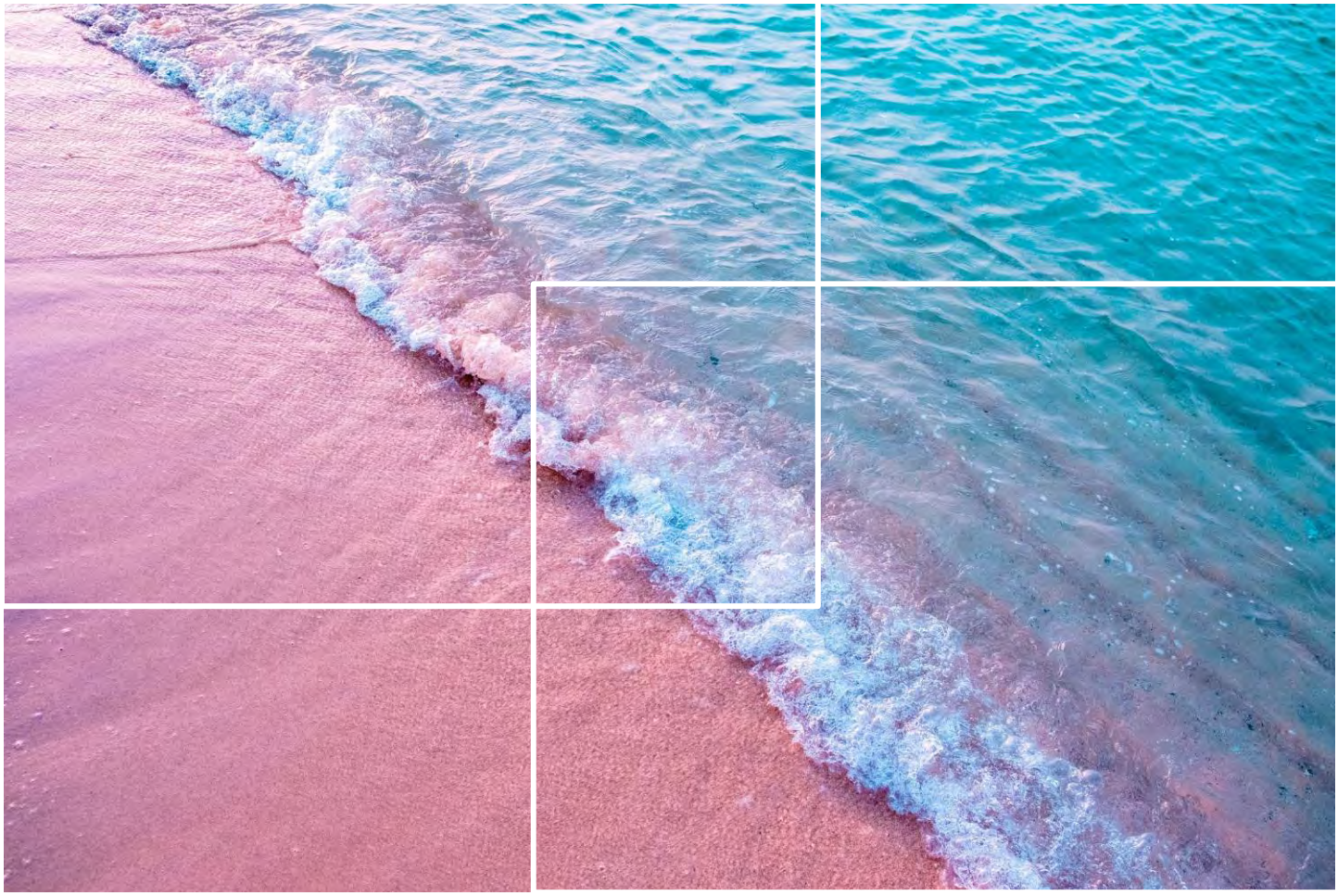

Namibian Marine Phosphate (Pty) Ltd

Submitted to: Namibian Marine Phosphate (Pty) Ltd
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I&AP COMMENTS COMPILATION:

I&AP COMMENTS AND RESPONSES FOR THE SANDPIPER MARINE PHOSPHATE PROJECT ML 170 ESIA REPORT

PROJECT NUMBER: ECC-133-377-REP-31-D

REPORT VERSION: REV 01

DATE: 31 OCTOBER 2022

Prepared by: ECC ENVIRONMENTAL COMPLIANCE CONSULTANCY

TITLE AND APPROVAL PAGE

Project Name:	I&AP Comments and Responses for the Sandpiper Marine Phosphate Project ML 170 ESIA report
Client Company Name:	Namibian Marine Phosphate (Pty) Ltd
Client Representatives:	Mr Chris Jordinson
Ministry Reference:	APP-003397
Authors:	Carlene Baufeldt and Jessica Bezuidenhout
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TERMS AND ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
BCLME	Benguela Large Marine Ecosystem
CFNA	Confederation of Namibian Fishing Associations
CSIR	Council for Scientific and Industrial Research
EAP	environmental assessment practitioner
ECC	Environmental Compliance Consultancy
EIA	environmental impact assessment
EMA	Environmental Management Act, No.7 of 2007
EMP	environmental management plan
ESIA	environmental and social impact assessment
EZZ	exclusive economic zone
FOA/NORAD	independent biomass transboundary demersal survey
HM	horse mackerel
I&APs	interested and affected parties
km	kilometre
m	metre
MARPOL	International Convention for the Prevention of Pollution from Ships
MEFT	Ministry of Environment, Forestry and Tourism
MFMR	Ministry of Fisheries and Marine Resources
ML	mining licence
MLA	mining licence area
MME	Ministry of Mines and Energy
NMP	Namibian Marine Phosphate (Pty) Ltd
pg	page
SADC	Southern African Development Community
SP1	initial target area
SP2 and SP3	other mining targets – not part of this assessment
WLHMA	Wet Landed Horse Mackerel Association

1 INTRODUCTION

1.1 PURPOSE OF THE I&AP COMMENTS CONSOLIDATION REPORT

This document has been compiled following the required period of review to be provided for public and registered Interested and affected parties (I&APs) to have access to and opportunity to comment in writing on the environmental impact assessment report (ESIA) for the proposed Sandpiper Marine Phosphate Project within ML 170, offshore, Namibia (the Project) before submission to the Environmental Commissioner.

The environmental and social impact assessment study was completed for the Project and undertaken in accordance with the requirements of the Environmental Management Act, 2007 (Act No. 7 of 2007) and the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2011) gazetted under the Environmental Management Act (EMA), 2007 (Act No. 7 of 2007).

Environmental Compliance Consultancy (ECC) prepared the impact assessment report, which was provided to the public and registered I&APs for review for 14 days from 06 – 20 September 2022.

This document compiles all comments received during the public review period; presents the responses from ECC as the appointed environmental assessment practitioner (EAP) for the project, the Proponent and specialists engaged in the assessment.

The document has been set out to provide a concise summary as set out below in Table 1.

Table 1 – Report structure

Chapter	Title	Content
-	Acronyms	A list of acronyms used throughout the report.
1	Introduction	This chapter introduces the addendum report provides background information on the ESIA report process.
2	Summary of comments	This chapter provides a summary of key issues raised in comments in 9 submissions received from I&AP's and stakeholders.
3	Detailed comment and response table	The full set of comments received from IAPs during the public review period with detailed responses provided to all comments received.
4	Acknowledgements	Provides acknowledgements to relevant parties for participation in the ESIA process as detailed in the assessment report and addendum.
Appendix	A	Original submitted comments and responses

2 SUMMARY OF COMMENTS FROM I&APS

2.1 INTRODUCTION

In accordance with the Regulations of the EMA 2007, on the 05 September 2022 the ESIA report was circulated electronically to all registered interested and affected parties (I&APs), identified key stakeholders and made available to the public with an invitation to submit comments in writing relevant competent authorities. On 06 September 2022 a hard copy was also submitted Ministry of Mines and Energy (MME), the Ministry of Environment, Forestry and Tourism (MEFT), and the Ministry of Fisheries and Marine Resources (MFMR) and hard copies were made available at the public libraries in Walvis Bay and Windhoek for public, I&AP and stakeholder access for comment.
Submissions received from 9 individuals/organisations were collated in separate "Comments and Responses" tables per I&AP that are presented in Table 2 – Table 9. Responses have been provided to all comments received. Where additional specialists input was required to fully address specific comments, it has been indicated as such in the tables as 'Specialists response'. Take note that Table 9 refers to comments that were received after the period for I&AP review closed, however these have been included and responded to despite being received outside of the above timeframe.

The original submissions as received from I&APs are provided in Appendix 1.

The final assessment report along with the comments/submissions received will be submitted to the Environmental Commissioner in accordance with the Regulations of EMA2007, and relevant competent authority Ministries.

The final ESIA report is available to download at:
https://eccenvironmental.com/download/esia-for-the-proposed-sandpiper-marine-phosphate-project-within-ml-170-offshore-namibia/

2.2 KEY FEEDBACK ON ISSUES OF CONCERN

The ESIA report was provided to all I&APs, identified stakeholders, and made publicly available on ECC's website and at the public libraries in Windhoek and Swakopmund. This period is set out to solicit comments, feedback, and allow genuine participation in the final phase of the ESIA process.

A range of comments were received from 9 different individuals or organisations during the review process, from different stakeholder groups and types include:

- Private residents;
- The Confederation of Namibian Fishing Associations;
- The Earth Organization Namibia;
- Economic & Social Justice Trust;
- Scientists; and
- Earthlife Namibia.

This varied group of I&APs and stakeholders for the Project presented queries that have all been addressed during the assessment phase of ESIA process. Where gaps or errors have been identified, this has been addressed in the final assessment report and EMP (Appendix A). Some comments raised are noted to be repeat comments from the scoping report, of which these issues, comments and responses were fully addressed.

Where required, further information has been provided in this document to address the area of concern or to answer the question presented.

The key areas raised from the review can be summarised in the following categories:

Public review period: An extension was requested to extend the public review period from the initial 14 days communicated to one month.

- A meeting was held between the DEA office, the Proponent and the EAP to confirm the review requirement for the ESIA report. The EC confirmed that the review period must be 14 days (7 days longer then the required period as set out in the Act).

Separation of the Marine and Terrestrial ESIA ECC application process: It has been queried why the marine and terrestrial ESIA's are not being incorporated into one process. This is an example of the repeated question from the scoping report with the explanation provided below:

- The marine and terrestrial applications are separate processes. The law requires that an environmental clearance certificate must be issued for mining licences (ML 170 in this instance). The approval of the marine ECC will give security of tenure to secure capital for the terrestrial component. The terrestrial component consists of land-based activities associated with the processing plant and further infrastructure. Different aspects and impacts are assessed per process. Therefore, it is a requirement to have two separate ESIA processes.

The release of tailings during dredging operations: Some I&APs raised questions about the release of tailings to the sea floor to reduce plume impacts.

- It must be noted that dredging discharge point located in the hull of the vessel sits 15 m below surface to dilute the sediment plume.
- This has been addressed in the ESIA report. Reference can be made to, chapter 7, section 7.4.2.1 Dredging generates plumes of suspended sediments, pg 138&139:

The release of heavy metals, radionuclides, and sediment plume influence: Various concerns have been raised regarding the potential influence and release of heavy metals, radionuclides, and distribution of the sediment plume during dredging operations into the surrounding environment and influence on the marine biota.

- All concerns have been adequately addressed in chapter 7 of the ESIA report.
- The impacts on the water column have been assessed in chapter 7 of the ESIA report based on the specialist study by Carter & Steffani (2021) (Appendix E). This study took account of the conclusions drawn from the sediment plume dispersion model conducted by HR Wallingford (2020) (Appendix I). Reference can be made to sections 7.4.2.1 (Dredging generates plumes of suspended sediments), 7.4.2.5 (Trace/metal toxicity at surface), 7.4.3.1 (Trace/metal toxicity on seabed - target dredge area trace metals are remobilized).
- The radiation component is further discussed in section 7.4.3.1.

Social and socio-economic component: Concerns have been raised regarding the outcomes of the Stratecon report issued and the socio-economic assessment, with regards to positive impacts, employment opportunity and the differentiation between total jobs that will be created for the marine vs the land based assessment.

