more than 50 000 breeding pairs in 2004,⁸⁴ to a record low of 10 041 pairs in 2022.⁸⁵

⁷⁹ Fournet Report, page 22.

⁸⁰ DEIAR, page 115.

⁸¹ DEIAR, page 47.

⁸² DEIAR, page 116.

⁸³ Draft Bunkering Code of Practice, September 2022

⁸⁴ Draft African Penguin BMP, page 7.

⁸⁵ Makhado, Crawford, Sherley and Upfold “the ongoing decrease of African Penguins globally and in South Africa, 1989–2022”, Table 1, page 7.

- A. The impacts of bunkering, both in terms of catastrophic impacts (fire and explosion)⁸⁶ and impacts associated with underwater noise have not been properly assessed.

Underwater noise impacts

A recent study (Pichegru *et al*, 2022)⁸⁷ has linked the advent of bunkering activities in Algoa Bay since 2016, with an 85% decline in African Penguin numbers on St Croix Island. Underwater noise impacts associated with bunkering therefore must be carefully considered, particularly from the perspective of cumulative bunkering impacts in Algoa Bay.

The Marine Ecology Report finds that: “Assuming vessels resupply every 25 days this will increase the number of ships entering the port by approximately 15 per annum, 1.67% of current vessel traffic (not considering continued presence of the Powership and FSRU). In the context of all the traffic in Algoa Bay, which includes vessel traffic to the Port of Gqeberha, the additional traffic of the LNGC is relatively small. As such, the contribution of the LNGC traffic to the cumulative vessel noise in Algoa Bay and potential associated effect on the African penguins is considered to be negligible”.⁸⁸

However, we have already detailed above that the Baseline Underwater Noise report and Underwater Noise Assessment failed to adequately describe the baseline marine soundscape at ecologically relevant timescales and frequencies (findings of Dr. Fournet). Consequently, the impact of the LNGC bunkering with the FSRU has not been properly assessed from an underwater noise perspective. We reiterate that what the studies claim is a natural baseline, is artificially higher due to the presence of vessels. The impact of the LNGC coming and going from the Port has therefore been understated, as it should have been assessed relative to the natural baseline. Had this been done, it is likely that the cumulative impact of the LNGC considered with other vessel traffic in the Port would have been found to be significant.

The only mitigation measure proposed is that when moving in and out of the port, the LNGC should not move at maximum speed, so as to reduce the amount of noise produced by its engines.⁸⁹ This mitigation measure is inadequate, considering the impacts associated with bunkering activities have not been appropriately assessed.

Catastrophic accidents

Bunkering may result in catastrophic accidents. Some of these are listed in the DEIAR and include large hydrocarbon spills, explosions, major vessel collision, and unintentional removal of vessel from moorings.⁹⁰ However, the potential impact of such accidents has not been properly assessed.

The DEIAR simply notes that because all these catastrophic events have protocols in place to avoid incidents, the probability and overall significance score for catastrophic accidents is **Low**. This is entirely inadequate considering the sensitivity of the marine environment of Algoa Bay, and the endangered

⁸⁶ DEIAR, page 285.

⁸⁷ Pichegru et al “Maritime traffic trends around the southern tip of Africa – Did marine noise pollution contribute to the local penguins' collapse?” *Science of the Total Environment* 849 (2022).

⁸⁸ Marine Ecology Report, page 108.

⁸⁹ Page 110, Marine Ecology Report.

⁹⁰ DEIAR, page 266.

species, including African Penguins, which stand to be impacted should a catastrophic accident occur. Because the impacts have not been assessed, no mitigation measures are proposed. This is a significant flaw.

The DEIAr also does not deal with all the risks associated with LNG bunkering. Others which have not even been mentioned, or described in any detail, include the following:

- i. Rollover phenomenon: The process of rapid release of LNG vapour as a result of spontaneous mixing-up of LNG from different densities in one storage tank;
- ii. Rapid phase transition: This phenomenon represents a very rapid physical phase transformation of liquefied natural gas to vapour, when the LNG comes in contact with water;
- iii. Possible BLEVE (Boiling Liquid Expanding Vapour Explosion): This phenomenon, also known as a fireball, is a sudden release of the pressurised gas caused by a rupture of a tank containing a pressurised liquid above its boiling point; and
- iv. Cryogenic damage to steel: A release of LNG, as well as other liquids at temperatures below -40°C can cause serious structural damage to steel and other materials, other than cryogenic steel, which may have serious implications for bunkering infrastructure.⁹¹

As it is, 4 major oil spills have occurred in Algoa Bay since the advent of bunkering in 2016. These spills have resulted in a significant number of oiled seabirds.

Year	STS Fuel Bunkering operator	Receiving vessel	Species and numbers affected
2016	Previously Aegean Oil Petroleum Network, now renamed under Minerva Bunkering	MV Energy Challenger	150 African Penguins
2019	South African Marine Fuels	MV Chrysanthi S	109 African Penguins 13 Cape Gannets 3 Cape Cormorants
2021	Heron Marine	MV Solin	1 African Penguin 3 Cape Gannets Note that it was a stroke of luck that the spill occurred during the annual moult cycle for African penguins, thus they were confined to the islands.

⁹¹ https://safety4sea.com/wp-content/uploads/2019/12/PI-Club-Risk-Focus-Safe-LNG-bunkering-operations-2019_12.pdf (accessed 7 December 2022).

2022	Minerva Bunkering	MT Umnenga	No oiled seabirds reported Note that the number of African Penguins on St Croix is now so low that the few remaining individuals could have avoided the slick. ⁹²
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We are aware that LNG spillage is different from heavy fuel spillage, in that LNG vaporizes rapidly in air, becoming buoyant at -110°C and disperses quickly,⁹³ and consequently doesn't pose the same risks. However, the risk of explosion (due to, for example, uncoupling of the LNGC and the FSRU) and associated impacts (including hydrocarbon release from damaged vessels) and impacts of vaporization have not been assessed. The Marine Ecology Report simply notes that because LNG vaporizes quickly, it would disperse immediately and not affect marine life and as such, LNG leakage has not been assessed.⁹⁴

The above table demonstrates that bunkering is a high-risk activity, and there should have been greater scrutiny of impacts associated with large-scale LNG spills. There is simply insufficient information contained in the DEIAr to conclude that because LNG vaporizes quickly, it would not affect marine life. There are other risks associated with LNG leakage, including explosions, which should have been properly assessed.

Regulation of bunkering

NEMA regulations require environmental impact assessments to provide "a description of the policy and legislative context within which the development is proposed," which includes identifying "all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity."⁹⁵

In order to conduct bunkering operations, the Karpowership project will require:

- i. A licence obtained from the TNPA under section 80(2) of the National Ports Act, Act 12 of 2005 ("the National Ports Act") read with Rule 148 of the National Ports Rules;⁹⁶ and
- ii. A licence from SAMSA in terms of section 21 of the Marine Pollution (Control and Civil Liability) Act, Act 6 of 1981 ("the Marine Pollution Act") and Marine Notice No. 3 of 2016.

Neither of the above provisions are noted in the DEIAr, which is a glaring oversight, and result in non-compliance with the NEMA EIA Regulations, 2014.

We are also aware that a moratorium currently prevents further licences for STS bunkering in Algoa Bay being awarded by SAMSA and TNPA, pending the completion of an environmental risk assessment ("ERA")

⁹² Data obtained from SANCCOB, September 2022.

⁹³ Marine Ecology Report, page 66.

⁹⁴ Marine Ecology Report, page 66.

⁹⁵ NEMA Regs Section 3(1)(e)(i).

⁹⁶ GN 255 in *Government Gazette* 31986 of 6 March 2009.

by the TNPA. The DEIAr should expressly deal with the regulatory regime applicable to bunkering, as the operations of the FSRU and LNGC will not be possible a) while the moratorium is in place (and there is no certainty as to when it will be lifted), and b) unless and until the relevant licences are obtained from the TNPA and SAMSA.

VII. THE DEIAR ADMITS THAT THE CONTINUOUS DISCHARGE OF HOT WATER WILL EXCEED REGULATORY GUIDELINES AND THE DEIAR'S ANALYSIS OF THE IMPACT OF INCREASED WATER TEMPERATURE ON THE MARINE ECOLOGY IS FLAWED.

The Project will continuously discharge hot water to the surrounding marine environment, which can have a harmful effect on marine ecosystems. The DEIAr's modeling shows that the Project will exceed national water quality guidelines, increasing temperatures at the site by more than 1 degree C at both a 100 m and 300 m mixing zone.⁹⁷ In addition to exceeding the guidelines, the DEIAr's analysis of this impact contains multiple flaws, including 1) using the wrong mixing zone to determine water temperature increase; 2) failing to adequately consider whether the temperature increase will induce harmful, sub-lethal ecological or biological impacts at the site; 3) failing to consider impacts on fish larvae and juveniles fish and sharks; 4) and fails to adequately explain how the mitigation measures will reduce the environmental significance of the impact. Moreover, the DEIAr makes confusing statements about whether this impact will increase the risk of algal blooms.

A. The Project's Discharge of Hot Water Exceeds National Water Quality Guidelines

The Project will discharge hot water ranging from 10°C - 15°C directly into the marine ecosystem.⁹⁸ The Department of Water Affairs & Forestry's Water Quality Guidelines for Coastal Marine Waters specify that for thermal discharges, temperature deviation from ambient conditions may not exceed 1 degree C.⁹⁹ The DEIAR admits that the Project will exceed regulatory guidelines, stating:

The 95th percentile ΔT exceeds the 1°C threshold on the 300 m mixing zone boundary by 0.2°C inside the admin craft basin in the north-east of the Port.¹⁰⁰

The project is thus in violation of South Africa's regulatory guidelines on water quality.

The DEIAR, citing no regulatory guideline or approval, dismisses the Project exceedance of regulatory guidance, stating "Since the admin craft basin is a small, artificial environment separated from the main port and the port entrance leading to Algoa Bay a less stringent guideline may be applicable here ... the macrofaunal density in the region of the proposed location of the Powerships is relatively low and has species reflecting its status as a disturbed habitat that is not particularly sensitive. Thus, any potential impacts to the marine biota in the immediate vicinity of the discharge are of relatively low concern."¹⁰¹

⁹⁷ Appendix 9 4b at 93.

⁹⁸ DIEAR Appendix 9 B4 at 84.

⁹⁹ Department of Water Affairs & Forestry, South African Water Quality Guidelines for Marine Waters, Volume 1 (1995) at 5-4, https://www.iwa-network.org/filemanager-uploads/WQ_Compendium/Database/Future_analysis/085.pdf

¹⁰⁰ Appendix 9 4b at 93.

¹⁰¹ Appendix 9 B4 at 93.

This directly contradicts statements made earlier in the DEIAR, which assert that significant biological diversity still remains at the port despite degraded conditions and that the port is an important nursery habitat for sharks and fish precisely because it is “separated” from the rest of the bay and can therefore shelter vulnerable juveniles.¹⁰² Moreover, contrary to the DEIAR’s assertions, the fact that the port area is already burdened from environmental harm weighs against adding impact, as the species existing there are already struggling to cope with a variety of stressors, and the remaining functional ecosystem services should be preserved. In fact, as stated above, the NCMS Biodiversity Plan explicitly states “further deterioration of ecological conditions must be avoided” in Ecological Support Areas such as the Project site.¹⁰³ Therefore, the DEIAR’s suggestion that a more relaxed regulatory guideline is appropriate here is not only unfounded but it directly contradicts national biodiversity guidance for the site.

B. The DEIAR’s analysis of the impacts of warm water discharge is flawed

In upholding the Competent Authority’s decision to reject the first EIA for the Project, Minister Creecy noted that “considerable uncertainties also surround such operational impacts as heating of the seawater and entrainment of organisms, and the specialist reports and FEIAR were not always entirely convincing regarding the low significance of these potential impacts.”¹⁰⁴ The Minister further noted that “No mitigation measures are put forward for impacts on marine ecology by activities of the proposed operation that are in essence unavoidable. This includes not only noise, but effects of the thermal plume caused by the simultaneous discharge of cooling water by two (2) powerships, both operational for 16 to 24 hours per day for the duration of the 20-year lifespan of the proposed Project, that may raise water temperatures and damage marine organisms.”¹⁰⁵ These flaws have not been adequately rectified in the new DEIAR. As noted above and explained in detail below, the DEIAR’s analysis of this impact contains multiple flaws, including 1) using the wrong mixing zone to determine water temperature increase; 2) failing to adequately consider whether the temperature increase will induce harmful, sub-lethal ecological or biological impacts at the site; 3) failing to consider impacts on fish larvae and juveniles fish and sharks; 4) failing to consider cumulative effects of the thermal discharge given variable ocean conditions and climate change 5) and irrationally concluding that mitigation measures will reduce the environmental significance of the impact.