- The 2018 Stratecon report assesses the potential socio-economic impacts of a phosphate based industry in Namibia. The study is based on an assumed start point for production of phosphate in Namibian based on the companies holding mining licences producing at their projected production levels. The study does not address the Sandpiper Project specifically nor has it been presented as representing the project and is not specifically linked to at a project level to any related timelines. The comments therefore have no bearing on the overall objective of the Stratecon Report and the stated objectives thereof.
- The socio-economic impacts have been assessed in detail in chapter 7, section 7.8 of the ESIA report. The impacts assessed in this document are related directly to the offshore marine operations component in ML 170. By far the greater part of the socio-economic benefits related to jobs and employment reside in the land-based component of the Project, which is projected to generate up to 600 direct and indirect jobs during the construction and operational phase of the project.

- The overall socio-economic impacts of the Project will be reassessed as part of the land-based component and the full scale of potential impacts will be determined thereafter (for example the total figures related to job creation and skills development will increase in numbers).
- Reference can further be made to the 2022 ESIA report, chapter 7 section 7.8.5.1 (Job creation for approximately 72-100 jobs (vessel and land based support operations) Appendix H (JDN socio-economic supplementary study) and section 7.8.5.2 (skills development).

Mining threats on the WLHMA operations and fisheries impacts: An I&AP group through the CFNA raised a concern that ML 170 and WLHMA operations are in proximity and would not co-exist as it poses a threat to the sector and food security.

- With regards to the impacts on fisheries and fish, reference is made to the impacts assessed in section 7.6.1 and 7.6.2 of the 2022 ESIA report.
- The most recent data available to the specialist Japp (2022) was utilised in his specialist report (Appendix F). Data was sourced from the Ministry of Fisheries and Marine Resources and the transboundary survey undertaken through the FAO/NORAD programme (Boyer et al., 2019).
- The evidence provided on the fishery over the last 4 years does not support the supposition that there is a significant overlap with the fishery – on the contrary it appears minimal. The stock dynamics of horse mackerel is such that the bulk of the biomass fished by both the midwater and purse seine is north of the mining area. Scale is important – any negative impact, if it may occur, is likely extremely low. The plume effect is localised and the plume modelling suggests the plume disperses – this effect on horse mackerel is deemed to be low. Horse mackerel are mainly filter feeders, with adults targeting increasingly with age, large prey and filter feeding becomes less important to the diet of adults. The very localised and limited scale of the mining (in time and space) is deemed low or negligible impact

Deep sea mining concerns: Concerns have been raised by some I&APs that the Sandpiper Marine Phosphate Project is a deep-sea mining activity and has been incorrectly classified and assessed, not taking into account international legislation on deep sea mining.

- No definitive reference has as yet been provided clearly articulating the justification for the application of the nominal depth of 200 m and the definitive criterion for classifying deep-sea mining.
- Deep Sea Mining is primarily mining of a specific group of deep-sea deposits (Cobalt Crusts, Polymetallic Nodules and Seabed massive Sulphides) which are found only at

water depths of greater than 800 - 1000 m on the Continental Rise and Abyssal plain in water depths of up to 6000 m.
- The proposed operations are at 200 - 225 m water depth on the continental shelf and are not located in the deep sea.

Historical or repetitive I&AP feedback: Some comments received from I&APs during this ESIA phase were the same set of comments received during the previous EIA process in 2012 and or the 2014 verification study as well as in the 2018 public consultation process. Not all comments related directly to the 2022 assessment chapter and outcomes of the ESIA report. There was a large focus on the review of the 2014 verification assessment, which forms part of the baseline data, not taking into account the updated 2022 assessment specialists studies and outcomes.

- Comments have all been addressed in the 2022 assessment and subsequent ESIA report.

Cumulative impacts: Some I&APs raised comments that the cumulative impact assessment has not been sufficiently conducted, as it has not taken into account SP02 and SP03 mining area and the land-based component.

- The cumulative impacts of mining have been discussed in the 2022 ESIA report with reference to chapter 7, section 7.10. This environmental clearance certificate application for mining activities is for SP1 only. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates.
- The overall project cumulative impacts will be assessed in the land-based ESIA.

Microbial studies: Some I&APs have commented that the microbial studies conducted are not sufficient.

- It is noted that microbial studies have been addressed in the current assessment process. This impact is further addressed in the 2022 ESIA report in chapter 7, sections 7.4.3.4 and 7.5.1.4.
- Additionally, the independent review by Payne (2022) supports the conclusions made (Appendix G, pg.4) by Carter & Steffani (2021).
- Large sulphur oxidising bacteria were not represented in the sediment samples analysed that were taken from the surficial layers of sediment cores. However, as other oxidising species were present, there is a potential for Beggiatoa, Thiomargarita, Thioplaca to colonise SP1 sediments. The varying migration within the sediment body will be taken account of in the environmental baseline update and monitoring programmes.

As an outcome of these comments, minor amendments have been made to the final ESIA EMP report to be submitted to the Environmental Commissioner as detailed below:

- ESIA report Figure 15 and related information updated (pg. 65).
- EMP benthic monitoring programme updated to include meiofauna as a study variable during the required monitoring surveys (Section 7.4 Marine biodiversity management measures, Table 5, pg. 55 & 56 and Section 7.5 Marine biodiversity monitoring, pg. 59).

3 ESIA REPORT - COMMENTS AND RESPONSES

Table 2 – Comments and feedback from the ESIA report public review period: general comments (private)

Comment	EAP/Proponent Response
David Russel (CNFA) submitted 06 September 2022: Please extend the review period to at least one month. Across the world, including high level politicians, policy makers and scientists, there is much discussion about how important it is to approach marine mining responsibly, particularly deep-sea mining below 200 metres depth, as it is a new frontier. As stated internationally, it is critically important to approach this properly given that it will impact future generations, and not rush a very important review such as this in just 13 days, particularly given the amount of documents that need assessing. As I stated in an earlier email, we need to get the NMP 2020 specialist reports on plume modelling, noise impacts, and sediment toxicity properly reviewed by international scientists with the necessary expertise. 13 days is not enough time for these people to properly review these documents given their busy schedules. The NMP ESIA is of both national and international importance. Please extend the review period to at least one month so we can review this large number of documents responsibly.	The period provided for comment by I&APs of 14 days was defined in consultation with the office of the Environmental Commissioner and is in accordance with both the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations ("EMA 2007"). This is a reasonable allocation of time for comment on the content of the assessment report prior to submission to the EC as required under Regulation 23 of the Act (7 days).
Bretchen Kohrs (Earthlife Namibia) submitted 07 September 2022: The time for comments is too short to work through such huge document and make valuable comments. Can you please extend the time for at least one	The period provided for comment by I&APs of 14 days was defined in consultation with the office of the Environmental Commissioner and is in accordance with both the Environmental Management Act,

Comment	EAP/Proponent Response
month?	No. 7 of 2007 and associated 2012 Regulations ("EMA 2007"). This is a reasonable allocation of time for comment on the content of the assessment report prior to submission to the EC as required under Regulation 23 of the Act (7 days).
Thomas Rathenam (X=tr Consultants) submitted 19 September 2022: An important part of the risk management plan is that it is entirely based on self policing. Is the company willing to commit sufficient funds to allow for I dependent periodic assessment and should adverse results come from these assessments to stop all mining activities until these adverse activities have been remedied?	Yes the Proponent is committed and is required to make provisions for independent assessments and remediate any findings as a results of the outcomes of these assessments.
Angela Alchin (Private) submitted 19 September 2022: I would like to know will Walvis Bay residents be made aware of the land-based component of this project? For example: 3D mapping another EIA of the land based part will we be made aware of the areas where the toxic waste will be stored, and where the run-off of the plant will occur in the ocean?	Thank you for your email which is well received. Yes consultation for the land based assessment would be undertaken and areas of public concern addressed throughout the assessment process. As an I&AP you would have an opportunity to raise your concerns early in the process so that they can be assessed throughout the assessment process. Do you have any comments to add on the marine ESIA? The public comment period concluded on that assessment today but should you have something you would like to add please do send it to us.

Table 3 – Comments on Appendix C and E and feedback from the ESIA report public review period submitted 12 September 2022: Lisa Levin (Private – Scripps Institution of Oceanography, University of California, San Diego)

Comment	EAP/Proponent and Specialists Response
Use of several terms and statements should be called into question, as they appear to be an attempt to deflect from the fundamental issues. Additionally – the assessment of impacts throughout the ESIA document are generally too conservative – where high significance (severe impact) is designated as medium, and moderate impact is designated as low significance	Specific examples need to be provided in order for a proper response to be provided on this statement made. The methodology utilised for the impact assessment is described in chapter 6 and chapter 7, sections 7.3 (Table 17) and 7.6 (Table 22). A score is applied to ensure an objective approach to the outcomes of the assessment.
The use of the term dredging is not appropriate for the mining operations proposed by Sandpiper, which will remove the upper 2.5 m (or even 3 m) of seafloor. Dredging is typically done to clean or remove unwanted sediments and debris. Note the removal of diamonds from marine sediments (e.g., by DeBeers) is called diamond mining, not diamond dredging. There is an extensive discussion of diamond mining by DeBeers in Appendix E. This is taking place in even shallower waters than the proposed phosphate mining as noted in Appendix E (which also refers to phosphate mining… not phosphate dredging).	For clarity, mining is the extraction of valuable minerals or other geological materials from the earth, usually from an ore body, lode, vein, seam, reef, or placer deposit. Dredging is the primary mining method utilised in seabed mining for recovery of mineralised ore or sediments for processing and recovery of the targeted mineral (s). Dredging is a process utilising suction for removing sediments from the bottom of a body of water and transporting the material to the surface. Different types of dredging equipment and vessel are used. Marine diamond mining utilises specialised crawler mounted dredging equipment and vessels. The proposed marine phosphate mining will utilise a standard trailing suction hopper dredger.
Removal of the seabed to 2.5 m (or even 1.5 m) is a huge impact on all features that affect life on the seafloor (substrate type, grain size, water content, geochemistry of sediments and porewaters, water flow, pH,	All potential impacts have been assessed and significance of the impact determined. Reference is made to chapter 7 (assessment chapter) of the 2022 ESIA assessment.

Comment	EAP/Proponent and Specialists Response
oxygen, suspended sediments etc.).	
This statement appears in several places. The proposed operations are at 200m-225m water depth on the continental shelf and are not located in the deep sea. Proposed operations at 200-225 m ARE in the deep sea as defined by practicing scientists. Depths below 200 m experience changes in light, temperature, food supply and other factors that select for different animal attributes (taxonomic composition, morphologies, lifestyles and body sizes) than in shallow waters. (Bindoff et al. 2019; IPCC SCROCC Ch. 5). Other reference for the >200 m definition of the deep sea Mengerink et al. 2014 (Science 344: 696-698); Danovaro et al. 2020 (Nature Ecol. Evol. 4, 181-192), Levin et al. 2019 (Frontiers Mar. Sci. 6: 21) and hundreds of others This statement is incorrect: "Deep Sea Mining is primarily mining of a specific group of deep-sea deposits (Cobalt Crusts, Polymetallic Nodules and Seabed massive Sulphides) which are found only at water depths of greater than 800-1000m on the Continental Rise and Abyssal plain in water depths of up to 6000m." Mining of phosphorites when below 200 m is considered deep-seabed mining. Phosphorites have been considered for deep sea resource extraction alongside cobalt crusts, polymetallic nodules and massive sulfides. For example, see Levin et al. 2016 (Marine Policy74: 245-259; Defining "serious harm" to the marine environment in the context of deep seabed mining). In some places minerals such as FeMn crusts and phosphorites can co-occur in the deep sea – such as off southern California	No definitive reference has as yet been provided clearly articulating the justification for the application of the nominal depth of 200 m and the definitive criterion for classifying deep-sea mining. No mention or reference to the source or justification for use of 200 m depth to define deep sea mining is provided in Levin et al. 2016 (Marine Policy74: 245-259; Defining "serious harm" to the marine environment in the context of deep seabed mining). As noted by Ingels et al 2016 in "Open Ocean Deep Sea - First Global Marine Assessment, Chapter: 36F, Publisher: Oceans and Law of the Sea, United Nations) "*The deep sea comprises the seafloor, water column and biota therein below a specified depth contour.* ***There are differences in views among experts and agencies regarding the appropriate depth to delineate the "deep sea"****.* This chapter uses a 200 metre depth contour as a starting point. In this document it is further noted that "*The global continental margins extend for ~150,000 km (Jahnke, 2010) and encompass estuarine, open coast, shelf, canyon, slope, and enclosed-sea ecosystems (Levin and Sibuet, 2012).* ***Deep-sea margins are those areas that lie beyond the shelf break****, where the seafloor slopes down to the continental rise at abyssal depths, and encompasses bathyal depths*." In the Namibian context, by application of this nominal criterion, the demersal hake and monk fisheries in Namibia which are conducted