1. The DEIAR uses the wrong mixing zone to measure temperature increase

As noted above, the then Department of Water Affairs & Forestry’s Water Quality Guidelines for Coastal Marine Waters specify that for thermal discharges, temperature deviation from ambient conditions may not exceed 1 degree C.¹⁰⁶ This temperature change is measured at the edge of a perimeter called a mixing zone. While the DEIAR does not specify the appropriate mixing zone, the DEIAR relies on Anchor 2015 for guidance. To determine the appropriate mixing zone for the Project, the DEIAR relies on local guidance:

¹⁰² DEIAR Appendix 9 B4 at 38.

¹⁰³ NCMS Biodiversity Plan at 277.

¹⁰⁴ Ngqura Appeal Decision at 2.61.3.

¹⁰⁵ Ngqura Appeal Decision at 2.61.4.

¹⁰⁶ Department of Water Affairs & Forestry, South African Water Quality Guidelines for Marine Waters, Volume 1 (1995) at 5-4, [https://www.iwa-network.org/filemanager-uploads/WQ_Compedium/Database/Future_analysis/085.pdf](https://www.iwa-network.org/filemanager/uploads/WQ_Compedium/Database/Future_analysis/085.pdf).

“Local (Anchor 2015) advice is 100 m radius for enclosed water bodies and those classed as sensitive environments and 300 m radius in open coast settings where water depths exceed 10 m and the distance offshore is >500 m. Sheltered, nearshore and shallow water environments such as estuaries are considered to have a smaller capacity to assimilate effluent than offshore, deep water, and well-flushed environments (Anchor 2015). The Port of Ngqura is classified as an open coastal and deeper water regime in this assessment, and therefore a 300 m mixing zone is applicable (Anchor 2015).”¹⁰⁷

As demonstrated in the above excerpt, the DEIAr erroneously classifies the Port of Ngqura as an open coastal and deeper water regime and does not explain the basis for this classification. The Project site lacks both cited characteristics of an open coastal and deepwater regime. The powerships are partially located in shallow waters, and some of the effluent is released in areas that do not exceed 10 m in depth.¹⁰⁸ Moreover, both powerships are located within 500 m from shore. Indeed, the breakwater, located adjacent to the powerships, creates a semi-enclosure, meaning that the project site is not “open” and should not be characterized as such. In fact, the DEIAR states as much in stark terms:

The basin [where the power ships are located] is a small, sheltered, and artificial environment separated from the main port, and this type of environment is not as well flushed as the main Port body.¹⁰⁹

The 300 m mixing zone therefore does not apply to this project, and the applicant should use the 100 m, more conservative mixing zone radius, which would cause the Project to be well in exceedance of the water quality guidelines. As a result of this misuse of mixing zones, it is very likely that the impacts on the marine environment have been significantly understated.

2. The DEIAr Fails to Adequately Consider Sublethal Effects of the Thermal Plume

The DEIAr claims that the Project does not exceed any biological thresholds (Appendix 9 B4 at 93) but the DEIAr does not establish this fact. Instead, the DEIAR only lists *lethal* thresholds for certain groups of organisms (plankton, benthic crustacean, and littoral marine biota) and concludes that the project’s contribution to increased water temperatures do not reach these lethal thresholds.¹¹⁰ But establishing that increased water temperatures will not kill certain organisms does not establish whether the project’s contribution to increased water temperatures is environmentally significant, because environmentally significant impacts can occur well before organisms die. In addition, the DEIAR does not discuss lethal thresholds for other organisms that may be present at the Project site, like fish larvae, for example.

The DEIAr does admit that water temperature changes can have sublethal effects, stating: “If temperature changes are beyond the adaptive range of resident communities, sub-lethal effects may occur, such as metabolic inefficiencies, increased susceptibility to disease and toxic effects of pollutants, changed behavioural patterns, intra- and inter-specific competition, predator-prey relationships, community composition and parasite-host relationships.”¹¹¹ All of these impacts could be significant. But the DEIAR does not discuss whether the change in water temperature caused by the Project can or will induce such

¹⁰⁷ DEIAR at 254.

¹⁰⁸ DEIAR at 88, Figure 4.2, showing that some of the effluent is released at 10 m.

¹⁰⁹ Appendix 9 4b at 93.

¹¹⁰ Appendix 9 B4 at 89-90.

¹¹¹ Appendix 9 B4 at 90.

changes, instead listing only temperature thresholds when various organisms die.¹¹² The DEIAr then concludes that impacts to marine ecology will be low, based solely on the fact that the Project will not cause water temperatures to reach lethal thresholds. The DEIAr should be revised to analyze whether the Project will cause the sublethal effects listed in the DEIAr (such as changes in behavioral patterns, susceptibility to disease, etc.), and the significance conclusion must incorporate these sublethal impacts. Further mitigation measures should be developed to address sub-lethal effects in order to ensure that ecological conditions are not deteriorated as required for an Ecological Support Area, such as the Port of Ngqura.

3. The DEIAr fails to consider impacts of increased water temperatures on fish larvae and juvenile fish

In addition, the DEIAr does not adequately discuss the impact of increased water temperature on fish larvae or juvenile fish and shark species, even though the DEIAr recognizes that “The Port functions as an important nursery area for many fish species and is a critical habitat and activity zone for juvenile and neonate dusky shark.”¹¹³ The DEIAr merely concludes that any impacts to these species will be low, since fish are mobile and can move away from the Project site.¹¹⁴ Contrary to the DEIAr claims, however, causing species to leave their habitat is a highly significant impact in and of itself, which can have lethal consequences. Moreover, the DEIAr’s claims that all fish can move is also false. First, fish larvae cannot move away from the Project site. Second, juvenile fish and shark species that inhabit the Port area are specifically there because the port provides shelter from predators and other threats.¹¹⁵ Leaving, therefore, would presumably cause these species harm.

4. The DEIAr fails to consider the cumulative effects of the thermal discharge given ocean variation and climate change

The DEIAr failed to consider the effects of increasing water temperatures at the site in the context of ocean variation and climate change. Even if the 1 degree temperature change has limited effects in isolation, this chronic change may affect organisms during marine heatwaves, which are becoming more common due to climate change. The DEIAr did not analyze whether such cumulative impacts could trigger various biological thresholds (including lethal thresholds) for marine organisms at the site.

5. The DEIAr’s discussion of the relationship between the thermal plume and algal blooms is confusing and misleading

The DEIAr’s discussion of the impact of the Project’s thermal plume on the frequency and extent of algal blooms is also inadequate. The DEIAr seems to imply that the Project’s thermal discharges may increase the risk of algal blooms, stating “an example of a worst-case scenario occurred in 2014, when warm waters in Algoa Bay resulted in a 2-month long harmful algal bloom, which led to two large fish die-offs in the Port of Ngqura.”¹¹⁶ The DEIAr then dismisses this impact, stating “The dead and dying fish were fed on by birds, resulting in the densest concentration of birds ever recorded in the Port. Afterwards, bird use of the

¹¹² Appendix 9 B4 at 89-90.

¹¹³ Appendix 9 B4 at 88.

¹¹⁴ DEIAr at 254.

¹¹⁵ Appendix 9 B4 at 38.

¹¹⁶ Appendix 9 B4 at 93.

port returned to normal levels, indicating the reversibility of warm water effects on avifauna (Martin 2021).”¹¹⁷

There are a number of problems with this discussion of algal blooms. First, if increased risk of algal blooms is an impact of the Project, the DEIAr must state this clearly so that the public and decision-makers know that the Project could result in this impact. Second, if the Project will increase the frequency of algal blooms at the Project site, the DEIAr should explain how this impact will affect the entire marine ecosystem, not just how it will affect birds. If increased algal blooms produce more regular fish die-offs than this could have negative impacts not only on fish species but also on fishermen, particularly since the Port is an important fish nursery grounds.

6. The DEIAr irrationally concludes that mitigation measures will reduce the environmental impact of the Project

The DEIAr describes the impact from the Project’s thermal plume at both a 100 m and 300 m mixing zone, stating that at 100 m, the temperatures increase by 1.3 degrees and at 300 m, temperatures increase by 1.2 degrees within the admin basin and by 1 degree outside the admin basin.¹¹⁸ The DEIAr then proposes three mitigation measures to reduce this impact:

- Release the hot water at 8 m below the surface, which reduces the total area of the hot water plume;
- Ensure that the discharge pipeline has a second elbow so that the water can be discharged horizontally away from the vessel to reduce the risk of recirculation;
- Implement a water quality monitoring programme to validate the predictions of the model and so that adaptive management can be implemented to ensure compliance with water quality guidelines.¹¹⁹

Based on these mitigation measures, the DEIAr reduces the environmental significance of the impact from medium-high to medium.¹²⁰ This analysis is flawed for the following reasons.

First, the area and degree of the impact that the DEIAr describes (a temperature increase of 1.3 degrees at 100 m) is the impact when the hot water is released at 8 m below the surface. Shallower release levels result in higher temperature increases.¹²¹ Thus, requiring the Project to release hot water at 8 m below does not reduce the impact further and mitigates none of the effects described in the DEIAr. Therefore it is irrational to reduce the significance score based on this mitigation measure.

The DEIAr fails to adequately explain how the second mitigation measure reduces harm. It is unclear if requiring elbows in the pipe to reduce the risk of recirculation merely helps the Project operate better or actually reduces water temperature at the site. The DEIAr must explain how requiring elbows to reduce

¹¹⁷ Appendix 9 B4 at 93.

¹¹⁸ Appendix 9 B4 at 93.

¹¹⁹ Appendix 9 B4 at 95.

¹²⁰ Appendix 9 B4 at 95.

¹²¹ Proposed Gas to Power Powership Project at the Port of Ngqura And Coega Sez, Nelson Mandela Bay Metropolitan Municipality, Eastern Cape, Avifaunal Impact Assessment (2021) at 37, stating that releasing the water at 2 m depth resulted in over a 2.4 degree temperature increase.

the risk of recirculation mitigates the harm as it is discussed in the DEIAR and compared to the modeling results. Without further explanation, it is irrational to reduce the significance score based on the second mitigation measure as well.

The third mitigation measure is a monitoring program to validate the model's predictions and to trigger adaptive management to ensure compliance with water quality guidelines. First, it is unclear whether this measure is mandatory, as both the DEIAR and the eMPR use the word "should."¹²² If this measure is discretionary, it is irrational to lower the significance score based on this measure. Even if it is mandatory, however, it is unclear what this mitigation measure does. The DEIAR does not explain what the adaptive management measures are or how they will reduce harm if implemented. Moreover, the model already predicts that the Project will not meet water quality guidelines, so it is unclear what thresholds will trigger the adaptive management measures. Without further clarification, it is irrational to use this ambiguous measure to reduce the significance score of this impact.

VIII. THE OVERALL SPECIALIST CONCLUSION ON THE PROJECT'S IMPACTS TO MARINE ECOLOGY IS FLAWED

Regarding the Project's overall impacts to the marine ecology at the site, the DEIAR states: "Overall, given that impacts on marine biodiversity and associated ecosystem services are mostly very localised and are all reversible, we are of the opinion that the project can proceed from a marine ecology perspective."¹²³

First, the DEIAR has failed to establish that the impacts of 20 years of increased temperature as a result of hot water discharge is reversible. The DEIAR admits that the hot water discharge may displace marine animals,¹²⁴ but the DEIAR does not explain the biological or ecological basis for concluding that organisms will repopulate an area after 20 years of displacement. Likewise, the DEIAR fails to establish that 20 years of chronic increase noise is a reversible impact. As stated in the Fournet Report, "There is no research (field or desk) to support the supposition that chronic noise impacts such as those that would be generated by running the powerships 16.5 hours per day are reversible. As noted above, chronic noise impacts have been demonstrated to cause physiological stress, habitat abandonment, reduced foraging effort, hearing loss and potential population declines."¹²⁵ Twenty years represents multiple generations for many marine organisms, and the DEIAR fails to explain why or by when the site is expected to return to pre-impact conditions after 20 years of harm, especially when the DEIAR admits that multiple endangered species inhabit the site, including the African Penguin which is currently experiencing a serious population decline.¹²⁶

Second, the DEIAR claims that because the effects are "very localized" the Project has a less severe impact on marine ecology.¹²⁷ But this statement is only true if the location is unimportant ecologically. Here, the Project site is an ecologically important area: the powerships are located directly at the mouth of a river. As depicted in the map below, the Coega River (marked by the blue line) empties directly into the Project site (the orange structure is the powerships).¹²⁸ Any estuarine organism entering the sea from the Coega

¹²² DEIAR at 95; eMPR at 120.