Comment	EAP/Proponent and Specialists Response
	in 200-600 m water depth, would then also be classified as deep-sea trawling. Additionally, the recent oil and gas discoveries off Namibia earmarked for development would equally be classified as deep-sea mineral resource extraction. It is a fact that deep sea minerals (polymetallic nodules, cobalt crusts and seabed massive sulphides) occur in deep sea environments which are located on the continental slope, continental rise and abyssal plain in water depths of 800 m to 6000 m typically in international waters. They do not occur on the continental shelf environment. While some other forms of phosphorite rock may co-occur with deep sea minerals, such as the Miocene Phosphatic rocks (marlstones and sandstones) that occur in deep sea off the coast of southern California, these deposits are significantly different (in both genesis and setting) to the unconsolidated pelletal phosphorite sands found on the continental shelf within the Exclusive Economic Zone off Namibia. (Burtnett, WS and Rigs SR, (Ed) 1990 "Phosphate Deposits of the World" Vol.3 Neogene to Modern Phosphorites). The continental shelf off Namibia is one of the widest continental shelves in the world (Bremner 1981) with the continental shelf break occurring over 100 km from the coast off ML 170 at a depth of approximately 350-400 m at an average gradient of 0.16 degrees. As

Comment	EAP/Proponent and Specialists Response
	such the Namibian marine environmental ecosystem does not become deep quickly as stated. The seabed on the continental shelf off Namibia at water depths of 200 to 600 m has been subjected to many years of extensive and repetitive bottom trawling operations and as such no longer represents a pristine seabed environment. **<u>Specialists response:</u>** This includes the deepwater fishery for orange roughy which focused on hard grounds and unlike in some other parts of the world e.g. New Zealand, these deepwater species are caught in relatively shallow water on the Namibian continental shelf. That fishery has been suspended as the resource has been depleted to an extent that it is no longer commercially viable and the spawning aggregations on which the fishery depended have declined i.e. recruitment failure primarily due to unsustainable fishing pressure.
Repetition of Comments: Please note that repetition of comments (by submitters) from previous reviews likely means these issues remain inadequately addressed.	Without specific context, this statement cannot be answered in any detail. It is further noted that in this current application all comments submitted by registered I&APs in regard to the scoping report and the ESIA report have been fully addressed.
Time for Review: Previous review comments objected to the short period available for review. This same problem has arisen with the current review period. There are many pages to examine and too little time.	The period provided for comment by I&APs of 14 days was defined in consultation with the office of the Environmental Commissioner and is provided in accordance with both the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations,

Comment	EAP/Proponent and Specialists Response
	which stipulates that I&APs must submit their comments within 7 days of notification of an application or receiving access to a scoping report or an assessment report. The 14 day period allocated is considered therefore as a reasonable allocation of time for comment on the content of the assessment report prior to submission to the EC as required under Regulation 23 of the Act (7 days).
Tailings Release Location: Release of tailings 15 m below the surface is distant from the bottom and makes it likely that almost the entire water column (to 220 m) will experience tailings impacts (turbidity, heavy metal and radioactive enhancement, changes in light) and that the tailings will disburse further than if placed near the bottom.	The comment is noted but there this claim is unsupported by any scientific study or evidence to support the statement made or to counter the plume dispersion modelling work conducted by the specialists HR Wallingford (2020) (Appendix I) and Carter & Steffani (2021) (Appendix E). These studies demonstrate that the sediment plume does not occupy the entire water column continuously due to the cyclic nature of the dredging operation (3 times/week for 16 - 20 hours). Reference can be made to 2022 ESIA report, chapter 7, section 7.4.2.1 Dredging generates plumes of suspended sediments, pg 138&139: 'Additionally, the potential operational mitigation measure of discharging the fine sediment plume at or near the seabed was addressed in response to comments raised in the scoping stage of this application process and was addressed in the ESIA (Refer ESIA, chapter 7, section 7.1.3.1). Dredging contractor JDN has advised that such measured are not routinely done for any of their international

Comment	EAP/Proponent and Specialists Response
	coastal dredging projects (JDN personal comms, 2022). For the current operational depths (200 m to 225 m) in ML 170, while it would be technically feasible, there is no clear evidence that it would have any substantial environmental benefits, considering that the current assessed impacts significance is low for plume dispersion and sedimentation and operational mitigation measures for fine sediment discharge are already being applied (environmental valve and discharge at -15 m depth). During dredging, there will be repeat traverses over the defined dredging lanes in order to mine to the required depth of sediment below seabed (leaving ~30 cm above the footwall) in the mine plan area. If fine sediment discharge is released at the seabed during the traverses, an amount of the fine sediment discharged would then fall back into the active dredge lanes and will need to be double handled and removed during the next traverse. Ore recovery efficiency would possibly be affected and reduced which would result in increased onsite dredging time and related fine sediment discharge. Comparisons when using an environmental valve of surface (40 m to 50 m depth), mid depth and bottom turbidity distributions against no valve, indicates an improvement in total suspended solids (TSS) concentrations in the surface layers to <7.6 mg/l but no or little change in the subsurface layers (HR Wallingford, 2020). This is beneficial as the 1 % light depth would be around -50 m at this sediment concentration, therefore negative effects of reduced light levels on phytoplankton production should be mostly

Comment	EAP/Proponent and Specialists Response
	avoided. Also, as there is little or no change in the near seabed TSS load, it can be assumed that the sediment deposition would be similar between the valve and no-valve scenarios which, according to modelling, is predicted to be 0.3 mm or less per dredge cycle. This is a factor of 20 below the HL5 threshold of effects on marine benthos reported by Smit et al. (2008). Note that the environmental valve is recommended as a mitigation measure during mining operations. Whether such deposition patterns would occur with a near-seabed discharge is uncertain, as behavioural aspects of the discharge in terms of jet momentum, dynamic plume collapse, associated mixing with the receiving water body along with possible turbidity flows and local currents will affect deposition rates and distributions. This may result in considerably higher instantaneous sediment deposition thickness in places, possibly approaching centimetres, with correspondingly higher risks of negative effects on benthic macrofauna as Smit et al (2008) determined a median hazardous effect level (HL50) of 5.4 cm for instantaneous burial on benthos. Therefore, the environmental benefit of a near seabed fine sediment discharge is moot and will most likely not warrant the linked cost and potential operational risks and uncertainties (Carter personal comms, 2022).'
Responses to Comments:	The addendum being referred to in this statement refers to the

Comment	EAP/Proponent and Specialists Response
The addendum responses in most cases fail to address the comments, and largely refer to the ESIA documents and processes. For example - the proposed zone for phosphate mining is the exact area of the large adult HM biomass and poses further threats for our fishery. Response: The potential socio economic, sediment plume dispersion and fisheries impacts will be fully assessed as part of the ESIA process.	Addendum – Comments and responses to the scoping report, not the assessment report (ESIA). The potential impacts referred to are assessed during the assessment stage and not the scoping stage of the ESIA process, as defined in the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations. As detailed in the background information document the scoping phase is directed towards defining the range and nature of anticipated potential impacts that may have significance to the biophysical and social environments at the scale of the proposed operations. The appropriate available baseline data and the literature are identified, forming the starting point for assessment of the required baseline and specialist studies that may be required for assessment of the project impacts. The points noted in this comment have been addressed in the ESIA and all I&AP comments received in this regard have been duly recorded and addressed as part of the current process.
The query about microbial studies has gone unanswered. It is not only a plume issue.	The comments above refer in this regard. The addendum being referred to in this statement refers to the Addendum – Comments and responses to the scoping report, not the assessment report (ESIA). The potential impacts referred to are assessed during the assessment stage and not the scoping stage of the ESIA process, as defined in the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations. It is noted that microbial studies have been addressed in the

Comment	EAP/Proponent and Specialists Response
	current assessment process. This impact is further addressed in the 2022 ESIA report in chapter 7, sections 7.4.3.4 and 7.5.1.4. Additionally, the independent review by Payne (2022) supports the conclusions made (Appendix G, pg.4) by Carter & Steffani (2021): 'Surficial organism removal (and notably of mats of sulphur-oxidising bacteria, crucial to oxidising toxic H_2S) will take place, but studies have shown such organisms not to be very common around and at the SP1 site. The significance rating of this subject to operational activity is not high, but monitoring pre-operation and regularly thereafter is recommended and supported.' **<u>Specialists response:</u>** Large sulphur oxidising bacteria were not represented in the sediment samples analysed that were taken from the surficial layers of sediment cores (Verification assessment. Appendix-N-2014, Section C2.3). However, as other oxidising species were present, there is a potential for Beggiatoa, Thiomargarita, Thioplaca to colonise SP1 sediments. The varying migration within the sediment body will be taken account of in the environmental baseline update and monitoring programmes.
Responses to queries that state the impacts have been assessed by specialists in their field internationally and by external peer reviewers are disingenuous. There were relatively few international specialists hired as official reviewers, some without deep-water expertise. Many of the external peer review comments from scientists around the world that have been	The statements given are not substantiated with any proper context or factual supportive evidence. In this regard it is however noted as follows: • In accordance with the provisions of the EMA2 007 and Regulations, the scope, procedures and methods of an

Comment	EAP/Proponent and Specialists Response
provided since 2014 seem to be ignored.	environmental assessment must be approved by the Environmental Commissioner before the assessment is undertaken. The specialist studies that are required to be included in the assessment and expertise needed to complete such studies is defined in the Scoping stage and submitted to the Environmental Commissioner for approval. • The professional qualifications and credentials of specialists (individuals and companies) that have contributed to or conducted studies included in the baseline information are presented in the scoping report and related appendices. The professional qualifications and credentials of specialists that have completed the current impact assessment studies are presented in the ESIA report (Appendix O) • The key specialist and independent peer reviewers that have contributed to this assessment all have specific experience and expertise in the Benguela Large Marine Ecosystem. • While no detail is provided on what qualifies as “deep water experience” it is noted that this Project is not a “deep sea” mining project. The Project area in ML 170 is located in water depths of 190-250 m on the Continental Shelf off Namibia where the seabed has been exposed to commercial bottom trawling activities concentrated in water depths from 200 up to 600 m extending along the entire length of the Namibian shelf. • No details are provided of the international external peer review comments from scientists around the world that have

Comment	EAP/Proponent and Specialists Response
	allegedly been ignored. All comments received from registered I&APs in regard to the Scoping Report and ESIA have been addressed in the current application process.
Comments on Appendix E 3.2.1 The discussion of benthic faunal recovery potential in the SP-1 mine area draws heavily on analysis of faunal recovery from shallow water dredging. Shallow-water processes in high oxygen settings will proceed very differently than in the SP-1 deeper water, lower oxygen environment. The projected significance of removing the benthic fauna and associated substrate over a maximum of 2.5-km^2 and average of 1.7 km^2 per annum for 20 y is given as medium. This cannot possibly be correct, based on the abundance of biota shown in images The authors of this section acknowledge that recovery will likely not occur in the lifetime of the mine. It reports that sediments will change from silty sand to silt, with altered species composition. An explanation is needed as to why this is a medium and not severe effect. The text refers to Jones et al. 2017 -which analyzed faunal recovery from simulated polymetallic nodule mining in 11 studies. Appendix E states Almost all studies showed levels of recovery in faunal density and diversity, especially for meiofauna and mobile megafauna, often within one year. However, some of the investigated sites were to a degree still depauperate in most faunal groups assessed over >10-year timescales suggesting longer-	*In situ* samples (macrofauna and meiofauna) were analysed in SP1 target area during the 2014 verification assessment, whereby conclusions were made by Carter & Steffani in Midgley (2014) and outcomes reassessed by Carter & Steffani (2021). Reference has only been made to diamond mining activities extending to 150 m water depth during the review of this impact (which has been well studied and documented by DebMarine with reference to Risk-Based Solutions (RBS), 2021), as recovery rates of benthic communities from dredging disturbance at water depths similar to the proposed SP1 mine area (190-225 m) in Namibia have not been reported. Further details regarding the assessment of the significance of this impact can be referenced in chapter 7, section 7.5.1.1 of the 2022 ESIA report. The conclusions are drawn after applying the assessment methodology described in 7.3, table 17. 'The removal of the upper layer of sediment may have an adverse impact, that will be limited to the annual mining area and the duration will be long term to permanent, depending on whether functional or complete recovery is attained. Note: A recovery to pre-

Comment	EAP/Proponent and Specialists Response
term recovery periods from effects of mining across most taxonomic groups. This is misleading as the key point made by Jones et al. 2017 is that " very few faunal groups return to baseline or control conditions after two decades" This quote was left out. So was the point that "sessile megafauna did not show any evidence of recovery". Also left out is the reference by Jones et al. 2017 to a study showing deep-sea meiofauna did not recover 26 years after disturbance. (Notably, meiofauna will not be monitored by NMP). It is also noted by Jones et al. that the assessed studies suffered from innaccurate location information – meaning it was unclear if the experimental disturbance sites were accurately resampled, and from undersampling of fauna. Jones et al. also concludes that " It is our view that insufficient information is currently available to generalise the observed biological effects to the longer terms, larger scales, and greater disturbance intensities (e.g., from sediment plumes) expected to result from full-scale mining activities. They point out that "Recolonisation of seafloor communities clearly is scale-dependent, such that recolonization of vast mined areas of seafloor impacted repeatedly by sediment plumes will require much greater time scales than recovery of the relatively small experimental disturbances reviewed here."	mining conditions is commonly defined as the recolonization of previously mined areas by marine faunal communities to the point that they can be considered to have an ecological function equivalent to those that exist in comparable undisturbed reference sites. This is deemed to be achieved when the communities have, after a number of years, reached a similarity to the undisturbed sites of at least 80% (MacDonald, L. and Erickson, W., 1994; Newell, R., Seiderer, L. and Hitchcock, D., 1998). The probability of the impact occurring is high probable/definite as this upper layer is required to be removed to mine for phosphate from the seabed. The sensitivity of the benthos will be medium and the magnitude of change serious effects, as communities will re-establish and function, but the assemblages might differ. The level of confidence remains high. The significance of the impact is moderate. Take note that the significance of the impact has decreased from the 2012 and 2014 assessments, after applying the quantitative scoring methodology as described in Chapter 6 for the previous assessments (major to moderate). This is possible to due to confidence in the assessment outcomes, professional opinion, approach to the methodology, in which the scale of extent was refined. In the 2012 and 2014 assessments, the impact was assessed on a larger scale (specific mine site i.e., SP1) and in the 2022 assessment the impact is assessed based on the annual mining area (up to 2.5 km^2 (average 1.7 km^2/year)).

Comment	EAP/Proponent and Specialists Response
These points need to be considered in the analysis of the proposed NMP mining. Some discussion of cumulative impacts from mining SP-2 and SP-3 is also needed.	Additionally, the independent review by Payne (2022) supports the conclusions made (Appendix G, pg.3) by Carter & Steffani (2021): 'Sediment removal is obviously going to happen operationally and knowledge of the biotic and abiotic benthos at the site is already good. Physical recovery from the suggested rates of extraction is predicted to be longer than the 20-year period of operation forecast, but functional recovery may be achieved earlier, an appropriate expectation. Leaving behind a residual sediment layer of the deposit and ensuring that extraction "lanes" be interspersed with untouched "lanes" is recommended, but a pre-operational dredging survey, focusing on macrofauna, will need to be carried out to ensure that up-to-date information is available for post-operational confirmation. I agree with the authors that given the small area of SP1 relative to the total area potentially containing phosphate deposits of Namibia, the long-term significance of sediment removal during operational mining is not going to be great.' The cumulative impacts of mining have been discussed in the 2022 ESIA report with reference to chapter 7, section 7.10. This environmental clearance certificate application for mining activities is for SP1 only. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates.
3.2.2	This impact is further addressed in the 2022 ESIA report in chapter

Comment	EAP/Proponent and Specialists Response
The altered topography and formation of anoxic areas is also given a medium significance rating. The text suggests, without real substantiation, that this is not considered likely – but where it occurs this is also of high significance.	7, section 7.5.1.3. The significance rating for the current assessment remains the same as noted from the previous assessments. The impact area is the only noted change as the area of disturbance is redefined, based on the boundary of the 20-year mine plan area, to an influence of 34 km^2 and not 176 km^2 as was used previously for evaluation purposes. Mining will not be carried out in the whole of the SP1 area, only in the 20-year mine plan area that lies within SP1. Relevant mitigation measures are incorporated in the EMP. Additionally, the independent review by Payne (2022) supports the conclusions made (Appendix G, pg.4) by Carter & Steffani (2021): 'Seabed topography would be altered locally during mining/dredging, potentially affecting the bottom hydrography. Again, the effect will be very local to the small operational area, so is not considered to have a great impact on the offshore Namibian seabed, and will be mitigated against by ensuring that a layer of deposit sediment and untouched dredge "lanes" are left.'
3.2.3 The sampling for thiotrophic bacteria is inadequate. As pointed out in the text, the large, sulfur oxidizing bacteria can migrate vertically and may not be visible in ROV or AUV imagery.	This impact is further addressed in the 2022 ESIA report in chapter 7, sections 7.4.3.4 and 7.5.1.4. Additionally, the independent review by Payne (2022) supports the conclusions made (Appendix G, pg.4) by Carter & Steffani (2021): 'Surficial organism removal (and notably of mats of sulphur-

Comment	EAP/Proponent and Specialists Response
	oxidising bacteria, crucial to oxidising toxic H_2S) will take place, but studies have shown such organisms not to be very common around and at the SP1 site. The significance rating of this subject to operational activity is not high, but monitoring pre-operation and regularly thereafter is recommended and supported.' **Specialists response:** Large sulphur oxidising bacteria were not represented in the sediment samples analysed that were taken from the surficial layers of sediment cores (Verification assessment. Appendix-N-2014, Section C2.3). However, as other oxidising species were present, there is a potential for Beggiatoa, Thiomargarita, Thioplaca to colonise SP1 sediments. The varying migration within the sediment body will be taken account of in the environmental baseline update and monitoring programmes.
3.2.5 The following statement may not be true: "Furthermore, elevated nitrate concentrations at the base of the water column and in the sediment pore-water supports the contention that HS-flux is low as the two compounds cannot coexist" Please see recent papers on nanoaerobic respiration e.g., Berg et al. 2022 FEMS Microbiology Review and others	**Specialists response:** This is a conclusion drawn from Namibian continental shelf data in Bruchert et al 2003 and sediment distributions and properties in Van der Plas et al 2007 as summarised by Monteiro *in litt* in Appendix-N-2014-Verification assessment, Section 5.
3.3 Appendix E states that "High suspended sediment concentrations near the sea bed generated by the drag head and subsequent re-deposition of the material causes smothering effects on the benthos. This impact is very localized and short term, and effects will only be relevant along a narrow	This impact is further addressed in the 2022 ESIA report in chapter 7, sections 7.5.1.6. This impact was reassessed by Carter and Steffani (2021) in light of the supplementary studies on plume generation and dispersion completed in 2020 by HR Wallingford

Comment	EAP/Proponent and Specialists Response
strip around the outer edge of the dredge site since any re-deposition inside the dredged area will have no impact as the animals are removed. Significance rating is low. Multiple parts of this statement are incorrect. The suspended sediment plume will affect areas that are left within SP-1 as source populations (discussed in section 3.2.1 - leaving unmined patches of seabed adjacent to or within targeted areas, to aid the recovery of macrofaunal communities. Many new papers have emerged recently on effects of deep-seabed mining sediment plumes. The dredge head plume will affect the lower 10 m of water and up to several hundred meters away. Over the SP1 area and surrounding this is a large volume of impact.	(Appendix I). The effects will only be relevant along a narrow strip around the outer edge of the dredge site since any re-deposition inside the dredged area will have no impact as the benthos are removed. The sediment plume duration is for 72 hrs maximum. **Specialists response:** Deposition from dredge head seabed disturbances is likely to be within the overall deposition footprint of the sediment plume discharged near the surface. Suspended sediment concentrations from dredge head disturbance were estimated by HR Wallingford (Appendix-1-HR-Wallingford-plume-dispersion-modelling) as 1 mg/l. The HR Wallingford modelling estimates peak near seabed suspended sediment concentrations in the range of 20 – 50 mg/l (HR Wallingford Appendix B). As the deposition footprint will be derived from the near seabed plume the contribution of dredge head suspended sediments to the deposition should be 5% or less. **EAP/Proponent response:** Additionally, the independent review by Payne (2022) supports the conclusions made (Appendix G, pg.4) by Carter & Steffani (2021): 'Smothering by seabed plumes created by the dredge head would not have a significant impact in this case because the biota in the small target area will anyway be removed and the spread of these plumes is very small'.
3.4 Plume from hopper spillover	This statement is referencing the work conducted during the 2014

Comment	EAP/Proponent and Specialists Response
The statement that sediment plume behaviour put forward in the EIA was based on available data on regional currents and measured and modelled marine diamond mining discharge plumes in ~100 m water depth is concerning. Are the sediment properties, particularly grain size, in the diamond mining area similar? Seems unlikely. Current regimes will differ as well.	verification assessments and not the scientific information utilised by Carter & Steffani (2021) for the 2022 ESIA assessment. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. This impact is further addressed in the 2022 ESIA report in chapter 7, section 7.5.1.7. This impact was reassessed by Carter and Steffani (2021) in light of the supplementary studies on plume generation and dispersion completed in 2020 by HR Wallingford (Appendix I). This study was based on detailed ocean current and plume dispersion modelling of dredge plume behaviour in the 20-year mine plan area based on their existing comprehensive regional and local metocean data bases, in situ measurements of sediment properties as well as water column and bottom currents in the 20-year target mining area (2014 verification assessment) along with the technical details on the proposed dredging programme production rates and equipment specifications provided by the

Comment	EAP/Proponent and Specialists Response
	dredging contractor (JDN). Additionally, the independent review by Payne (2022) supports the conclusions made (Appendix G, pg.4) by Carter & Steffani (2021): 'Likewise, hopper overflow plumes and dredger overspill plumes would be of such short duration and so local to the SP1 mining area that potential toxicity and smothering effects on biota generally will be virtually insignificant.'
3.4 and 3.5 Significance impact of plumes and sediment deposition smothering are given as low. But these sections do not discuss the actual sublethal consequences of the suspended plume or deposited sediments or note the effects of multiple mining operations, should they occur. Strips of biota left unmined within SP-1 will be severely affected – the impacts will not be low! Since the claim is that this will not contribute to the nepheloid layer – please give the range of existing suspended sediment concentrations and the amount /percentage increase expected from mining. The Report states "According to the plume dispersion model, an area of 151 km^2 outside of the dredge area will have a total re-deposition rate of >10 cm, which would well trigger the SSD HL50 of 54 mm. However, this is an accumulative prediction for dredging activity for the entire 20 years of dredging, while a single operational cycle is predicted to result in a 0.3 mm deposition, well below the HL5 (6.3 mm). Accordingly, no amendment to the significance rating is warranted. " What is the duration of a single operational cycle? Have any long-term	The cumulative impacts of mining have been discussed in the 2022 ESIA report with reference to chapter 7, section 7.10. This environmental clearance certificate application for mining activities is for SP1 only. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates. **<u>Specialists response:</u>** • Smit et al (2008) is the only data set that provides dose response relationships on instantaneous burial by fine sediments. • A single dredge cycle comprises 13.3 hours of dredging within a 35.1-hour cycle period (Appendix I). • There are no applicable long–term data for press/pulse determinations. • Near seabed turbidity measurements show episodic high turbidity events that can extend >24 hours (Figure 17, Appendix-N-2014-Verification-study). Resident filter feeding benthos should be able to survive through these and short term, e.g.,