¹²³ DEIAR at 269.

¹²⁴ DEIAR at 254.

¹²⁵ Fournet Report, page 19.

¹²⁶ See e.g. Appendix 9 B4 at 40.

¹²⁷ DEIAR at 269.

¹²⁸ See Figure Below, also

River will run directly into the Project—and will have to face increased water temperatures and elevated noise levels. This would be true for, among other species, the estuarine-dependent dusky kob, which is endangered, and which the DIEAR admits “is in a critical state and is important to the commercial line fishing industry.”¹²⁹

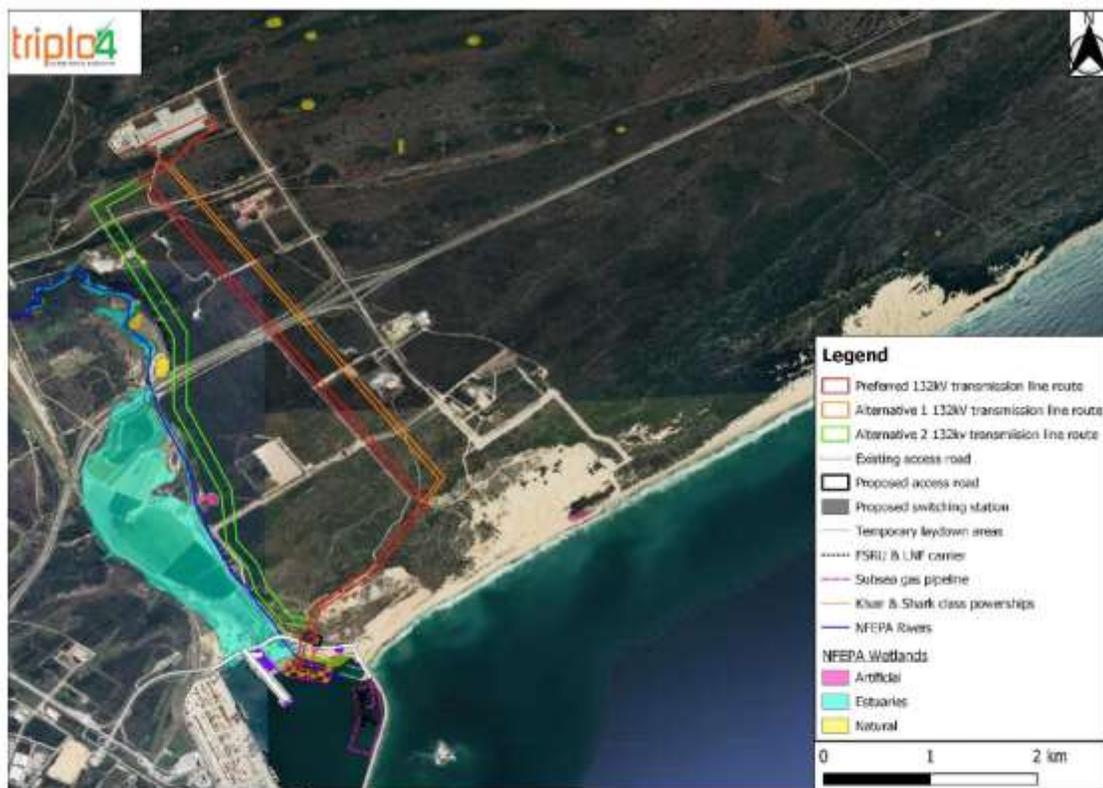


Figure 6-13: Map of the FEPA Rivers and Wetland in relation to the proposed development, from the NFEPA dataset.

The Project tries to minimize the seriousness of the Project’s location by stating that the Coega estuary system is highly degraded already and that it is ranked as having low to medium biodiversity importance.¹³⁰ But as stated above, the DEIAr omits the fact that national biodiversity guidance instructs planners that “further ecological deterioration must be avoided” in Ecological Support Areas like the Project site—and that these sites (including the Project site) are biodiversity priority areas necessary to achieve South Africa’s biodiversity goals. In addition, this characterization of the site as already degraded

¹²⁹ DEIAR at 322.

¹³⁰ See Appendix 9 B4 at 112, stating “the function of Coega Estuary has collapsed, and the Estuary is listed as critically modified i.e., it has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions and processes have been destroyed and the changes are irreversible in both the 2011 and 2018 National Biodiversity Assessments.” See also the DIEAR at 138, stating “The system is currently rated as being of ‘low to average biodiversity importance’, and is not a nationally important fish nursery area. The Coega Estuary is, therefore, not among the priority estuaries identified as requiring formal protection in order to conserve South Africa estuarine biodiversity (van Niekerk, Turpie and Lamberth, 2019).” At 138.”

and of low biodiversity importance is contradicted by other statements in the DIEAR, which elsewhere asserts that the high number of fish assemblages at the Port “demonstrated that the Port functions as an important nursery area for many fish species and is an important habitat and activity zone for juvenile and neonate dusky shark. This is likely due to the relatively calm and sheltered environment provided by the Port compared to the surrounding coastline.”¹³¹ Because the location of the Port is important, both as the connection between the Coega River and the ocean, as well as a sheltered refuge for juvenile sharks and fish, the DAIAr cannot rationally conclude that the localized impacts of the Project will have an insignificant or reversible impact on marine ecology.

IX. THE DEIAR FAILS TO ADEQUATELY CONSIDER THE NEED AND DESIRABILITY OF THE PROJECT

In her appeal decision on the Port of Ngqura project, the Minister reiterated that, “[w]hile another government department may decide the ‘need and desirability’ of a project from their planning perspective,” “proposed activities are to be considered needed and desired from an EIA perspective, in particular, whether that option provides the most benefit, and causes the least damage to the environment as a whole, at a cost acceptable to society, in the long-term as well as in the short-term.”¹³² In denying the powership’s environmental authorisation, the Minister found that the potential environmental harms of the project were too high, no matter how important the project claimed to be for alleviating the energy crisis. The Minister stated: “The alleviation of the current energy crisis may be vital, but this does not mean that it must be achieved by this specific project, nor does it follow that there is now a license to ignore all relevant environmental considerations.”¹³³ The Minister also listed a litany of environmental harms from the powership to justify her decision, including an increase in greenhouse gas emissions, harm to marine organisms from underwater noise, threats to the highly sensitive estuarine habitats and organisms.

None of these harms have disappeared just because the applicant has prepared an updated environmental assessment. In fact, the project is exactly the same. Although the updated DEIAR has added more text to justify the powership’s need and desirability, including various reports discussing the shortcomings of renewable energy and the benefits of gas to meet the energy crisis, these updates do not address the core of the Minister’s concerns that the environmental and social harms of the project are just too high. As we have addressed throughout our comments, the potential harms to the marine ecosystem in and around the Port of Ngqura, the climate and air harms, and the potential harm to the livelihoods of fishing communities are serious and undeniable, no matter how many additional flawed specialist reports the applicant presents.

Unfortunately, the updated DEIR still does not honestly assess renewable energy alternatives that are cost-effective and proven to provide the electricity needs of South Africa. Instead, the DEIAR falls back on a misguided narrative that renewable energy is substantially more costly than gas from the powerships, that renewable energy cannot meet the energy demands of the grid, and that the use of gas has negligible climate impacts and is consistent with the goals of the Paris Agreement to limit global warming to under

¹³¹ DIEAR Appendix 9 B4 at 38.

¹³² Karpowership Port of Ngqura Appeal Decision at para. 2.18; DEA (2017), *Guideline on Need and Desirability* at 10, Department of Environmental Affairs (DEA), Pretoria, South Africa.

¹³³ Appeal Decision at para. 2.22.

1.5 degrees. As we explain below, this narrative is false, relies on fundamentally flawed analysis, and should not support any assessment of the need and desirability of this project.

A. Cost

In support of the cost-effectiveness of the Karpowership projects, the applicant appended a report by Political Economy Southern Africa (PESA) on the role of gas in a just energy transition to its DEIR. PESA's main finding is that "The Karpowership projects, despite their shortcomings, are the quickest way to provide South Africa with the much-needed dispatchable power".¹³⁴

In reaching this finding, PESA dismisses several reports by Meridian Economics and Meridian and CSIR, including Meridian's report titled "Resolving the Power Crisis Part A: Insights from 2021 - SA's Worst Load Shedding Year So Far",¹³⁵ which found through modelling that 96.5% of loadshedding in 2021 could have been avoided through the direct impacts and knock-on impacts of adding 5GW of renewables,¹³⁶ with battery storage and demand response meeting the remaining supply gap.¹³⁷

In challenging the Meridian report's conclusion that "an additional 5GW of wind and solar would have allowed Eskom to eliminate 96.5% of loadshedding in 2021,"¹³⁸ PESA asserts that "the [Meridian] report does not make any consideration or reference to assumptions about the storage capacity and climate conditions required to produce the optimal amount of electricity from the additional 5GW in renewables."¹³⁹ This assertion is incorrect. Meridian found that 5GW of wind and solar alone could have eliminated 96.5% of loadshedding in 2021—even before installing additional battery storage. The needed "climate conditions" were also considered because Meridian assumed that the new renewable energy capacity "would have the same hourly generation profile" as existing renewable capacity.¹⁴⁰

PESA also asserts that Meridian's and other studies that compare the least cost energy between renewables and gas are inappropriate because "they leave out the cost of service from the tariff ..., [which] includes frequency and voltage control, transmission, synchronous power, dispatched ramping, system balancing and last mile connections. ... Moreover, these types of studies make factually inaccurate comparison between the cost of gas-to-power (which includes the total cost of evacuation and distribution) against the incomplete estimations about the cost of renewables".¹⁴¹ PESA, though, does not itself submit its own cost calculations.¹⁴² Instead, PESA submits that "[t]he closest the system costs

¹³⁴ DEIAr, Appendix 8.1 at 36.

¹³⁵ DEIAr, Appendix 8.1 at 20.

¹³⁶ Meridian Economics, *Resolving the Power Crisis Part A: Insights from 2021 – SA's Worst Load Shedding Year So Far* at iii (June 2022), <https://meridianeconomics.co.za/wp-content/uploads/2022/06/Resolving-Load-Shedding-Part-A-2021-analysis-01.pdf>.

¹³⁷ *Resolving the Power Crisis Part A* at iii.

¹³⁸ DEIAr, Appendix 8.1 at 20.

¹³⁹ DEIAr, Appendix 8.1 at 20-21.

¹⁴⁰ *Resolving the Power Crisis Part A* at 5.

¹⁴¹ DEIAr, Appendix 8.1 at 20.

¹⁴² DEIAr, Appendix 8.1 at 21.

have been reflected was with the RMIPPPP tariffs, which included energy, dispatchability, voltage stability and storage costs.”¹⁴³ PESA’s arguments are fundamentally flawed.

For example, Meridian and CSIR’s July 2020 report on different CO₂ emissions scenarios for South Africa (“CSIR & Meridian Report”) found that a least-cost scenario for the South African electricity sector involves rapidly expanding wind and solar power in the near term, with 90% renewable uptake in the grid by 2050.¹⁴⁴ The modelling does incorporate costs of service based on the parameters of the Integrated Resource Plan 2019 model, but reflects updated demand, existing fleet performance, and technology costs, and assumes “no carbon emissions constraint, no forced-in new-build technologies, and no annual new-build constraints on any technologies.”¹⁴⁵ The renewables pricing assumptions in the Resolving the Crisis report are also based on actual bid prices from the Renewable Energy Independent Power Producer Programme, accounting for inflation.¹⁴⁶

PESA’s reliance on the RMIPPPP as the best existing standard for determining technology costs is also misplaced and unsurprising, given that the restrictions imposed in the request for proposals made gas projects “seemingly, but erroneously, cost-competitive.”¹⁴⁷ Clyde Mallinson’s techno-economic evaluation of the RMIPPPP from 21 August 2021,¹⁴⁸ attached here as **Appendix B**, identifies several design flaws in the request for proposals which resulted in bid tariffs that are untethered to the realities of an electricity system and do not reflect true technology costs. Mallinson explains that the “restrictions, terms and conditions” of the RFP process “have little to no impact on gas-dominated projects,” but they raise the bid tariffs for renewable energy “on average by more than 50%.”¹⁴⁹ In particular, the prohibition on storing energy outside the dispatch window and requirement that energy storage systems be co-located with the renewable generation capacity “result in the need to unnecessarily oversize storage systems, increasing the costs for renewable projects and thus increasing the tariffs that were bid.”¹⁵⁰ Mallinson’s analysis reveals that a “full systems approach” to the request for proposals where “projects were fully integrated with existing Eskom storage assets,” evaluated in the context of their interaction with other generation assets, and free from arbitrary restraints, would have resulted in tariffs that were “less than

¹⁴³ DEIAr, Appendix 8.1 at 21.