Comment	EAP/Proponent and Specialists Response
experiments (press vs pulse) been carried out on sedimentation effects? It is possible that 0.3 mm deposition (17 times a year – required to get 10 cm over 20 y) is harmful? Numerous sublethal effects such as clogging of feeding apparatus) are likely. Also epibenthic sessile taxa cannot escape even small burial (1 cm) as indicated by Smith et al. 2008 (..epifaunal suspension feeders, permanently attached to hard substrate could not escape burial of 1 cm depth). The suspension feeding tunicate Mogula appears to be exceptionally abundant in the area. Note the bias in Smith study towards molluscs (24/32 species were molluscs). What fraction of the Namibia benthos is molluscs? Also data in Smit et al. 2008 come from shallow water dredging studies, where the organisms may be far better adapted to periodic sediment disturbance.	dredge cycle, exposures to possibly impaired filtration efficiency through sedimentation effects on filter feeding apparatus. • Molluscs were not well-represented in the benthic macrofauna in the SP1 area (Appendix-N—2014-Verification-study, section 2.2.2) that was dominated by polychaetes. Plot data in Smit et al (2008) indicates effects on this taxon at >5 cm instantaneous burial. The predicted 0.3 mm deposition in limited seabed areas over ~13 hours during the individual dredge cycles should have limited effects on burrowing species.
3.6. Sound effects are given as low significance in the EIA and review comments indicate sound should be measured, but that "this can only be carried out once the dredger is actively operating onsite in ML170. What was learned from sound under diamond mining? Please see Williams et al. 2022 8 JULY 2022 • SCIENCE VOL 377 ISSUE 6602 p. 157. It is unclear how reference areas to examine effects of sound could be placed anywhere near the mining areas (and still be representative of the ecosystem). Vibration is also generated and can disrupt animal activities.	The associated potential impact was assessed in 2012 and reassessed in 2014 during the verification programme, whereby infield surveys were conducted (Japp in Midgley 2012 and 2014). As part of this current assessment report, the appointed specialist Japp (2022) has expanded the baseline information and re-assessed the potential impacts accordingly, per species group (Appendix F). Additionally, Carter & Steffani (2021) have assessed the potential impacts of noise in their specialist study for this assessment (Appendix E), which includes new quantitative noise generation and attenuation data for dredge vessels operated by the dredging contractor JDN (Appendix K). Results from this study are for a similar dredging vessel that will be used for mining activities in SP1. However it is further recommended as part of the monitoring

Comment	EAP/Proponent and Specialists Response
	program for additional direct noise measurements to be taken when the dredger is operating and has been included in the EMP as such. Reference can be made to chapter 7, section 7.6.4.1 in the 2022 ESIA report. (Pg213) 'Carter and Steffani (2021) further concluded that modelled sound attenuation predicts that attenuation to 100 dB re 1 µPa at 1m will be attained at an average range of 15 km. The modelled sound attenuation for the TSHD Gerhardus Mercator (Jan De Nul N.V., 2020) indicates that received sound levels <130 dB will be restricted to within a radius of 2 km to 3 km from the operating dredger. Additionally, JDN conducted sound monitoring campaigns (Sound monitoring campaign TSHD Pedro Álvares Cabral dredging, 2017) on TSHD fleet, which has the same technical specifications as the Christobal Colon vessel, which will be utilised for dredging activities in SP1. Figure 76 below shows the interpolated sound levels (kriging method) and locations of the sound's measurements. Sound levels were recorded as 90 dB (a) on the dredger, dropped to 70 dB (a) at 100 m from the dredger, below 60 dB (A) at 200 m and were near background levels (50 dB (A)) at 300 m. Therefore, overall sound propagation was limited. This confirms what is found in the literature, that 150 DB contour range extends less than 100 m from the TSHD vessels.'

Comment	EAP/Proponent and Specialists Response
	The sound levels are in all cases far below those which would or could pose any threat to marine life.
EIA and Environmental Monitoring Plan. The benthic biological studies focus on macrofauna. There is no mention of meiofaunal sampling. Why? Meiofauna (nematodes, copepods) may be a major means of transferring energy from the seabed to the pelagic and demersal fisheries. There is limited focus on mobile epifauna and fish. Note that sieving through a 0.5 mm mesh prior to preservation (as proposed) will retain many fewer animals than if preservation is done prior to sieving. Some fraction of macrofaunal juveniles will be lost**.**	It is agreed that meiofauna be included in the suite of monitoring variables and the EMP has been amended to reflect such. **<u>Specialist Response</u>** There are logistical and health issues with this approach (excessive exposure to formalin) and it can complicate comparisons with previous benthic macrofauna studies in the Benguela Current region that have sieved and then fixed biological samples.

Table 4 – Comments and feedback from the ESIA report public review period submitted 19 September 2022: Marcia Fargnoli (The Earth Organization Namibia)

Comment	EAP/Proponent and Specialists response
1. I would like to first state that the commenting period for such a large amount of documents was rather short at 15 days. In any case, I have done my best to raise many of the issues I am concerned with.	The period provided for comment by I&APs of 14 days was defined in consultation with the office of the Environmental Commissioner and is in accordance with both the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations ("EMA 2007"). This is a reasonable allocation of time for comment on the content of the assessment report prior to submission to the EC as required under Regulation 23 of the Act (7 days).
2. Please give details of how you ascertained the legal requirements of your project. Did you employ a legal expert? Can you provide details such as a short CV on this person?	In accordance with the provisions of EMA 2007, the Proponent has appointed an Environmental Assessment Practitioner ("EAP") to conduct the assessment process. Under the provisions of EMA it is the EAP that is authorized to compete the impact assessment within the boundaries of the Act itself, which includes assessment of the relevant legal frameworks applicable to the project. The legal requirements related to the project are detailed in chapter 3 of the scoping report which was submitted for review and approval by the Ministry of Environment, Forestry and Tourism. MEFT approved the scoping report formally with a letter on the 30 August 202022 and informed the ECC and the Proponent to continue with the assessment report (Appendix M). The Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations do not call for a legal practitioner to be utilized.
3. Please can you explain how you came to the conclusion that the portions of the mining project that must take place on land should not	Mining involves two key processes 1) ore recovery (excavation of mineral bearing rock or sediment) and 2) processing of ore to produce a

Comment	EAP/Proponent and Specialists response
be included in this EIA when they are part and parcel to the mining project and mining cannot take place with no place to put the recovered material.	concentrate. Under normal (on-land) circumstances both these processes occur within the confines of the mining licence boundaries (i.e. the area within which the mineral deposit occurs and is extracted from). This is not the case for this Project which is not the same as a normal land-based mining project. The mining licence ML 170 is located in the ocean 160 km southwest of Walvis Bay. The law requires that an environmental clearance certificate must be issued for the proposed operations in mining licence ML 170, a) in compliance with the attached licence conditions and b) for authorisation of any operations in the mining licence area. The ESIA for ML 170 is directly related to the assessment of impacts in the offshore marine environment related to the recovery of the ore. No processing is done in the ML 170 at sea. Award of an environmental clearance certificate does not in any way permit any processing activities to be undertaken on-land. The processing of the landed ore takes place at a separate on-land location and does not involve any mining activity and hence does not require a mining licence for the area of the processing plant. As an industrial process, a separate environmental clearance certificate is therefore required for the proposed land-based processing and product handing operations and associated land sites allocated for these activities. While related, in this instance the land-based component of the project cannot proceed without environmental permitting for the mining licence ML170.

Comment	EAP/Proponent and Specialists response
	Therefore, it is a requirement to have two separate EIA processes. Mining operations in ML 170 cannot commence without completion of a full ESIA and environmental permitting of the land-based processing and product handling component infrastructure which is required for commencement of construction There can be no investment in progressing the land component of the Project if there is no valid authorisation to conduct operations in the mining licence where the vessel and mineral deposits are located. Therefore, it is a requirement to have two separate EIA processes. Staged application for environmental approval for project development is not contrary to any laws in Namibia and has been done both previously and currently. The EMA 2007 is comprehensive in its requirements for assessment which will be done for each location.
4. Please can you explain why your Environmental Management Plan is so vague? There does not seem to be a very clear reporting structure. There also does not appear to be internal regulations/strict standards for noncompliance. The EMP is overtly self-regulating. How did you conclude that this Environmental Management Plan is sufficient to regulate your operations in a way that will be compliant with the Environmental Management Act.	A comprehensive environmental management plan (EMP) has been compiled by and in accordance with the recommendations of the specialist consultants engaged to complete the relevant components of the ESIA. The EMP is regulated and managed in accordance with the provisions of Namibian legislation including the requirements of the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations as well as the Minerals (Prospecting and Mining) Act, No. 33 of 1992. Assessment of the EMP and any related approval or amendment thereof, as well as enforcement falls under the authority of the Environmental Commissioner, not the Proponent.

Comment	EAP/Proponent and Specialists response
5. Please can you give details of the minimum requirements (qualifications and experience) you will utilise in order to hire an Environmental Manager.	This will be determined by the Proponent and in line with industry requirements and professional qualifications required for the position in the management level of the company as per the relevant human resources organizational development standards.
6. Please explain how you came to the conclusion that you will 'only' mine 34km^2 out of your whole Mining Licence Area? What will legally bind you 'only' to mine in this 'mine plan area'? What control measures are in place that will prevent you from mining outside of this 34km^2 'mine plan area'?	Location and design of the 20 year mine plan is dictated by distribution and grade of the defined ore reserves and mineral resources. The defined area of 34 km^2 is sufficient to support the proposed mining operations for a period of 20 years at the projected production rates. The mine plan within the boundaries of ML 170 is approved by the Ministry of Mines and Energy. Any adjustment thereto or increase thereof would require prior approval of the Ministry of Mines and Energy and accompanying adjustment of the environmental clearance certificate issued by the Ministry of Environment, Forestry and Tourism, following submission of relevant information. If the Proponent in the future needs to amend/change this mining plan, an amendment to the environmental clearance certificate will need to be lodged with MEFT and additional impacts assessed as per the requirements of the 2012 Regulations.
7. You suggest that you might mine in other areas of the Mining Licence area in the future, but the onsite studies have not been completed for the entire Mining Licence Area, so how can you claim that your scientific studies would be accurate for areas where you have not conducted studies?	Response above refers. This environmental clearance certificate application for mining activities is for SP1 only. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates. Impacts will need to be assessed for those specific mining areas, including cumulative impacts in further detail.
8. The Zone of Influence is overly downplayed in the report. The Zone of	**Specialists response:**

Comment	EAP/Proponent and Specialists response
Influence from the discharge plume is 513 km^2 outside of the mining target area from only Zone 1. It needs to be made clearer up front that the impact extends far beyond the 34km^2 'mine plan area.' What would the zone of influence be if you mined other areas in the MLA? Where would they extend? What if you mined the whole MLA?	These zones were determined for the fisheries assessment as a guide only, so extrapolation to other non-fisheries aspects is probably tenuous. The plume zone of impact really is not material to the zone, it is a standalone assessment. **<u>EAP/Proponent response:</u>** The zone of influence is accurately presented per the supplementary study by HR Wallingford (2020) (Appendix I) which notes that: *'It must be emphasized that the overall Zone of Influence represents the area within which non-negligible changes in suspended sediment and/or deposition above background are predicted to occur at any time within the proposed 20 year period of mining. However, at any given moment within the 20 years the plume represents a much smaller area than the Zone of Influence. For example, the Zone of Influence for a single dredging operation extends up to 5 km^2 outside the 20 year mining plan area.'* The impacts of the cumulative impacts of the plume and defined zone of influence have been assessed by appropriately qualified specialists. These results were further analysed by Carter & Steffani (2021) in their specialist report (Appendix E). Further reference to this assessed impact can be located in chapter 7 of the 2022 ESIA report, under section 7.4.2.1 (Dredging generates plumes of suspended sediments).

Comment	EAP/Proponent and Specialists response
	For the dredging activity in the mine plan area (34 km^2) within ML 170, the overall ZOI for the total 20-year dredging operations extends over an area of 513 km^2 which lies predominantly within the boundaries of ML 170, and which extends only up to 11 km outside of ML 170 For a single dredging cycle, which has an average duration of 16 hrs onsite, the sediment plume ZOI ranges from 1 km^2 to 5 km^2 from the dredger for a duration of 72 hours. This environmental clearance certificate application for mining activities is for SP1 only. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates. Impacts will need to be assessed for those specific mining areas, including cumulative impacts in further detail. See comments for point 6 above. It is not practical or feasible to mine the whole ML 170. Hence the concern raised in this regard is moot.
9. Please explain why the footprint of your mining operation will extend beyond your Mining Licence Area by 11km^2 for Zone 1 and why you think this is acceptable. How far would this footprint extend outside of the MLA if you mined the entire MLA (which is what you have a mining licence for that you seek Clearance for).	**Specialists response:** The mining footprint is the actual area mined, any impacts beyond the actual area mined is a zone of influence. This can be compared to a trawling footprint which is the actual area trawled or fished and there is a zone of influence for trawling or any other anthropogenic activity that extends beyond this "footprint", which is difficult to quantify and which mostly relies on qualitative expert judgement with regards to the zone

Comment	EAP/Proponent and Specialists response
	of influence. **<u>EAP/Proponent response:</u>** This environmental clearance certificate application for mining activities is for SP1 only. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates. Impacts will need to be assessed for those specific mining areas, including cumulative impacts in further detail. Comments provided in point 6 and 8 above refer in regard to mining the entire MLA.
10. How do you plan to stay to the maximum of 3 metres into the sea floor? What systems do you have in place to prevent you from going deeper?	Dredging control is explained in detail in section 4.7.1, pg 72 of the ESIA report. Modern dredgers are equipped with sophisticated high resolution kinematic positioning and multibeam seabed tracking systems which are used to monitor and control the depth of excavation below seabed. Dredging control is typically maintained by means of a High resolution positioning system, a dredging control system, a suction tube positioning system, a dynamic tracking system coupled with dredge progress monitoring and related survey procedures. The cut depth is controlled by the vessel trailing speed in a linear

Comment	EAP/Proponent and Specialists response
	relationship that allows for a deeper cut with slower speeds or shallower cuts at higher speeds. Pre and post dredging mutlibean surveys are conducted to confirm excavation depths and volumes extracted for both mine control, environmental monitoring and contract management purposes.
11. Please explain any other activities you will be conducting in the remainder of the Mining Licence Area?	Other than the activities required for development of the proposed operations in the SP1 area, no other activities are currently planned to be undertake in in the remainder of the mining licence area at this time. Going forward, only permitted activities will be conducted within the mining licence area. Such future activities may include ongoing environmental surveys including high resolution geophysical surveys and standard seabed sampling.
12. Please explain why you have not included the full cumulative impacts of the full project including those revolving around mining waste and why you have separated these as if they do not form part of mining operations. These form a critical part of the mine and the project cannot go forward without these, so why are these not in this EIA? As part of the whole project EIA, all of the components (including those based on land) must be looked at to ascertain the cumulative impacts of the mine. Most of the components of the mining project are based on land and these 13. Will also have impacts on the marine environment that need to be addressed. If all components of the project are assessed together, it will be much clearer what the cumulative impacts will be.	The comments provided under point 3 refer. Cumulative impacts were assessed in the 2022 ESIA report in chapter 7, section 7.10. The full-scale project cumulative impacts will be assessed during the application for the land-based operations environmental clearance certificate.
14. Please explain what you mean by the statement "The dredger then	Based on the recent developments in the Port of Walvis Bay, the

Comment	EAP/Proponent and Specialists response
travels to Walvis Bay to berth at an appropriate facility to discharge the phosphate ore ashore as cargo." Has an 'appropriate facility' been designated already to discharge the phosphate ore 'as cargo'? If so, where is this facility located in Walvis Bay? How will such a 'cargo' facility be regulated enough to handle 125,000t of slurry per campaign week?	discharge and management of bulk cargoes falls withing the provisions and capabilities of the Namport Bulk Handling terminal, which would be the appropriate site for such activities. No sites have been formally allocated for the land based operations at this time. This aspect will be will be determined and addressed in detail during the land based ESIA assessment. Comments for point No 3 refer.
15. Please explain why you believe it is acceptable or appropriate to dispose of tailings 15m below the ocean surface? Shouldn't the tailings be brought to shore and disposed of in a Tailings Dam on land? Why do you believe it is acceptable to dispose of the tailings into the ocean and not in a Tailings Dam?	In all standard TSHD dredging operations, a portion fine sediment is incorporated in the excess water that is discharged overboard. This practice is also practiced by the Marine Diamond Mining fleet of vessels, which discharge all (+90 %) of recovered sediments directly overboard at the sea surface. It is not technically feasible or possible to accumulate all sediment laden water in the dredge hopper. Discharge of sediments at any depth below sea level has beneficial effects as it increases the dilution and reduces the concentration of the sediment plume. The nature and potential impacts of the sediment plume from the proposed operations been thoroughly considered by relevant specialists for purposes of this assessment. Reference can be made to 2022 ESIA report, chapter 7, section 7.4.2.1 Dredging generates plumes of suspended sediments, pg 138&139: 'Additionally, the potential operational mitigation measure of

Comment	EAP/Proponent and Specialists response
	discharging the fine sediment plume at or near the seabed was considered. Dredging contractor JDN has advised that such measured are not routinely done for any of their international coastal dredging projects (JDN personal comms, 2022). For the current operational depths (200 m to 225 m) in ML 170, while it would be technically feasible, there is no clear evidence that it would have any substantial environmental benefits, considering that the current assessed impacts significance is low for plume dispersion and sedimentation and operational mitigation measures for fine sediment discharge are already being applied (environmental valve and discharge at -15 m depth). During dredging, there will be repeat traverses over the defined dredging lanes in order to mine to the required depth of sediment below seabed (leaving ~30 cm above the footwall) in the mine plan area. If fine sediment discharge is released at the seabed during the traverses, an amount of the fine sediment discharged would then fall back into the active dredge lanes and will need to be double handled and removed during the next traverse. Ore recovery efficiency would possibly be affected and reduced which would result in increased onsite dredging time and related fine sediment discharge. Comparisons when using an environmental valve of surface (40 m to 50 m depth), mid depth and bottom turbidity distributions against no valve, indicates an improvement in total suspended solids (TSS) concentrations in the surface layers to <7.6 mg/l but no or little change in the subsurface layers (HR Wallingford, 2020). This is beneficial as the 1 % light depth would be around -50 m at this sediment concentration, therefore

Comment	EAP/Proponent and Specialists response
	negative effects of reduced light levels on phytoplankton production should be mostly avoided. Also, as there is little or no change in the near seabed TSS load, it can be assumed that the sediment deposition would be similar between the valve and no-valve scenarios which, according to modelling, is predicted to be 0.3 mm or less per dredge cycle. This is a factor of 20 below the HL5 threshold of effects on marine benthos reported by Smit et al. (2008). Note that the environmental valve is recommended as a mitigation measure during mining operations. Whether such deposition patterns would occur with a near-seabed discharge is uncertain, as behavioural aspects of the discharge in terms of jet momentum, dynamic plume collapse, associated mixing with the receiving water body along with possible turbidity flows and local currents will affect deposition rates and distributions. This may result in considerably higher instantaneous sediment deposition thickness in places, possibly approaching centimetres, with correspondingly higher risks of negative effects on benthic macrofauna as Smit et al (2008) determined a median hazardous effect level (HL50) of 5.4 cm for instantaneous burial on benthos. Therefore, the environmental benefit of a near seabed fine sediment discharge is moot and will most likely not warrant the linked cost and potential operational risks and uncertainties (Carter personal comms, 2022).'
16. Why have you not analysed the temperature of the tailings that you	**Specialists response:**

Comment	EAP/Proponent and Specialists response
will release back into the ocean? Temperature has a very serious effect on marine life and how can you guarantee the temperature of the tailings will be exactly the same temperature of the receiving environment? This could potentially have a serious effect on the receiving environment and you have chosen not to even consider it as a potential issue and have failed to assess this.	There is no ore treatment process on the dredger and thus no heat addition to the water discharged subsurface at ~15 m depth. The behaviour of this water follows that of the sediment plume. Modelling shows a dynamic plume descending to ~50 m depth and then lateral spreading as the plume passively mixes into the receiving water body. The latter occurs predominantly in sub-thermocline water where the temperature differences between discharged water and the receiving water body are reduced. Due to this dynamic the temperature differential is not viewed as a significant consideration. The marine diamond mining fleet discharge tailings directly overboard and do not conduct temperature measurements of discharged tailings, as per Debmarine Namibia updated EIA issued in 2021 for renewal of the environmental clearance certificate for the Atlantic 1 Mining Licence ML 47.
17. Figures and maps relating to Walvis Bay and Figure 15 are too blurry to understand.	Noted, this will be updated in the final ESIA report.
18. Why do you conclude that resident demersal fish, such as hake and monkfish, already have elevated levels of cadmium in their livers and this is the reason why unnatural disturbance will not increase the toxicity load? Certainly if they already have elevated levels of cadmium in their livers, adding more would not be a good thing.	**Specialists response:** The fishing industry must routinely have their products tested for heavy metals and other chemicals as their products are for human consumption and must comply with very strict guidelines, in particular for export. Typically toxicity in most top predatory fish and other species bioaccumulates with age. Therefore the larger older fish may have elevated levels of these heavy metals and as such the sale of these products will be rejected for human consumption. The fishery study has shown that fishing effort in the proximity of the SP1 is negligible or low.

Comment	EAP/Proponent and Specialists response
	There is also a recognized depth-size relationship with the main commercial fish species – in particular hake and monk. Larger fish are caught in deeper water so the naturally occurring high toxin loads are expected to be found in these fish well away from the mining area. Hake are a mobile and migratory species moving into deeper water with age and in the immediate locality of the mining we expect low impact. As determined in the assessment, higher impact is expected on the less mobile monk species – monk are nevertheless still mobile and are expected to move away from the area of mining disturbance.
19. Why do you conclude that unnatural disturbance and release of sediment through mining will not increase the level of heavy metals released by way of a plume. Disturbing up to 3 meters of the sea floor with a dredger is unnatural and as a result, the sea life will be exposed to an amount of sediment that has never been naturally released. Indeed this can result in bioaccumulation and this can negatively affect the whole food chain including fish, sharks, marine mammals, sea turtles, and birds, many of which are protected. Your report refers to arsenic, cadmium, chromium, copper and nickel as being the heavy metals that occur in the area. It has also been admitted that uranium and thorium and their associated radionuclides could be released. Why would this not be a serious concern for these to be released in the form of a plume caused by mining activity of 3 metres of the sea floor which is not natural? With regard to the radioactive elements, it seems you will only analyse this effect through the EMP only once mining operations are underway. That is way too late to make such an assessment. You	The impacts on the water column have been assessed in chapter 7 of the ESIA report based on the specialist study by Carter & Steffani (2021) (Appendix E section 3.2.6). This study took account of the conclusions drawn from the sediment plume dispersion model conducted by HR Wallingford (2020) (Appendix I). Reference can be made to sections 7.4.2.1 (Dredging generates plumes of suspended sediments), 7.4.2.5 (Trace/metal toxicity at surface), 7.4.3.1 (Trace/metal toxicity on seabed - target dredge area trace metals are remobilized). **<u>Specialists response:</u>** Due to low apparent heavy metal solubilities and thus barriers to uptake in marine food chains acute toxicity and trophic transfers at measurable scales are not predicted. **<u>EAP/Proponent response:</u>** The radiation component is further discussed in section 7.4.3.1.