¹⁴⁴ CSIR and Meridian Economics, 22 July 2020, *Systems analysis to support increasingly ambitious CO₂ emissions scenarios in the South African electricity system* (CSIR & Meridian Report) https://researchspace.csir.co.za/dspace/bitstream/handle/10204/11483/Wright_2020_edited.pdf?sequence=7&isAllowed=y.

¹⁴⁵ CSIR & Meridian Report at 60. PESA acknowledges that it makes sense for the IRP2019—a system-wide plan—to “include a multitude of parameters such as system and transmission constraints, load following, dispatch costs and energy costs.”

¹⁴⁶ *Resolving the Power Crisis Part A* at 33.

¹⁴⁷ Clyde Mallinson, *The South African Risk Mitigation Power Producers Procurement Programme (RM4P): A techno-economic evaluation of the underlying design of the request for proposals (RFP) and the resultant impact on the outcomes of the RM4P* at 1 (27 Aug. 2021).

¹⁴⁸ This report was submitted to the National Energy Regulator of South Africa by the Centre for Environmental Rights as further support for why the Karpowership projects should not receive electricity generation licenses.

¹⁴⁹ Clyde Mallinson RMI4P Report at 4.

¹⁵⁰ Clyde Mallinson RMI4P Report at 7.

one half of the Karpowership [bid] tariffs.”¹⁵¹ Notably, the “optimal full system integrated [request for proposals] would have no gas.”¹⁵²

PESA also takes issue with another Meridian report called “Hot Air About Gas: An Economic Analysis of the Scope and Role for Gas-Fired Power Generation in South Africa,” in which Meridian found that “[f]orcing large-scale gas use into the power generation portfolio in South Africa instead of the much smaller alternative peaking role to support renewables will increase the cost of the electricity generated by more than 40%.”¹⁵³ Rather than dispute the validity of this conclusion, PESA instead argues that “this is not the immediate trade-off given [South Africa’s] need to expeditiously resolve the intensifying energy crisis, which needs a solution now and not a decade in the future.”¹⁵⁴ Yet, South Africa need not make this trade-off at all, as the next section on alternatives explains, because renewables can provide an immediate solution to the energy crisis.

B. Alternatives

In her appeal decision on the Karpowership Port of Ngqura project, the Minister noted that “[t]he alleviation of the current energy crisis may be vital, but this does not mean that it must be achieved by this specific project”¹⁵⁵ In fact, the objective of addressing this crisis can be better met through focusing on adding renewable energy capacity to South Africa’s grid. Yet, as with the original EIA, Karpowership’s current DEIAr fails to assess renewable energy options in its alternatives analysis, even though expert reports submitted in response to the original EIA and recent analyses demonstrate renewables are viable options that would result in the same, if not more, benefits than the Karpowership projects. Besides site, layout, and no-go alternatives,¹⁵⁶ Karpowership only discusses the possibility of using hydrogen gas to power and reserves an assessment of it for “an appropriate time when the feasibility of hydrogen fuelled power generation has sufficiently matured.”¹⁵⁷ There is no excuse for the DEIAr’s failure to consider alternatives.

Other renewable energy options, such as wind and solar, are feasible, affordable, and preferred alternatives. Meridian’s report on resolving the power crisis demonstrates that the addition of renewable energy would have eliminated almost all the loadshedding in 2021, without any help from new gas resources. The CSIR & Meridian Report found that “[p]eaking requirements can be provided by liquid fuels for at least the next 10 years in all scenarios,” and South Africa “can wait for 10 – 15 years” before making a decision to “expand gas infrastructure to support the power sector.”¹⁵⁸ Rocky Mountain Institute’s expert report¹⁵⁹ evaluating the CSIR & Meridian Report and applying its findings to the Karpowership projects, included here as **Appendix C**, concludes that the Karpowerships “would come online as much as

¹⁵¹ Clyde Mallinson RMI4P Report at 12.

¹⁵² Clyde Mallinson RMI4P Report at 12.

¹⁵³ DEIAr, Appendix 8.1 at 5; Meridian Economics, *Hot Air About Gas: An Economic Analysis of the Scope and Role for Gas-Fired Power Generation in South Africa* at 49 (June 2022), <https://meridianeconomics.co.za/wp-content/uploads/2022/06/Hot-Air-About-Gas.pdf>.

¹⁵⁴ DEIAr, Appendix 8.1 at 5.

¹⁵⁵ Karpowership Port of Ngqura Appeal Decision at para. 2.22.

¹⁵⁶ DEIAr at 467-470.

¹⁵⁷ DEIAr at 100.

¹⁵⁸ Meridian Economics, 2020, *A Vital Ambition: Determining the cost of additional CO2 emission mitigation in the SA electricity System* at 59, <https://meridianeconomics.co.za/wp-content/uploads/2020/07/Ambition.pdf>.

¹⁵⁹ This report was attached to groundWork’s responding statement in the EA appeal as AJ1.

a decade prior to the planned need for any type of new high utilization energy capacity” and thus “represent an unneeded and uneconomic addition to [South Africa’s] electricity system” for “over half of their operational life.”¹⁶⁰

In support of a larger role for gas despite studies like the CSIR & Meridian Report, Karpowership submits several industry publications, none of which are specific to South Africa except a paper by Wärtsilä Energy,¹⁶¹ the developer of the Powerships’ gas engines and hardly an independent expert in this matter. The Wärtsilä publication concludes that the optimal capacity mix (its “Perfect World” scenario¹⁶²) for South Africa “requires the addition of 9 GW of flexible gas, 7 GW of energy storage systems, and 40 GW of combined wind and PV by 2032.”¹⁶³ According to Wärtsilä, the 9 GW of flexible gas required is best provided through Internal Combustion Engines (ICE) rather than Combined Cycle Gas Turbines (CCGT), which “only make a small appearance with 670 MW in Perfect World in 2025 and 280 MW in 2028.”¹⁶⁴

However, Wärtsilä methodology or data is often not disclosed and its conclusions are made without considering important information. For example, for its estimates on the costs of ICE, Wärtsilä relies on “internal” references, experience, and observations, data which cannot be verified independently.¹⁶⁵ Wärtsilä identifies what it calls critical gaps in information that it did not consider, such as the need for “[i]nvestigating the degree of flexibility and integrating any supply constraints which mimic real-life limitations one may encounter when considering the LNG supply chain and/or other gas supply options.”¹⁶⁶ Meridian, however, has considered such a constraint in its report “Hot Air About Gas,” where it cautioned that importing fuel exposes South Africa’s power prices to “the vagaries of the exchange rate and the global gas market,” which “result in price shocks that usually entail a combination of energy price changes and currency weakening.”¹⁶⁷ Wärtsilä also mentions that it compared system costs across its different scenarios, but it is unclear what data it used or how it quantified them.¹⁶⁸ Even if Wärtsilä’s Perfect World scenario correctly identified the optimal energy mix for South Africa, it does not support the Karpowerships. The combined capacities of all three Karpowership projects (1,220 MW) greatly exceed both the CCGT allocations for 2025 and 2028 in Wärtsilä’s Perfect World scenario identified above.

The DEIAr also vaguely refers without any citations to “models developed by the CSIR” that “proposes that gas-powered electricity should have an installed capacity of approximately 6GW by 2030 and 14GW by 2050” and “more than 70% of the energy mix should be renewable energy by 2050 to be cost-

¹⁶⁰ RMI Report at 12.

¹⁶¹ Wärtsilä Energy (2022), *Flexible Gas: An Enabler of South Africa’s Energy*.

¹⁶² Wärtsilä describes this scenario as one where it “[a]llow[ed] the model to determine the optimal capacity mix without imposing any of the known new capacity addition opportunities and/or restrictions.” Wärtsilä Energy (2022), *Flexible Gas* at 6.

¹⁶³ *Flexible Gas* at 2.

¹⁶⁴ *Flexible Gas* at 10.

¹⁶⁵ *Flexible Gas*, Attachment 1 – Key Inputs and Scenarios.

¹⁶⁶ *Flexible Gas* at 26.

¹⁶⁷ Hot Air About Gas at 41, 46.

¹⁶⁸ *Flexible Gas* at 16.

optimal”.¹⁶⁹ It is impossible to verify what CSIR model the DEIAr references without citations, however, the most recent modeling by CSIR in 2020 found very different requirements for gas.¹⁷⁰ In particular:

1. A least cost model for South Africa’s electricity grid would be composed of 90% renewable capacity by 2050.
2. Such a grid would be complemented by small quantities of storage capacity and gas fuelled generation capacity.
3. Under this model, there is no need for new gas generation capacity within the next decade as peaking capacity can be provided by existing diesel fuelled generation capacity until then.
4. There is no need for new combined cycle gas capacity in the next decade, and no need for 3 GW of such capacity until 2041. Gas and peaking resources contribute just 1.1% of total electricity generation in 2025, and 2.4% by 2035.
5. South Africa would be better served by focusing on investment in infrastructure to enable a 21st century electricity system, which CSIR/Meridian’s findings and global trends show to be largely renewable.

Finally, no-go alternative analysis assumes that renewable projects would not replace the Karpowership projects in filling the short-term electricity supply gap. This assumption allows the DEIAr to list a slew of unwanted consequences, including “[c]limate change and air quality impacts due to reliance on coal based power generation,” “[n]o additional dispatchable power,” and a missed opportunity to “pave the way to a just transition.”¹⁷¹ However, as described above, renewable energy projects would meet any gap left by the Karpowerships and could provide needed electricity along with the environmental and socioeconomic benefits Karpowership claims would be lost if the projects do not go ahead, all without exacerbating climate change.

C. Site-specific Analysis

Karpowership has not adequately assessed the site-specific environmental impacts of the Port of Ngqura project. A need and desirability analysis involves not only an assessment of general impacts but also those on the “location of the development being proposed,”¹⁷² including the unique sensitivities of the surrounding environment.

Section 2 of Appendix 3 to the EIA Regulations states that the objective of the EIA process is to “describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping

¹⁶⁹ DEIAr at 379 (“Models developed by the CSIR indicate how an increase in flexibility of the grid would occur with increased gas technology uptake. In their modelling on least-cost renewable energy uptake scenarios, more than 70% of the energy mix should be renewable energy by 2050 to be cost-optimal.”).

¹⁷⁰ CSIR and Meridian Economics, 22 July 2020, *Systems analysis to support increasingly ambitious CO₂ emissions scenarios in the South African electricity system*.

¹⁷¹ DEIAr at 72..

¹⁷² *Guideline on Need and Desirability* at 10.

report.” An EIA should describe how a project will “negatively impact on ecological integrity objectives/targets/considerations of the area.”¹⁷³

As we discuss throughout these comments, there are many areas of the DEIAr that have material deficiencies and flaws, including related to underwater and terrestrial noise, marine ecology, climate change, socio-economics, among others. These deficiencies make an accurate assessment of the need and desirability of the project impossible.

The location of the project near an industrial development zone does not excuse the inadequacy of the DEIAr’s analyses of such impacts or justify them. Karpowership notes in support of need and desirability that “the Karpowership project is in an active port, and Coega Development Special Economic Zone, which is considered a key growth node catering specifically for the energy and maritime sectors.”¹⁷⁴ While relevant context, these characteristics of the project location are not dispositive of whether the project should be approved. As the Minister made clear in her appeal decision, [t]he strategic nature of [a] proposed [p]roject is not a license to override all other relevant environmental considerations.”¹⁷⁵ The purpose of an EIA is to identify “the best practicable option that will best ensure the maintenance of ecological integrity while promoting justifiable social and economic development.”¹⁷⁶ What is required to ensure ecological integrity does not change based on the designation of a location as an industrial zone.