Comment	EAP/Proponent and Specialists response
must be sure before an environmental clearance can be given and before you are allowed to mine.	'Further the potential for the radioactive mineral uranium and its associated radionuclides to be dispersed in the water column from the sediment was assessed. The total uranium concentration in the ore sediment was quantified during the test work for the Sandpiper Project as part of the pre-feasibility study (Bateman, 2011) and defined. The natural uranium content is determined to be low (~100 ppm), which is in line with other mined phosphate sedimentary deposits globally. Currently there is very little international and local information and studies available on marine radioactivity levels and their potential impacts on marine organisms. **Specialists response:** However, uranium itself is largely inert (Gillian M. Stewart, Scott W. Fowler, Nicholas S. Fisher, 2008. The Bioaccumulation of U- and Th-Series Radionuclides in Marine Organisms, Radioactivity in the Environment, Elsevier, Volume 13, Pages 269-305, ISSN 1569-4860, ISBN 9780080450124, https://doi.org/10.1016/S1569-4860(07)00008-3. https://www.sciencedirect.com/science/article/pii/S1569486007000083) and should have no direct toxicity or bioaccumulation effects on such organisms. **EAP/Proponent response:** Furthermore, there is no evidence in available published literature of any known detrimental effects on demersal fish as yet recorded from radioactive components being released into the water column as a result of trawling activities, which dominate the Namibian EEZ. However,

Comment	EAP/Proponent and Specialists response
	it is acknowledged that radioactive elements exist in the seabed and uranium, thorium and their associated radionuclides will be included as variables in the baseline monitoring required in the EMP for the sediments and water column.'
20. Why has the impact of sediment plumes and their possible toxicity not been assessed for the entire food web including marine mammals, turtles and seabirds?	The results of the impacts of sediments plumes and toxicity on the food web has been considered and assessed as presented in the studies by Carter & Steffani (2021, see Appendix E and Japp (2022), see Appendix F. **<u>Specialists response:</u>** The specified total suspended sediment thresholds are protective of 95 % of the tested species in a wide range of marine organisms including phytoplankton, zooplankton, crustacea, molluscs and fish. Due to their large sizes and high mobility, there are no experimental or even observational data on effects on marine mammals, turtles and seabirds. It is expected that, if there were deleterious effects, these animals would swim out of the spatially constrained sediment plumes with no further implications at the individual or species population levels.
21. Sediment plumes could affect echolocation and other forms of communication between species. This has not been discussed.	Reference can be made to the specialist study by Japp (2022) in Appendix F. **<u>Specialists response:</u>** Certainly echo-location is used by mammal species. There are many examples of how dolphins use low visibility in combination with their echo-location skills to hunt for prey – such as the freshwater species in high turbidity rivers as well as in tropical water. Our assessment has

Comment	EAP/Proponent and Specialists response
	therefore not considered the impact on echo-location to be significant factor to warrant rating the impact. Further plumes are more likely to affect mammals vision. This is of course likely to apply extensively throughout Namibian waters in periods of plankton plumes (which are common) and periods of very low visibility associated with upwelling etc.
22. With regard to noise impacts, why did you choose only to conduct a literature based assessment and instead wait until the intended dredger is on site in order to assess the impacts only once mining starts? You have stated that "Noise levels from the dredging may also affect behaviour, but we have no firm conclusion on this impact which requires a specialist response." You have provided no specialist response with on the ground data. You must be sure before environmental clearance can be given and before you are allowed to mine. You will also not have a specialist response on the boat at all times. Why is it that you say that fish will not be displaced or affected by the noise but marine mammals will choose to avoid the area when you have not had a specialist response on this? How do deem this as not serious enough to study thoroughly in this EIA and only wait to explore this issue once already mining? Noise can have a serious impact on marine life and this has been proven before. Your study does not address this.	The noise impact assessment includes data from in-field noise profile and attenuation measurement data for comparative dredgers and has been assessed by specialist marine scientists. The potential impact of noise was assessed in 2012 and reassessed in 2014 during the verification programme, whereby infield surveys were conducted (Japp in Midgley 2012 and 2014). As part of this current assessment report, the appointed specialist Japp (2022) has expanded the baseline information and re-assessed the potential impacts accordingly, per species group (Appendix F). Additionally, Carter & Steffani (2021) have assessed the potential impacts of noise in their specialist study for this assessment (Appendix E), which includes new quantitative noise generation and attenuation data for dredge vessels operated by the dredging contractor JDN (Appendix K). Results from this study are for a similar dredging vessel equipped with the same engines to that which will be used for mining activities in SP1 which generates sound pressure levels (SPL) of 180-190 dB re 1 µPa at 1m. Note: the dredging contractor, JDN, operates dredgers internationally and has significant experience in quantifying and managing vessel noise levels in order to comply with international

Comment	EAP/Proponent and Specialists response
	standards in regard to noise levels and related impacts. Due to the numerous site specific variables affecting the noise propagation and attenuation (e.g. water temperature, seabed type, seasonal variations, turbidity etc.) it is only possible to do accurate profiling of the dredger once it is onsite in ML 170. Provision is therefore made as part of the environmental management and monitoring program for the additional direct noise measurements to be taken when the dredger is operating onsite. Reference can be made to chapter 7, section 7.6.4.1 in the 2022 ESIA report. (Pg213) 'Carter and Steffani (2021) further concluded that modelled sound attenuation predicts that attenuation to 100 dB re 1 µPa at 1m will be attained at an average range of 15 km. **<u>Specialists response:</u>** Sound receptors in the operations area will be mainly cetaceans, seals, and fish. Temporary (hearing) threshold shift (TTS) in cetaceans and seals are reported as being 175 dB re 1µPa at 1 m SPL received level and above. Mortality can be caused in fishes at SPL >207 dB re 1µPa at 1m for fish with swim bladders and >213 for fish without bladders, TTS thresholds are ≥186 dB; mortality in fish eggs and larvae can occurs after exposure to 207 dB. Mortality or potentially mortal injury to sea turtles can follow exposures to similarly high SPLs. Given the dredger

Comment	EAP/Proponent and Specialists response
	sound source level (above) such effects are unlikely. Received sound level thresholds causing moderate behavioural shifts for baleen and odontocete cetaceans and seals range from 130 to 180 dB re 1µPa at 1 m. Modelled sound attenuation for the TSHD Gerardus Mercator provided by Jan de Nul (Jan De Nul N.V., 2020) indicate that received sound levels >130 dB will be restricted to within a radius of 2-3 km from the operating dredger while sound levels >150 dB will be restricted to within 100 m. According to published literature, the sound levels are in all cases below those which would or could pose any threat of injury to marine life.
23. The studies on whales, turtles and seabirds is entirely lacking and consists only a very short desktop study. Many of these species are protected under Namibian and International law. Your report has admitted that Zone 1 is located in a critical area offshore for whales and dolphins, and that most, if not all species are expected to be found in the proximity of the mine site. The entire zone of influence of 513km^2 could impact them and displace them and affect their feeding, but you have not completed an onsite impact assessment. You do not even know exactly what species occur in the MLA, and what they use the area for but you assume the impact is insignificant enough to not even study it. Your conclusion is that these species will not be affected once mining ceases, so it is a minor effect. The reality is that mining will occur for 20 years. This conclusion is seriously flawed especially with no on site studies having been conducted.	**Specialists response**: We agree the assessment was almost entirely based on desktop information. The available information on mammals, seabirds and turtles in Namibian waters is mostly generic in nature. There are a few site-specific examples of mammal, seabird and turtles such as those provided in the assessment in NORAD surveys and localised nearshore surveys in the Walvis Bay area. In fact, there is not even fishery Observer data on interactions and sightings of these species for fisheries that operate extensively in Namibian waters (that can be classified as Endangered, Threatened and Protected – or ETP). The broad distribution of these species and the seasonal nature of their distribution to many maritime sectors including shipping and fishing is poorly known and extrapolating to site-specific areas or zones such as the planned phosphate mined area is scientifically not defensible. Note also our

Comment	EAP/Proponent and Specialists response
	zoning was deliberately created for our own purpose to provide a benchmark to rate impacts. Our assessment has confidence in the fact that the proposed mining areas over 20 years is constrained to the areas NMP have been given a mining right and not the whole MLA or even the area within SP1. Undoubtedly there is a need to closely monitor the mining operation and activity, and to adapt and mitigate to any negative impacts as needed. If on-site studies were to be done before mining commenced, the same would need to be applied broadly to other extractive industries operating in the immediate area of the planned mined area in order to contextualise any impacts. This of course is impractical, so the best approach is to ensure any impacts if they occur, is restricted to the mined area and through monitoring and adaptation, any impacts are mitigated.
24. Why do you determine that with a 20 year life of mine that the project will have long term positive socio-economic impacts? How do you determine 20 years of a mine will offer a long term positive impact when essentially it will only last for 20 years? This is not a renewable resource and this is therefore cannot be a sustainable industry over the long term. Long term cannot be defined as 20 years. What will the impact of closure after 20 years be? In numerous towns across Namibia, there is a boom and bust result from mining. In the end, the Karas region was left much poorer because of mining. How do you assume it will be different in this case?	The methodology has been defined in chapter 6 of the 2022 ESIA report. The duration and term of the socio-economic benefits from the project are defined by the quantum of ore reserves and resources, not the term of the mining licence. The ore reserves can support mining for more than 100 years at the projected production rates. The 20 year term is related to the duration of the mining licence ML 170 which is valid for a period of 20 years from date of issue. However, under the provisions of the Minerals (Prospecting and Mining) Act, No. 33 1992, on expiry of the current term, the mining licence term may be extended and granted for additional period of up to 30 years. As such there would be no plan to close the mine on expiry of the current 20 year term of the mining

Comment	EAP/Proponent and Specialists response
	licence. An industry level socioeconomic study has also been completed to investigate the potential long-term benefits to Namibia to be derived from establishment of a phosphate based industry.
25. What employment opportunities for local communities do you refer to? Certainly marine mining is extremely specialised and requires higher educational skills and experience, so the main type of work offered will not go to those in society that experience the highest unemployment rate. How many of the jobs are permanent and how many of these jobs will go to unskilled unemployed people?	As noted in Section 7.8 of the ESIA report, the socio-economic impacts assessed in this document are related directly to the offshore marine operations component in ML 170. By far the greater part of the socio-economic benefits related to jobs and employment reside in the land-based component of the Project, which is projected to generate up to 600 direct and indirect jobs during the construction and operational phase of the project. The overall socio-economic impacts of the Project will be reassessed as part of the land-based component and the full scale of potential impacts will be determined thereafter (for example the total figures related to job creation and skills development will increase in numbers). In this regard, reference can be made to the 2022 ESIA report, chapter 7 section 7.8.5.1 (Job creation for approximately 72-100 jobs (vessel and land based support operations) Appendix H (JDN socio-economic supplementary study) and section 7.8.5.2 (skills development). As outlined in Appendix H in regard to the marine component, the current labour plan for operational activities, it is required for 40 local employees to operate on the vessel in shifts. The current plan is for

Comment	EAP/Proponent and Specialists response
	three months in year 1, six months in year 2 and nine months from year 3 and beyond. Employees will be sourced locally but expats will be on the vessel as NMP plan to utilise Jan de Nul as the main contractor (not local). Foreign nationals are excluded in the above reported figures. Additionally land based staff will be required to work from the head office in Walvis Bay to support operational activities. This includes for example, financial staff, HSE staff, administrative staff, human relations staff, management, maintenance staff, etc. All staff hired will receive an income in the payment of salaries and monetary benefits linked to employment for NMP.
26. In your socio-economic sections, you clearly state that 600 Namibians will acquire direct and indirect jobs when both the marine and terrestrial components of the project can commence. It is confusing that throughout the rest of the report you refrain from analysing the terrestrial component of the project, but you have chosen to analyse it in this instance. Why is that? Since your report consistently focuses on how you choose to separate the impacts of the marine component from the land component, you need to be consistent and separate the 'positive' socio-economic impacts as well, otherwise the report is entirely inconsistent in weighing up the pros and cons of the project. Please can you break down the types of jobs and the types of skills and education that will be needed for the marine component only since that is what this report is supposed to be focused on?	Comments under point 3 and point 25 refer. As already stated, consideration of the jobs related to the land component of the project have not been included in the assessment of the socioeconomic benefits of the marine component, which relate only to the marine dredging and related support operations for ML 170. The overall socio-economic impacts of the Project will be reassessed as part of the land-based component and the full scale of potential impacts will be determined thereafter (for example the total figures related to job creation and skills development will increase in numbers).
Why are you including positive socio-economic impacts for the land component of the project in the Marine EIA? If you are including positive	Only marine based socio-economic impacts were assessed in this report. Reference is made to chapter 7, sections 7.8 and 7.9 of the 2022

Comment	EAP/Proponent and Specialists response
impacts from the land, certainly negative impacts from the terrestrial EIA then also have to be included in this assessment, especially those which do directly negatively impact the marine environment arising from the terrestrial component of the project.	ESIA report.
27. Why are you including positive socio-economic impacts for potential future industries, such as a fertiliser industry, that have not even been considered and have not undergone any environmental impact assessment? These have no place in the Marine EIA.	Context needs to be provided here in order to comment on this statement properly. Future industries were not included in the assessment chapter of the 2022 ESIA report and were therefore not assessed,
28. Why have you separated the socio impacts and the economic impacts into two separate impacts in the structure of the assessment chapter?	Economic and socio impacts differ. Economic impacts include issues such as employment, changes in economic activity such as fishing and tourism, and increased expenditure. Socio refers to social impacts that include the consequences to local populations in terms of ways in which people live, work and interact.
29. When looking at the breakdown of the structure of assessment, the marine assessment is taking only four of the assessment categories, where socio and economic take two, and cumulative one. Since this is a marine EIA, it seems odd that so much of the EIA is focussed on Socio and Economic issues on land.	Each section is broken down into sub-sections and this needs to be looked at in context. The socio-economic assessment only assessed marine based impacts and not land based impacts. The environment is assessed in three speres those being the biophysical, social and economic environments. They are all as important as each other and important when making informed decisions about a project.
30. Throughout the assessment on the marine environment impacts, potentially serious impacts, are down-played as low significance, especially when looking at the various tables of potential impacts. Why is this?	In the absence of any specific supporting evidence the statements are noted as opinions. The ESIA process has been applied utilizing a well defined quantitative