X. THE CLIMATE CHANGE IMPACT ASSESSMENT IS FLAWED

The Minister’s appeal decision about the original Karpowerships EIAr points to several flaws in the proponent’s original Climate Change Impact Assessment (“CCIA”) and integration of climate change into the EIAr. In the revised DEIAr and CCIA, these deficiencies remain either partially or wholly unaddressed. The CCIA again fails to appropriately assess upstream emissions from the project, does not fulfill the comprehensive assessment required by the *Thabametsi* judgment, and makes no additional effort to mitigate the emissions from the project, found to be of “High Significance,” which should be considered a fatal and material flaw to the project.

In the context of a climate crisis already resulting in significant harm and loss of life across South Africa, a failing electricity system in which consumers are already paying too much for unreliable and dirty energy, and the opportunity to rapidly and more cheaply deploy renewables at scale today, the high climate impacts of this project, and the failure of its DEIAr and its CCIA to comprehensively consider these impacts, render this project unacceptable for the climate and the people of South Africa.

Climate context

It is incontrovertible that we are in a climate crisis which is being caused by human activities that emit carbon dioxide (“CO2”) and other greenhouse gases, including methane (CH4), into the Earth’s atmosphere. As of June 2022, atmospheric CO2 levels had reached 421 parts per million (ppm), up from 353 ppm in 1990, and 316 ppm in 1960.¹⁷⁷ This represents a 50% increase over pre-industrial levels. Nearly

¹⁷³ *Guideline on Need and Desirability* at 14.

¹⁷⁴ DEIAr at i.

¹⁷⁵ Karpowership Port of Ngqura Appeal Decision at para. 2.3.1.

¹⁷⁶ *Guideline on Need and Desirability* at 18.

¹⁷⁷ NOAA, *Carbon dioxide now more than 50% higher than pre-industrial levels*, (June 3, 2022),

70% of this CO₂ comes from the burning of fossil fuels. 2021 saw the largest annual increase in atmospheric methane, 17 ppb, since systematic measurements began.¹⁷⁸

South Africa is party to several international legal instruments aimed at addressing climate change. It has signed and ratified the UNFCCC, acceded to the Kyoto Protocol and signed and ratified the Paris Agreement of 2015. The Paris Agreement commits state parties to limiting the global average increase in temperature to "well below 2°C above pre-industrial levels" and to "pursue efforts to limit the temperature rise to 1.5 ° above pre-industrial levels".

1.5 ° is not an arbitrary number. Global average warming above 1.5 ° C above preindustrial levels will have profoundly harmful impacts on humanity and the planet, including in South Africa. The IPCC, the preeminent body for assessing the science related to climate change, documents and predicts these harms. In 2018, the IPCC prepared a Special Report on the impacts of global warming of 1.5° C above pre-industrial levels.¹⁷⁹ The Summary for Policy Makers published alongside that report explains that surpassing 1.5 °C would lead to irreversible loss of the most fragile ecosystems, and crisis after crisis for the most vulnerable people and societies.¹⁸⁰ The report indicates that " ... Some of the worst impacts on sustainable development are expected to be felt among agricultural and coastal dependent livelihoods indigenous people, children and the elderly, poor labourers, poor urban dwellers in African Cities ... "¹⁸¹

The Summary for Policy Makers of the "Physical Science Basis" Working Group of the IPCC's Sixth Assessment (2021), meanwhile, clearly establishes that each incremental increase in global average temperature comes with more substantial impacts. In other words, every fraction of a degree makes a difference to the ultimate health and survival of humanity and the beings with whom we share this planet. There is therefore wide consensus that urgent action is necessary in the next decade to limit global warming to 1.5° C. In the IPCC's Sixth Assessment, it was concluded that to limit warming to 1.5 ° C, emissions will need to peak between 2020 and 2025 and countries must halve CO₂ emissions within the next decade and achieve net zero CO₂ emissions around 2050. To date, the global community has fallen short of reaching this goal and emissions have continued to rise each decade. According to the UN Emissions Gap Report of 2020, the world is currently heading for at least a global average 3 ° C of warming by 2100.

The IPCC's Sixth Assessment further concludes that projected cumulative future CO₂ emissions over the lifetime of existing and currently planned fossil fuel infrastructure, including gas, without additional abatement (measures to prevent their emissions entering into the atmosphere) puts the planet on a pathway roughly aligned with 2°C average global temperature increase. Construction of further fossil fuel infrastructure would worsen this outlook. In short, there is wide consensus that urgent action is necessary in the next decade to limit global warming to 1.5°C and that there is no atmospheric space left for new fossil-fuel emissions.

<https://www.noaa.gov/news-release/carbon-dioxide-now-more-than-50-higher-than-pre-industrial-levels>.

¹⁷⁸ NOAA, *Increase in atmospheric methane set another record during 2021*, (April 7, 2022),

<https://www.noaa.gov/news-release/increase-in-atmospheric-methane-set-another-record-during-2021>.

¹⁷⁹ IPCC, *Summary for Policymakers: Global Warming of 1.5 ° C*, p. 5 and 9, (2018),

<https://www.ipcc.ch/sr15/chapter/spm/>.

¹⁸⁰ IPCC, *Summary for Policymakers: Global Warming of 1.5 ° C*, (2018), <https://www.ipcc.ch/sr15/chapter/spm/>.

¹⁸¹ IPCC, *Global Warming of 1.5 ° C*, p. 244 and 227, (2018), <https://www.ipcc.ch/sr15/>.

South Africa has already experienced more warming than the rest of the world. From 1931 to 2015, western parts of South Africa, “including much of the Western and Northern Cape, and also in the east over Gauteng, Limpopo and the east coast of KwaZulu-Natal,” warmed by “2°C/century or even higher – in the order of twice the global rate of temperature increase.”¹⁸² This trend is predicted to continue, with resulting increases in extreme heat waves¹⁸³, drought¹⁸⁴, water and food insecurity¹⁸⁵, wildfires¹⁸⁶, storms and flooding¹⁸⁷, sea level¹⁸⁸, and vector borne diseases¹⁸⁹ already underway.

Despite its particular vulnerabilities to climate change, South Africa is already lagging behind in the global effort to address climate change. The Climate Action Tracker (CAT), which takes the current government action and policies into account, rates South Africa's proposed actions and policies under the Paris Agreement as "insufficient".¹⁹⁰ The CAT states that South Africa's climate commitment in 2030 will fail to limit its warming to 1.5° C as required under the Paris Agreement. South Africa's climate commitment is not in line with a "fair" approach to the Paris Agreement's 1.5° C limit.¹⁹¹

This context frames the urgency of taking decisions about South Africa's energy future that align with 1.5° C and that avoid exacerbating the harms from climate change that South Africa is already experiencing. Critical to making these decisions is a full analysis of every proposed project's climate implications within the EIA process. Unfortunately, as described below, the Karpowerships proposal falls short of such a comprehensive assessment.

¹⁸² Republic of South Africa, Department of Environmental Affairs, *South Africa's Third National Communication under the United Nations Framework Convention on Climate Change* at 12 (March 2018), https://unfccc.int/sites/default/files/resource/South%20African%20TNC%20Report%20to%20the%20UNFCCC_31%20Aug.pdf.

¹⁸³ Innocent Mbokodo et al., *Heatwaves in the Future Warmer Climate of South Africa*, 11 *Atmosphere* (3 July 2020), https://res.mdpi.com/d_attachment/atmosphere/atmosphere-11-00712/article_deploy/atmosphere-11-00712.pdf

¹⁸⁴ The SPEI measures precipitation minus potential evapotranspiration. *Id.*

¹⁸⁵ ASSAf Report, page 15.

¹⁸⁶ Nick Watts et al., *The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises* at 9 (02 December 2020), <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2932290-X>.

¹⁸⁷ Elizabeth J. Kendon et al., *Enhanced future changes in wet and dry extremes over Africa at convection-permitting scale*, 10 *Nature Communications* (23 April 2019), <https://www.nature.com/articles/s41467-019-09776-9#Fig2>.

¹⁸⁸ Climate Central, *Surging Seas Risk Zone Map* (2019), <https://ss2.climatecentral.org/#globalwarning>.

¹⁸⁹ S.J. Ryan et al., *Global expansion and redistribution of Aedes-borne virus transmission risk with climate change*, *PLoS Neglected Tropical Diseases* (28 March 2019), <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0007213>; S. J. Ryan et al., *Warming temperatures could expose more than 1.3 billion new people to Zika virus risk by 2050*, *Global Change Biology* (09 October 2020), <https://onlinelibrary.wiley.com/doi/10.1111/gcb.15384>; S. J. Ryan et al., *Shifting transmission risk for malaria in Africa with climate change: a framework for planning and intervention*, 19 *Malaria Journal* (01 May 2020), <https://malariajournal.biomedcentral.com/articles/10.1186/s12936-020-03224-6>.

¹⁹⁰ Climate Action Tracker, *Climate Action Tracker Country Summary: South Africa*, (Oct. 28, 2022) <https://climateactiontracker.org/countries/south-africa/>.

¹⁹¹ Climate Action Tracker, *Climate Action Tracker Country Summary: South Africa*, (Oct. 28, 2022) <https://climateactiontracker.org/countries/south-africa/>.

1) The CCIA's high level of greenhouse gas emissions constitute a fatal flaw

The proponent estimates that the emissions from the project will be some 31,000,000 tonnes of CO₂e over the 20 years of the project, or 1,500,000 tonnes of CO₂e per year.¹⁹² We cannot verify if this is an accurate number, however, because the assumptions and methodologies used in making this calculation are not detailed enough. These details must be provided. Nonetheless, this is equivalent to 0.44% of what the Carbon Action Tracker considers to be South Africa's fair share annual emissions rate of 347.78 MTCO₂e by 2030¹⁹³, and 0.42% of South Africa's latest 2030 NDC target (insufficient for achieving 1.5° C) of 366 MTCO₂e annually.¹⁹⁴ It's important to remember that annual emissions from the project will also continue until at least 2042, even as South Africa's emissions will need to fall, meaning that by 2042, the project will make up about 0.92% of South Africa's total emissions if the country were to be on track to contribute its fair share of mitigation to reaching 1.5° C limit.¹⁹⁵ While 1% may seem relatively small, this is very significant for a single project when compared with emissions from across all sectors. Importantly, this 1% represents only the emissions from one of three of the three proposed powership projects.

The first CCIA concluded that the project, would have a "high impact,"¹⁹⁶ while the CCIA presently under consideration decided that the project emissions, while having substantially greater annual and total emissions than previously estimated, would be categorized only to have a "medium impact" (p. 52 and 25). The reason for this backtracking is because the new CCIA arbitrarily changed the threshold limit for what should be considered a "high" impact level. (see Figure 1 and 2). While the previous CCIA used 10 M tCO₂e lifetime emissions for its "high impact" threshold, the new CCIA used 15 M tCO₂e *annual* emissions for its "high impact" threshold. The new "high" impact threshold was determined, according to the specialists, based on the annual emissions of a coal fired power plant of 2900 MW, calculated to be 15 MtCO₂e. It appears that in the current CCIA, the specialist intentionally adjusted the threshold level to prevent the project from being considered to have a high GHG emissions impact without abatement, which would have rendered it fatally flawed. In other words, it appears that the new CCIA has moved the goalpost to offer an advantage for its climate change assessment.

¹⁹² FEIAr CCIA report, October 2022, p. 30.

¹⁹³ Climate Action Tracker, *CAT Assessment Data ZAF*,
https://climateactiontracker.org/documents/995/202210_CAT_AssessmentData_ZAF.xlsx/.

¹⁹⁴ Climate Action Tracker, *Climate Action Tracker Country Paris Agreement Targets: South Africa*
<https://climateactiontracker.org/countries/south-africa/targets/>.

¹⁹⁵ Climate Action Tracker, *CAT Assessment Data ZAF*,
https://climateactiontracker.org/documents/995/202210_CAT_AssessmentData_ZAF.xlsx/.

¹⁹⁶ DEIAr CCIA report, April 2012, p. 47.

Figure 1. Climate change impact criteria used in first CCIA¹⁹⁷ (represents *total emissions* over lifetime of project)

GHG impact rating as a % of SA's carbon budget	GHG emissions generated (tCO2e)		Percentage of South Africa's carbon budget used over the life of the project	
	Lower limit	Upper limit	Lower limit	Upper limit
Low	0 tCO2e	10 000 tCO2e	0%	0.000227%
Medium	10 001 tCO2e	1 000 000 tCO2e	0.000227%	0.0227%
High	1 000 001 tCO2e	10 000 000 tCO2e	0.0227%	0.227%
Very High	10 000 001 tCO2e	+	> 0.227%	

Figure 2. Climate change impact criteria used in the current CCIA¹⁹⁸ (represents *annual emissions* of project)

GHG impact rating as a % of SA's carbon budget	Amount of GHG emissions				Relative to Low Emission NDC Carbon Budget			
	Lower (tCO2e)	limit	Upper (tCO2e)	limit	Lower (tCO2e)	limit	Upper (tCO2e)	limit
Low	-		30 000		0.000000%		0.00039%	
Medium	30 001		1 500 000		0.00039%		0.019%	
High	1 500 001		15 000 000		0.019%		0.193%	
Very High	15 000 001		+		> 0.193%			

We assert that this is an inappropriate and arbitrary attempt to manipulate the study outcomes, and it is in bad faith and unreasonable to select an incredibly massive coal plant as the threshold for high emissions. Using massive coal fired power plants (much larger than most in South Africa) as the metric against which climate impacts of new energy projects are evaluated would allow even large new coal plants to have less than high impacts. This is misaligned with South Africa's overall climate ambitions and the urgency of the climate crisis for the country. It misrepresents the true climate impacts of the powership.

¹⁹⁷ FEIAr CCIA report, April 2021, p. 47.

¹⁹⁸ DEIAr CCIA report, November 2022, p. 10.

Looked at objectively, the lock-in of emissions of this scale through South Africa's peak, plateau, and decline mitigation phases will be a barrier to it achieving its climate goals. These emissions alone, without a clear plan for abatement, should, then, constitute a fatal flaw in the project.

2) *Further inadequacies of the DEIAr's climate assessment*

The new DEIAr and its CCIA fall short of representing a comprehensive climate assessment, required by the *Thabametsi* judgment and reiterated in the Minister's appeal decision, in several respects.

a) CCIA greenhouse gas assessment is incomplete

The primary emphasis of the revised CCIA remains the greenhouse gas emissions associated with the project. These calculations lack detail and underestimate the true emissions of the project.

Upstream and fugitive emission accounting inadequacies

The greenhouse gas analysis included several categories of upstream emissions – more than the original EIAr - including the transport of natural gas to the port from within the country, and the production of natural gas, which together accounted for nearly 100,000 t CO₂e/year.

The assessment only considers emissions in the GHG inventory that occur within the boundary of South Africa, though, meaning that LNG processing and transport outside of South African waters are not considered. Liquefaction alone can make up 8% of the lifecycle emissions of gas.¹⁹⁹

By limiting assessment of emissions to those which occur inside of South African borders, the assessment fails to consider material information relevant to the lifecycle assessment, as required by *Thabametsi*, and consequently skews the results. It does not ensure “consistency” in the impact assessment as alleged in the DEIAr – consistency with what? Whether South Africa has jurisdiction over emissions occurring outside of its borders is irrelevant to determining the full lifecycle impacts of a plant within its borders will be.

The precise assumptions behind the emissions calculations, including how fugitive methane emissions in various phases of the gas lifecycle are accounted for, are also lacking in the CCIA, making it difficult to ascertain whether the specialists assessed the universe of emissions from the natural gas lifecycle appropriately. The missing information is critical to allow I&APs and the Competent Authority to critically analyse the information presented in the CCIA and to make an informed decision.

Questionable assumptions about run times of the powerships and associated emissions

The CCIA assumes that the powerships will run for at maximum 16.5 hours per day, as per the constraints of the RFP.²⁰⁰ This is repeatedly explained to be a “worst case scenario”, simply because the RFP was for dispatchable power and specified that the project “be able to operate between 05h00 and 21h30”.²⁰¹ However, nowhere is it stated in the RFP or in the DEIAr documents that the plant will *only be allowed* to run at these hours. Those familiar with energy markets know that resources can be run for more time than was originally specified in their procurement process – such as is the case with diesel “peakers”

¹⁹⁹ Sphera, *GHG Intensity of Natural Gas Transport*, (July 8, 2020), <https://sphera.com/research/ghg-intensity-of-natural-gas-transport>.

²⁰⁰ CCIA, page 28

²⁰¹ CCIA, page 29

across South Africa today. It is not unreasonable to assume that the plants could be called on to run in more of a baseload capacity, in which case, the 16.5 hours a day, 450 MW limit may very well *not* be the worst-case emissions scenario.

There are indications elsewhere in the DEIAr that the plants will run at or above the presumed “worst-case.” The project documents assume that an LNG carrier will bring LNG to the FSRU between every 20 to 30 days,²⁰² which would represent between approximately 12 and 18 vessels per year. If the plant were run at supposedly “worst-case scenario” levels year round, a maximum of 10 of these 100,000 m3 LNG carriers would be needed to supply the facility, based on the information provided in the CCIA about the powerships’ engine efficiencies. Thus, if between 12 and 18 ships of 100,000 m3 of LNG (in reality, a relatively small LNG carrier) are arriving at the port annually, this would mean that the plants would be running at higher capacity and/or for longer every day than the “worst-case” 450 MW, 16.5 hour days.

There are other efficiencies to running the plants more frequently that also might encourage that, including simple mechanical efficiencies, as referenced in the previous FEIAr: “From an emissions perspective, the Powership performs most efficiently when operating at full capacity.”²⁰³ Additionally, LNG is generally cheaper, and easier to procure, when purchased under long-term contracts that guarantee a supplier a steady customer. Thus, purchasing LNG for intermittent use is far more expensive and uncertain, meaning that there are incentives for the buyer to know exactly how much they will use and use it.

All of these factors suggest that the supposed “worst-case scenario” laid out in the CCIA may in fact be the most predictable scenario, or even more optimistic than other very likely scenarios. This would mean not just more direct emissions from the project itself, but also more upstream emissions, as more gas will need to be produced, processed, and transported. As such, emissions over the lifetime from the project would likely exceed 30.7 Mt CO₂e.

Failure to correctly account for global warming potential of methane

The revised CCIA uses the global warming potentials (GWPs) of methane from the 2006 IPCC report (23), rather than the most recent IPCC report, which finds that the 100-year GWP of methane is 29.8.²⁰⁴ This means that the methane leakage estimates included in the CCIA are converted to CO₂ equivalent (CO₂e) at a rate lower than the latest science supports. In addition, the specialists dismiss the use of the 20-year GWP (82.5), rather than the 100-year GWP (29.8) for methane, even though the growing scientific consensus around climate tipping points suggest that a 20-year GWP is more relevant.²⁰⁵

²⁰² DEIAr, page 27.

²⁰³ FEIAr CCIA April 2022, p. 51.

²⁰⁴ IPCC, *AR6 - Climate Change 2021, The Physical Science Basis - Chapter 7*, p. 1017, (August 2021), https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07.pdf.

²⁰⁵ E.g. IGSD and CHRE, *The Need for Fast Near-Term Climate Mitigation to Slow Feedbacks and Avoid Tipping Points Critical Role of Short-lived Super Climate Pollutants To Address the Climate Emergency*, (2022), <https://www.igsd.org/wp-content/uploads/2020/09/Science-Supporting-Need-for-Fast-Near-Term-Climate-Mitigation-Sept2020.pdf>.

Unfounded statements about emissions avoided and positive impacts

Despite the amended “medium impact” emissions from the project, the DEIAr climate change impacts section wishfully concludes, “When considering all impacts related to the project, it can be considered to have a low positive impact. Despite having a medium intensity impact from operational emissions, the project enables significant reductions through avoided emissions and enabled renewables. Furthermore, it allows for economic development to occur by providing dispatchable power onto the grid which is critical for the economy”.²⁰⁶

There is no data or other evidence provided to support this conclusion in the CCIA. Instead, the CCIA includes vague assertions that the project “can offer load following capability required to stabilise additional renewable energy capacity until sufficient battery storage is added to the grid”.²⁰⁷ However, there is no modeling provided to show precisely how this would benefit the grid. The CCIA also offers no assessment of the capability of battery, and other forms of storage, to play that role today, other than reference to two of the hundreds of grid-stabilizing battery projects in operation around the world today²⁰⁸. To the contrary, as we have noted in the section on need and desirability, renewable energy alternatives could meet South Africa’s immediate energy requirements, and the failure of the DEIAr to assess renewable sources as an alternative is a material flaw.

The CCIA also assumes that the gas will necessarily be a replacement for coal and diesel.²⁰⁹ Its avoided emissions analysis suggests that the project will avoid 17 million tCO₂e between 2023 and 2030, under the assumption that the gas will entirely replace coal coming offline.²¹⁰ However, the CCIA does not offer any basis for this substitution. Our comments have presented expert evidence refuting this assumption. All of these assertions are also framed in the optimistic statement, “if/when the Eskom generation crisis is solved, and the use for power from this project is decreased due to the addition of more generation capacity to the grid, this project may be requested to dispatch less power, and the emission from the project will be reduced”.²¹¹ While the resolution of the Eskom power crisis and the lowered dependence on fossil fuels would indeed be a positive outcome, the 20-year power purchase agreement (PPA) for the project, and the nature of long-term LNG contracts mean that there will be strong incentives to keep the ships running more, rather than using them to dispatch occasional power at critical times as a peaker might. As a recent Meridian Economics report explains, “Peaking plant fuel offtake is both variable and unpredictable and increasingly will be characterised by long periods of minimal or zero usage as renewables and battery storage provide for daily demand cycles. LNG contract norms require predictable, steady offtake fed by scheduled replenishment vessels with take-or-pay terms. Erratic usage as characterised by peaking plant needs is fundamentally incompatible with these norms, requiring LNG usage to be limited to what will definitely be needed between replenishment cycles.”²¹² Thus, the physics and markets of gas make this optimistic downward dispatching scenario unlikely. This is a limitation to the flexibility of the powerships for which the project’s economic and feasibility studies must also account.

²⁰⁶ CCIA, page 31.

²⁰⁷ CCIA, page 30.

²⁰⁸ CCIA, page 33.

²⁰⁹ CCIA, page 32.

²¹⁰ CCIA, page 33.

²¹¹ CCIA, page 29.

²¹² E.g. A. Roff *et al.*, *Hot Air About Gas*, Meridian Economics, (June 2022)

b) Inadequacy of greenhouse gas emission mitigation measures

The greenhouse gas emission mitigation measures proposed in the CCIA have not improved since the FEIAr.

The first of three options proposed is to reduce the duration of the PPA. While this would be desirable, the CCIA notes “this measure may affect the financial viability for the project,” and therefore seems to write it off.²¹³ The second proposed mitigation measure is that Eskom does not dispatch the power from the ships, which again would be desirable but also unlikely if the project goes ahead.²¹⁴ Finally, the CCIA states that green hydrogen could be used in the future, but that this is not considered economically viable right now.²¹⁵ While, again, this might be desirable, there is no evidence provided that the turbines could run on 100% green hydrogen, and the lack of economic viability currently makes it unlikely to serve as a real solution. Thus, all three mitigation measures proposed are unlikely to occur, and should not be considered to mitigate any of the greenhouse gases from the project.

The only measure in the EMPr that includes reference to climate change mitigation is that the project should include, “i) GHG emissions meters to ensure efficiency and safety; ii) gas leak detectors so that fuel can be immediately isolated and shut off, the leak identified, and the necessary repairs or replacements made”.²¹⁶ These basic control measures *must* be included in the project and are not meaningful mitigation measures to reduce emissions.

Therefore, no meaningful or likely greenhouse gas mitigation measures such as CCS are included in the design of the project, much less proposed within the CCIA. Thus, the new CCIA does not address the Minister’s finding in the appeal decision that mitigation measures are “entirely undeveloped and inadequate”.

c) Inadequacy of comprehensive assessment of climate change

In addition to assessing the greenhouse gas emissions of the project, the *Thabametsi* judgement requires that the CCIA include a comprehensive assessment of the project’s interaction with climate change, including an assessment of climate change on the project itself, and the ways in which the project might aggravate the impacts of climate change in the area. The Minister’s appeal decision found fault with the proponent’s original CCIA because it was instead mainly concerned with the contribution of the proposed Project’s GHG emissions towards climate change (2.69). The new CCIA, while including more information about the likely impacts of climate change in the project area and the general social context of the area, fails to meet the *Thabametsi* standard in several respects.

The CCIA does not explain how the project will manage the risks to its operations described, such as, among others, rising sea temperatures affecting the cooling mechanism of the ship, and rising sea levels combined with storm surges and more intense tropical cyclones causing severe damage and flooding to pipelines, the transmission line, and the ships themselves. The only suggestion the CCIA poses for reducing

²¹³ CCIA, page 34.

²¹⁴ CCIA, page 34.

²¹⁵ CCIA, page 34.

²¹⁶ EMPr, page 190.

harms from these impacts is “regular maintenance of port infrastructure is crucial for reducing these risks and impacts”.²¹⁷

The DEIAr also fails to consider how the project might aggravate the impacts of climate change in the area, both on people and ecosystems. That is, impacts of the project beyond its GHG emissions may operate as a threat multiplier, either reducing the resilience of community members to climate change, or exacerbating their challenges that climate change is making worse. For example, small-scale fisherpeople may already be struggling with catches because of warming waters affecting fish breeding and fitness, while the project’s noise and vibrations, thermal plumes, and impacts on estuaries may further reduce fish breeding and juvenile success. The CCIA does not describe how climate change may result in vulnerabilities and challenges for people of the region, nor does it describe how the project will interact with and potentially exacerbate these vulnerabilities.

The CCIA asserts that, “The principle that the emission of GHGs has no local impact and can therefore not be managed on a local level, is fundamental to the formation of the UNFCCC, the Kyoto Protocol, and the Paris Agreement. It is in this context that the climate change specialist study did not consider the cumulative impacts of any of the additional power plants underway or planned within proximity of the Port of Ngqura ”.²¹⁸ This is faulty reasoning on several levels. First, cumulative impact analysis has been firmly established as standard practice for understanding the combined effects of proximate projects, whether those effects are for air quality, water quality, or climate change. In light of the multiple current proposals for gas plants in the Port of Ngqura, the CCIA should have included at minimum a review of the cumulative climate change implications of these projects. Second, while a given carbon dioxide molecule of course cannot be traced to a given climate change impact, there are established methods for assessing the overall social costs that greenhouse gas-emitting projects have based on their CO₂e emissions.²¹⁹ The emissions from this project would contribute to the socio-economic climate change impacts felt by local communities that are described elsewhere in the CCIA, yet there is nowhere a clear acknowledgment of this direct link or effort at describing the real-world impacts of this project’s greenhouse gas contributions to the larger global climate crisis. Finally, the implications of this statement that managing the emission of GHGs at the local level and linking emissions to local impacts, such as through the social cost of carbon, somehow undermine the UNFCCC or the science of climate change is patently false. The emissions of GHGs must of course be managed at a local level, while the IPCC’s Sixth Assessment Report, in fact, suggests using social cost of carbon analysis to support planning and to help companies assess the external damage of their emissions.²²⁰

The CCIA also fails to address the project's impact on the natural resources that have an ability to either mitigate climate change and/or reduce vulnerability to climate change, such as seagrass, coral, and dunes. These ecosystems buffer against extreme weather events such as storms, rough seas, and/or flooding. Seagrass, and salt marshes are particularly important as they absorb large amounts of carbon from the atmosphere, thereby acting as carbon sinks.²²¹ The impacts of the project on these critical ecosystems and

²¹⁷ CCIA, page 38.

²¹⁸ CCIA, page 30.

²¹⁹ See, for example, K. Ricke et al., *Country-level Social Cost of Carbon*, Nature Climate Change, (2018), <https://www.nature.com/articles/s41558-018-0282-y>.

²²⁰ IPCC, *Sixth Assessment Report, Working Group III: Mitigation of Climate Change*, (pg. 1-59 (2022)

²²¹ NOAA, *What is Blue Carbon?*, <https://oceanservice.noaa.gov/facts/bluecarbon.html>.

their intersection with climate change were not addressed in the CCIA. Again, especially given that the CCIA acknowledges that climate change itself could contribute to the degradation of these critical ecosystems, this is an important gap.

Finally, while the CCIA describes how climate change will exacerbate local vulnerabilities, the proposals for how the project could reduce these vulnerabilities are vague and inadequate.

In summary, in its totality, then, the CCIA and the integration of climate change impacts and interactions into the DEIAr fail to address all of the concerns raised by the Minister about climate change in her appeal decision, and cannot be considered to have addressed the requirements of the *Thabametsi* judgment. The assessment is inadequate, fails to consider crucial information, and as a result, misrepresents the true impacts of the proposal.

XI. SOCIO-ECONOMIC IMPACT ASSESSMENT IS FLAWED

The Minister's appeal decision denying the Karpowerships environmental authorisation was extremely critical of the Socio-Economic Impact Assessment report for the project, finding that it had gaps, limitations, and inconsistencies.²²² The Minister stated that "neither socio-economic needs nor procurement considerations can elevate the recommendation in a Socio-Economic Impact Assessment report above the holistic consideration of the actual and potential risks, and impacts on the geographical, physical, biological, social, economic, and cultural aspects of the environment."²²³ The Minister found that the "actual and potential impacts on the environment, as well as the socio-economic conditions – particularly in relation to small-scale fisheries, could not be determined due to gaps and inconsistencies in the various reports submitted".²²⁴ This conclusion was based on the following:

"2.119.3 ...this study does not include the socio-economic impacts related to many aspects, such as socio-economic impacts due to loss of biodiversity, and implication on tourism and tourism related jobs, negative impacts (such as underwater noise, heated water discharge, pollution, climate change impacts) on juvenile fish, and in turn the socio-economic implication on local fishermen and mariculture in the Ngqura region; socio-economic impact of climate change, such as loss of property, life, and food."

The Minister elaborated further, stating that "the gaps, limitations and inconsistencies in the information provided in the Socio-economic Assessment report had the effect of excluding critical environmental concerns from the EIA, that Karpowership attempts to rationalise based on its own notions of development and improvement of the South Africa economy."²²⁵ In particular, the Minister singled out a lack of information in the Underwater Noise Impact; the Marine and Ecology Study, and the Estuarine Impact Report.

A socio-economic assessment must identify and weigh all the negative and positive socio-economic impacts for its findings to be credible. As the Minister has suggested, a socio-economic impact assessment is only as good as the underlying specialist studies on which it relies for its assessment of negative impacts and risks. All the major shortcomings in the DEIAr and its specialist studies that are identified in the comments above also are relevant when considering the adequacy of the socio-economic impact assessment for the powership. For example, the noise analysis has substantial flaws, and cannot be relied on to understand potential impacts to marine organisms and the communities and industry that rely on healthy marine ecosystem for their livelihoods (i.e., the small-scale fishers and tourism industry).

At the same time, the stated need and desirability for the project continues to overstate the necessity of the Karpowerships to address the current energy crisis and its benefit to the local economy. The result is that the Socio-Economic Impact Assessment report and the DEIAr downplay the negative impacts from the project, while overplaying the benefits of the project. This renders the findings in the assessment spurious.

²²² Ngqura Appeal Decision, para. 2.119.1.

²²³ Ngqura Appeal Decision, para. 2.114.

²²⁴ Ngqura Appeal Decision, para. 2.120

²²⁵ Ngqura Appeal Decision, para. 2.119.1.

Below we identify major shortcomings, gaps, limitations, and inconsistencies in Socio-Economic Impact Assessment report. It is worth noting that the findings of the Socio-Economic Assessment Report have been supplemented from the previous EIA by the findings of two reports prepared by Afro Development (Pty) Ltd. The first Afro Development Report, included as Appendix D1, notes that:

“Afro was appointed to prepare, among others, a supplementary report to the *Socio-economic impact assessment report for the proposed power powership project at the Port of Ngqura within the Coega SEZ in the Nelson Mandela Bay Metropolitan Municipality, Eastern Cape* done as part of the previous EIA application. This report therefore provides updated, and additional information to what has been presented in the existing socio-economic impact assessment report.”²²⁶

A. Impacts on Energy Security

The DEIAr states: “It is evident that gas is a necessary transitional energy source (and has been declared as ‘green’ by the EU) and that not all arguments against gas such as cost and environmental impact are founded within the context of the project within South Africa’s energy crisis and policy frameworks for climate change and renewable energy.”²²⁷ No negative impacts are identified.

As we have noted above in the section on need and desirability, this claim is not only factually incorrect, but also misleading. Gas is not a necessary transition fuel in South Africa and has tremendous climate impacts; renewable energy is economically competitive, has substantially fewer climate impacts, and can meet South Africa’s immediate energy needs. Moreover, as we noted above, the way that the RMIPPPP request for proposals was designed resulted in bid tariffs that are untethered to the realities of an electricity system and do not reflect true technology costs. A properly designed request for proposals would have resulted in renewable energy tariffs that were substantially less than the Karpowership bid tariffs.

B. Impacts on the Political Economy

The report finds that “utilisation of gas for energy generation in South Africa is considered to be an integral means of reducing the carbon footprint of the country, addressing the current energy challenges, diversifying the national economy and reducing poverty. Any project contributing to the above-mentioned objectives, such as Port of Ngqura Powerships, can therefore be considered strategically important to South Africa.”²²⁸ The report argues that the Karpowership projects are the quickest way to provide South Africa with the needed dispatchable power in order to resolve the electricity crisis and reduce climate change impacts.²²⁹ No negative impacts are identified.

As mentioned in the section on need and desirability above, Meridian Economics and CSIR have published multiple reports that, while recognizing the need for new electricity capacity in South Africa, dispute the

²²⁶ Afro-Development Report, Appendix 9 D1.1, p. 1.

²²⁷ DEIAr, Section 8.2.7.7, p. 387.

²²⁸ Socio-Economic Assessment Report, p. 19.

²²⁹ Afro-Development Report, Appendix 9 D1.1, p. 62.

need for gas until at least 2030.²³⁰ For example, Meridian in a report from this year found²³¹ that 96.5% of loadshedding in 2021 could have been avoided through the direct impacts and knock-on impacts of adding 5GW of renewables,²³² with battery storage and demand response meeting the remaining supply gap.²³³ The DEIAR makes these faulty conclusions about renewable energy because it opted not to assess renewable energy sources as an alternative to the powerships, which we assert is a material flaw.

C. Noise Impacts

The report states that “For the operation period it is predicted that neither the Powerships, or FSRU, will have a noise impact on any species associated with Jahleel Island, including the penguins”. Further “no noise impact is expected on any marine mammal species from the Powerships, and the levels of noise are not anticipated to be substantially different from the normal operations of the port”²³⁴ and that “no additional noise mitigation is deemed necessary”. Finally, “no impact is expected to be experienced by fish, as the decibel level required to induce a temporary reduction in hearing acuity exceeds the decibel level of the Powerships...Thus, Mason and Midforth (2022) find that the Powerships and FSRU will create a negligible increase in noise levels in the Port, as they closely match the existing noise levels of ships entering the port. As such, there is expected to be no or a negligible noise impact on marine species.”²³⁵ The report relies on the noise impact assessment’s faulty reasoning that the ships associated with this project are not substantially different to the noise levels produced by ships typically using the Port.

As noted in the section on acoustics above, many of the potential acoustic impacts on marine organisms have not been considered because of the major shortcomings in the acoustic assessment. As Dr. Fournet noted, “this is in large part due to (1) the failure of the studies to acknowledge that the anthropogenic noise associated with this project as chronic, (2) the failure of the study to adequately assess Underwater Noise conditions at meaningful temporal scales, and (3) the failure of the studies to consider impacts to the broader marine community, including benthic organisms and invertebrates.”²³⁶ As such, the mitigation actions proposed in the associated EIARs are founded on an erroneous assessment of noise impacts, and they fail to meaningfully address the possible or likely impacts of anthropogenic noise to the marine environment associated with the powership projects.

Further, Dr. Fournet also notes that: “No specific analyses were conducted on the impact of underwater noise on ecologically or economically important species (see Underwater Acoustics Assessments and Baseline Acoustics Reports). Dedicated investigation of the impact of noise on sound sensitive marine species, including marine mammals, commercial fish and invertebrate species, and diving sea birds in particular did not occur. This means that socioeconomic and ecology assessments of the projects could

²³⁰ Meridian Economics, CSIR A *Vital Ambition* (2020) See at <https://meridianeconomics.co.za/wp-content/uploads/2020/07/Ambition.pdf>

²³¹ DEIAR, Appendix 8.1 at 20.

²³² Meridian Economics, *Resolving the Power Crisis Part A: Insights from 2021 – SA’s Worst Load Shedding Year So Far* at iii (June 2022), <https://meridianeconomics.co.za/wp-content/uploads/2022/06/Resolving-Load-Shedding-Part-A-2021-analysis-01.pdf>.

²³³ *Resolving the Power Crisis Part A* at iii.

²³⁴ Afro-Development Report, Appendix 9 D1.1, Section 3.4.1, p.42.

²³⁵ Afro-Development Report, Appendix 9 D1.1, Section 3.4.1, p.40.

²³⁶ Fournet Report, page 2.

not properly integrate the impacts of underwater noise from the projects, and therefore that the DEIAr had gaps and imbalances as a result.”²³⁷

The section on noise impacts assessments discussed above also demonstrates the major flaws in the argument that noise from the powerships should not be considered because its noise is not substantially different from other ships in the harbour. This reasoning is not only legally implausible and factually incorrect, it would set a dangerous precedent. Just because other ships create noise, does not mean that the powerships, which would intensify the existing noise by at least a magnitude of ten, would not exacerbate the situation for marine organisms. The noise assessment should have ***integrated existing sources into a cumulative noise assessment with the project***. Also, this argument ignores that the nature of the powership’s noise is very different than existing ships- the powerships present chronic and continuous noise (up to 16.5 hours a day) that is long term (twenty years). These key differences should not be ignored at the whim of the applicant’s specialist. This is a material oversight in the DEIAr, which has led to a skewed assessment of socio-economic impacts as they are related to impacts on underwater noise.

D. Impacts on small-scale fishers.

The powership’s previous Socio-Economic Impact Assessment report stated that there are no fishermen in the harbour area, and thus there is minimal impact. As we have stated previously, this misses the point, since, the loss of juvenile fish and crustaceans (due to underwater noise, or temperature increase due to climate change and discharge of heated water by Karpowership), may ultimately impact the spawning of fish and the crustacean populations; and in turn, the economics and livelihoods for all local fishermen in the region, not just fishermen within the harbour location. Dr. Fournet finds in this regard that: “Anthropogenic noise from various sources (powership operations, vessels, construction), has the potential to negatively impact species important for both small and large scale fisheries, as well as important prey species for birds, marine mammals, turtles and pelagic fishes...In addition, and more problematic for fisherpeople than for fish, research shows that anthropogenic noise can negatively impact commercial catch rates in teleost fishes.”²³⁸

The updated report (supplemented by the Afro Development Report, Appendix D1) now finds that: “Small-scale fishing communities were identified as operating in close proximity to the Port, however no cooperatives are registered to use the site, although two Gqeberha based cooperatives utilise the old Port Elizabeth harbour (T. Steenkamp & Rezaei, 2022). Thus, considerations for the impact of the project on small-scale fishers pertains to how the project could impact marine ecology, and fish stocks outside of the Port.”²³⁹ It however concludes that “no fishing is permitted within the port, and therefore the fishers livelihood unlikely to be negatively impacted as a result of the underwater noise.”²⁴⁰ The impacts on small-scale fishers are therefore seemingly dismissed on the basis that because marine impacts are limited to the Port, and no fishing occurs in the Port, no negative socio-economic impacts on fishers are

²³⁷ Fournet report, page 16.

²³⁸ Fournet report, page 16.

²³⁹ Afro-Development Report, Appendix 9 D1.1, Section 3.3.1, p 40.

²⁴⁰ Afro-Development Report, Appendix 9 D1.1, Section 3.4.1, p. 42.

anticipated.²⁴¹ This does not take into account the impacts on juvenile fish in the Port, and associated impacts to fisheries beyond the boundaries of the Port.

Although the updated report now concludes that there will be “negligible” impact from the project to small-scale fishers,²⁴² and that no fishing is permitted in the port,²⁴³ the reality is that the report did not assess or consider potential impacts to fishers outside the harbour in making its findings. The Socio-Economic Assessment report, as supplemented by the Afro Development report, completely disregards any potential impacts on fishers along the coastline outside of the Port and does not undertake any meaningful assessment of risk to such fishers.

In this regard, the socio-economic assessment report’s findings and analysis with respect to local or small-scale fishers is largely based on the report prepared by Afro Development Planning, the materially deficient noise impact assessment report, discussed above, which failed to adequately assess potential impacts on marine organisms, and the DEIAR’s inexplicably flawed findings that there would be low to medium potential negative marine impacts. None of these sources can be relied upon to credibly understand potential impacts to local fishers in the region.

Afro Development’s findings are based on a two-hour meeting it organised focused on “establishing trust (building on the relationships already established by the CLOs) and understanding the fisher community’s relationship to the site (including aspects related to cultural heritage, livelihoods and sense of place), and concerns around the project.”²⁴⁴ Afro Development’s report is attached as Appendix 9 D1.2 to the DEIAR. It is not clear how or whether Afro Development’s meeting participants truly represented communities that engage in fishing around Coega and the region (versus other economic interests), nor how participants were chosen to be invited. Importantly, Afro Development noted that “at the time of this engagement many of the specialist studies were still being undertaken. Therefore, specialist findings could not be conveyed to the attendees.”²⁴⁵ This means, that even though the applicant attempted to hold some kind of meeting with certain individuals it identified as “representing” the small-scale fisher communities, it could not convey any information about potential impacts to them. Nevertheless, the Afro Development report records as follows:

“There was some concern regarding noise pollution and water temperature fluctuations caused during power production on the ships. The general concern is loss of sustainable livelihoods and subsistence associated with the ocean economy. It was, however, explained that numerous specialist studies are being undertaken to understand the potential impact of the powerships on the environment and society. And, that the findings of this will be shared at the draft EIA public participation workshops in November.”²⁴⁶

We reiterate that in the absence of the findings of the specialist reports being conveyed to the meeting participants, the latter were unable to engage meaningfully with the Karpowership project and its impacts. Indeed, their primary concerns relating to noise pollution and increased temperature were

²⁴¹ Afro-Development Report, Appendix 9 D1.1, p. 17.

²⁴² Afro-Development Report, Appendix 9 D1.1, Section 3.4.1, p. 42.

²⁴³ DEIAR, page 323.

²⁴⁴ Afro-Development report, Appendix 9 D1.2, p. 5.

²⁴⁵ Afro Development report, Appendix D1.2, p.5.

²⁴⁶ Afro Development report, Appendix D1.2, p.7.

incapable of being addressed. This fact alone means that Afro Development, the Socio-Economic Impact Assessment report, and the DEIAR cannot credibly rely on any information or findings from the meeting to assess potential impacts on fishers.

The Afro Development report goes on to note: “However, if it is found that juvenile fish species which are important to the local fisheries industry are significantly disturbed to the point where fish stocks decrease, then negative socio-economic impacts are likely to arise.”²⁴⁷

As we have noted in the section on marine-impacts above, the threat to fisheries from the powership is substantial, and the DEIAR’s conclusion that the Project’s sound impacts and discharge of warm water will not significantly impact fish and fisheries is in error. The DEIAR wildly underestimates the impacts of sound on fish species and fisheries in this important area, based on an inadequate and flawed underwater noise assessment, combined with the omission of chronic noise impacts, and reaches conclusions despite major gaps in information. Dr. Fournet finds that: “The failure of the studies to include impacts of noise on prey species and fish species important for subsistence and commercial fisheries is particularly problematic given that all of the proposed sites of the powerships contains nursery areas, refuge areas and food sources for numerous marine biota, some of which are commercially important.”

Despite its paltry analysis of impacts on small-scale fishers in the region and presumably because of its finding that the impacts on small-scale fishers will be negligible to none, no mitigation measures are proposed. Given the impact on fish species which may be experienced, and the knock-on effects for the small-scale fishery, this is entirely inadequate.

E. Economic benefits and job creation

The Socio-Economic Assessment report notes in relation to project construction that: “The proposed Powerships and their related infrastructure are anticipated to directly create approximately 90 Full Time Equivalent (FTE) employment positions over the course of the construction phase”²⁴⁸ The significance of this is rated a high positive.

With regards to the operational phase, the report notes further that: “The ongoing operation, maintenance and monitoring of the Powerships and their associated infrastructure will directly create 166 FTE employment position all of which will be retained for the lifespan of the development.”²⁴⁹ These impacts are also rated as having a high positive significance.

Job creation is therefore punted as an economic benefit associated with the Karpowership project. The DEIAR however notes, in relation to the Coega area, that while levels are higher than other areas of the Eastern Cape, levels are still low and as such most un- and semi-skilled required during the project will be sourced from NMBM, but skilled personal from outside the area would initially need to be brought in.²⁵⁰ There is accordingly insufficient information on how many local people will benefit from the employment opportunities created by the project, as opposed to external, skilled workers being brought in from elsewhere.

²⁴⁷ Afro-Development report, Appendix 9 D1.1, p. 40.

²⁴⁸ Socio-Economic Assessment Report, section 5.1.1, p. 40.

²⁴⁹ Socio-Economic Assessment Report, section 5.1.1, p. 50.

²⁵⁰ DEIAR, p. 306.

In addition, these findings also assume there will be no potential negative impacts on small-scale fishers, the marine ecosystem, from climate change, among others. In other words, a tainted and one-sided perspective is portrayed, considering only positive impacts of the Karpowership and ignoring serious potential harms of the project.

F. Climate Change Impacts

The report states: “No negative socio-economic impacts directly due to emissions are anticipated”²⁵¹ and further that: “Considering the assessment by Promethium Carbon (2022), which contextualises the project’s GHG emissions in comparison to the direct avoidance of GHG and particulate emissions from coal and diesel fired plants, and the indirect avoidance of GHG emissions by enabling a greater development of renewable energy sources, the long term socio-economic impacts are expected to be positive.”²⁵²

In essence, the DEIAR finds that the impacts of climate change are justified on the following basis: “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.”²⁵³

We dispute this finding. As the section in our comments addressing the project’s climate change assessment notes, the CCIA for the project and DEIAR fail to consider how the project’s existence (irrespective of, and in addition to, its greenhouse gas emissions) might aggravate the impacts of climate change in the area, both on people and ecosystems. For example, small-scale fishers may already be struggling with catches because of warming waters affecting fish breeding and fitness, while the project’s noise and vibrations, thermal plumes, and impacts to estuaries may further reduce fish breeding and juvenile success. While the CCIA does acknowledge that climate change may result in vulnerabilities and challenges for people of the region, it does not describe how the project will interact with and potentially exacerbate these vulnerabilities, does not describe how it determined there would be no negative impacts from these vulnerabilities, and does not consider the social costs of the project’s emissions. Nor could it, because the DEIAR’s noise impact analysis is so flawed it could not adequately assess impacts on fisheries from climate change.

G. Summary of findings on the Socio-Economic Assessment

Despite the numerous material deficiencies noted above, the Socio-Economic Assessment Report concludes: “The Karpowership project will result in an overall positive socio-economic impact when considering the host of economic and environmental impacts discussed throughout this report.”²⁵⁴ This conclusion is based on a vast amount of materially deficient and flawed analysis and is not credible. The DEIAR has again failed to address the concerns of small-scale fisher communities in the region and vastly overstated the positive benefits of the project, resulting in a highly skewed analysis, while down-playing the significance of climate change impacts and impacts to marine ecology insofar as they result in further socio-economic impacts.

²⁵¹ Socio-Economic Assessment Report, p.17.

²⁵² Socio-Economic Assessment Report, p.51.

²⁵³ DEIAR, p. 327.

²⁵⁴ Afro-Development report, Appendix 9 D1.1, p. 61.

XII. FAILURE TO CONSIDER THE NATIONAL ENVIRONMENTAL MANAGEMENT: INTEGRATED COASTAL MANAGEMENT ACT, ACT 24 OF 2008

The DEIA report fails entirely to consider the requirements of section 63 of the National Environmental Management: Integrated Coastal Management Act, 24 of 2008 (“NEM:ICMA”). Section 63 sets out the factors relevant to environmental authorisation for coastal activities. It further fails to recognise the interests of the whole community, or assess how the interests of the whole community are impacted by the proposal.²⁵⁵

This is a fatal flaw.

XIII. CONCLUSION

We have set out in these comments the various bases upon which we believe the DEIAr and associated specialist studies are inadequate, and have failed to meet legal requirements.

We trust our comments will be taken into account in the finalisation of the EIAr.

BIODIVERSITY LAW CENTRE

GREEN CONNECTION

²⁵⁵ **“interests of the whole community”** means the collective interests of the community determined by—

(a) prioritising the collective interests in coastal public property of all persons living in the Republic over the interests of a particular group or sector of society;

(b) adopting a long-term perspective that takes into account the interests of future generations in inheriting coastal public property and a coastal environment characterised by healthy and productive ecosystems and economic activities that are ecologically and socially sustainable; and

(c) taking into account the interests of other living organisms that are dependent on the coastal environment.