Comment	EAP/Proponent and Specialists response
	methodology as described in chapter 6 and chapter 7, sections 7.3 and 7.6. The significance of the impact was scored, which is an objective and not subjective approach.
31. Why did adverse major impacts in 2012 and 2014 miraculously change to adverse low impacts in 2022, particularly with benthic biota, fishing operations and displacement of fish?	It is noted that the current 2022 assessment report is based on current updated specialist impact assessments now supersedes the 2012 and 2014 report findings. The 2012 and 2014 verification study reports form part of the baseline information that has been considered in the current assessment, along with additional more recent supplementary information in the form of additional specialist's studies As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The current updated specialist impact assessment has included reviewing and refining of the assessment methodology (chapter 6, chapter 7 section 7.3 and 7.6), particularly with reference to scale of the proposed operations. Additionally, an impact score to significance was introduced. The 2012 and 2014 impacts previously were not conducted in this manner and the current 2022 assessment was adjusted and improved to ensure consistency with the methodology approaches.
32. The maps are very blurry and unclear and it is hard to understand and see the details. Some of the maps do not have a clear key to make it understandable (for example it is not clear what the big red dot on some of the maps represents). The fish maps in the EIA only show the mining target areas, but they do not show the 513 km^2 zone of	Reference needs to be given to the text whereby it is unclear to the reader what the keys are describing per figure. The red dot is consistent and refers to the 20-year mining licence area for scale. Reference can be made to Figure 44 for a visual representation of the

Comment	EAP/Proponent and Specialists response
influence outside of the mining target areas. The zone of influence must be clearly included and overlaid on these maps.	cone of influence.
33. Why did you make some of the specialist studies available to certain members of the public for them to include in media reports prior to all IAAPs receiving them to review and analyse themselves?	The 2020 technical reports have not been released to any parties, they were provided directly to the EC only at that time in 2020 as the then current application was formally suspended by the MEFT pending the outcome of the legal proceedings initiated by CNFA. In June 2021 the High Court ruled that the then current application was invalid and instructed that NMP should apply in the prescribed manner for an environmental clearance certificate. These technical reports now form part of the current application process undertaken in compliance with the order of the High Court and have been made available to all parties at the same time, without preference, as part of the processes as defined in Environmental Management Act, No.7 of 2007 and associated 2012 Regulations. I&AP's have therefore not been denied access to the 2020 technical reports. All reports have been provided to the registered I&APs in accordance with the prescribed process for the present application.
34. Your report seems to deem that direct impacts on the fishing industry operations will be low because you suggest you will only mine in Zone 1 and this will impact direct fishing operations less (but not entirely). However this cannot be guaranteed to the fishing industry because you are seeking environmental clearance for the whole Mining Licence Area. If you are really 'only' going to mine the 34km^2 area of Zone 1, then why not apply for a mining licence and environmental clearance only for that area? As long as you have a mining licence for	This environmental clearance certificate application for mining activities is for SP1 only, not ML 170 in its entirety. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates. Impacts will need to be assessed for those specific mining areas, including cumulative impacts in further detail.

Comment	EAP/Proponent and Specialists response
the entire area of ML170 which you are seeking environmental clearance for, then you have to declare the impacts on the whole of ML170 and this includes the extensive impact on fishing rights throughout ML170.	
35. In your report, you have determined that you could not provide data for cumulative impacts within your project because you do not have data to evaluate this. How can you determine the impact as being low across every category if you admittedly have no data to work from? How can you, with no available data on your intra-project cumulative impacts, conclude that your project "is unlikely to contribute significantly to cumulative impacts and therefore the contribution is marginal compared to overall activities within the Namibian EEZ." You do not have the data to back up this statement.	The statement as given is not accurate. Contribution to cumulative impacts is directly related to the scale and significance of the project related impacts. Where Project related impacts are assessed to be low then it follows the contribution to cumulative impacts across multiple activities will be proportionate. Where specialist studies were available for a specific cumulative impact, this was assessed according to chapter 6 methodology in its entirety and the significance of the impact was scored. Where no specialist study was available, information was sourced through information acquired from the 2014 verification assessment, literature review or personal communication with the Proponent. Therefore, only the impact rating was scored. Additionally, there is no available data on quantified and assessed impacts of other activities within and adjacent to ML 170, such as commercial fisheries, including bottom trawling, which can be used to assemble a broader cumulative impact assessment. This issue of availability comparable industry impact data for cumulative assessment purposes is a matter that falls under the responsibility of the relevant authorities and not individual proponents.

Table 5 – Comments and feedback from the ESIA report public review period submitted 19 September 2022: Heidi Potgieter (Private)

Comment	EAP/Proponent Response
As the former Environmental Commissioner unequivocally stated, clearance may not be granted, before *both* the marine aspects *as well as* the land-based operations, onshore processing facilities, waste components and so on have also been submitted, commented on, reviewed and accepted, as per legal requirements and guidelines. As such, the application for an environmental clearance for only part of the components of the project is premature and incomplete. **The full cumulative impact is impossible to assess, or clear, without also taking account of the above-mentioned, integral land-based activities, in a holistic manner, document and assessment**. Currently there is insufficient information on how the waste aspect of the proposed operations will be addressed, in its entirety, which is extremely alarming for Namibian citizens, and ecosystems at large.	No supporting documents are provided regarding the statement attributed to the former Environmental Commissioner. Additionally, in the Environmental Management Act 2007 and regulations ("the Act") there is no clause which prohibits or excludes a proponent from making application for environmental clearance for discrete stages of a larger project. Mining Project typically involve two key processes 1) Mining or ore recovery (excavation of mineral bearing rock or sediment) and 2) Mineral Processing of ore to produce a concentrate. Under normal (on-land) circumstances both these processes occur within the confines of the mining licence boundaries (i.e. the area within which the mineral deposit occurs and is extracted from). This is not the case for this Project which is not the same as a normal land-based mining project the Sandpiper Phosphate Project comprises two discrete stages being 1) Mining/ore recovery process which occurs offshore in ML 170 and 2) Mineral Processing which occurs at a separate location, on land. The mining licence ML 170 is located in the ocean 160 km southwest of Walvis Bay. The law requires that an environmental clearance certificate must be issued for the proposed operations in mining licence ML 170, a) in compliance with the attached licence conditions and b) for authorisation of any operations in the mining licence area. The ESIA for ML 170 is directly related to the assessment of impacts in the offshore marine environment related

Comment	EAP/Proponent Response
	to the recovery of the ore. No processing is done in the ML 170 at sea. Award of an environmental clearance certificate does not in any way permit any processing activities to be undertaken on-land. The processing of the landed ore takes place at a separate on-land location and does not involve any mining activity and hence does not require a mining licence for the area of the processing plant. As an industrial process, a separate environmental clearance certificate is therefore required for the proposed land-based processing and product handing operations and associated land sites allocated for these activities. While related, in this instance the land-based component of the project cannot proceed without environmental permitting for the mining licence ML170. Mining operations in ML 170 cannot commence without completion of a full ESIA and environmental permitting of the land-based processing and product handling component infrastructure which is required for commencement of construction. There can be no investment in progressing the land component of the Project if there is no valid authorisation to conduct operations in the mining licence where the vessel and mineral deposits are located. Therefore, it is a requirement to have two separate EIA processes. Staged application for environmental approval for project development is not contrary to any laws in Namibia and has been done both previously and currently. The Environmental

Comment	EAP/Proponent Response
	Management Act, No.7 of 2007 and associated 2012 Regulations ("EMA 2007") is comprehensive in its requirements for assessment which will be done for each location. The waste aspect, including the full-scale project cumulative impacts will be assessed during the application for the land-based operations environmental clearance certificate.
The dangers of slime, waste and tailings has just been tragically and clearly portrayed in the very recent Jagersfontein debacle in our neighbouring country, South Africa: This mining catastrophe resulted in substantial, tragic loss of irreplaceable human life, millions of damages in destroyed homes and municipal infrastructure, to mention but a few; resulting in **multiple lawsuits**, by local government, **human rights watchdogs** and more. Contaminated water sources may well have been **irrevocably damaged**, providing huge concern as the area's summer rains are around the corner. These may have been destroyed forever, for generations to come. No water, no life. Loss of livelihoods and towns for generations to come, if not forever. Threats to underground water sources are by no means immaterial and cannot simply be downplayed or ignored. Such damage may last into perpetuity	Tailings storage facilities ("TSF") are a common and necessary feature of mines in Namibia and worldwide. National and international TSF design and best practice principles have and are being updated and improved, in light of the previous and most recent events. The planned tailings facility for the Sandpiper Project forms part of the land component of the Project. Accordingly the design, construction and management of the proposed TSF will be conducted in line with relevant National and international design and best practice guidelines such as to the International Commission on Large Dams (ICOLD) guidelines and the Global Industry Standard on Tailings Management. The aspects and related potential impacts associated with the land-based component and related infrastructure of the Project, including the TSF, will be assessed during the application for the land-based operations environmental clearance certificate.
In this context it would appear inconceivable to envisage the processing and dumping of tons of highly toxic material and slime in the proposed	Tailings storage facilities ("TSF") are a common and necessary feature of mines in Namibia and worldwide. National and

Comment	EAP/Proponent Response
proximity to Walvis Bay. The proponent acknowledges the presence of heavy metals, uranium and cadmium, among others, in the sediments concerned.	international TSF design and best practice principles have and are being updated and improved, in light of the previous and most recent events. The planned tailings facility for the Sandpiper Project forms part of the land component of the Project. Accordingly the design, construction and management of the proposed TSF will be conducted in line with relevant National and international design and best practice guidelines such as to the International Commission on Large Dams (ICOLD) guidelines and the Global Industry Standard on Tailings Management. The aspects and related potential impacts associated with the land-based component and related infrastructure of the Project, including the TSF, will be assessed during the application for the land-based operations environmental clearance certificate.
Disastrous examples of similar phosphate mining projects wreaking havoc in countries such as Nauru, Tonga and Mauritania, among others, may not be disregarded.	The comment offers only a generalised statement and provides no specific details of the claims made. It is noted that such generalised references to phosphate mining and processing in other countries (Nauru, Tonga and Mauritania) are typically made without reference to specific details such as nature and type of phosphate deposit, prevailing mining and environmental legislative controls on mining and source of the reported negative impacts (social and/or environmental). In most cases, is not the commodity itself that caused the environmental harm, but rather the lack of proper

Comment	EAP/Proponent Response
	environmentally responsible management of the mining operations. Accordingly, these often quoted examples have no bearing at all on the proposed operations in Namibia. Current mining and environmental legislation in Namibia incorporate suitable measures to ensure that proper, environmentally responsible management of mining operations can be enforced. Namibia has been conducting marine mining for more than 20 years and the management frameworks are well established and now supported with additional initiatives including Marine Spatial Planning and the Blue Economy Policy.
One of the many reasons this initial NMP EIA was overturned and rejected in 2012, the other reasons being inadequate science, inaccurate scope, and unsatisfactory public participation. Not much has changed since then, except for reams of overwhelming, volumous documentation having been dumped on the public for scrutiny two weeks ago.	This statement is not accurate, is not supported with any references or specifics and therefore is noted as an opinion. The 2012 EIA was not overturned and rejected in 2012. Following the 2014 EIA verification study, and workshop meeting with the Ministry of Fisheries and Marine Resources in 2016, as well as two independent external reviews appointed by the Environmental Commissioner, an Environmental Clearance Certificate for ML 170 was issued in 2016, based on the scientific evidence and expert assessments presented. Public (prior to the subsequent legal proceedings) and stakeholder consultations were held in 2011, 2012, 2013, 2014, 2016 and again in 2018 prior to public consultations for the current 2022 application. In all instances, both with the prior application and the current application, the EAP and the Proponent has followed all the requirements as expected of them as defined in the EMA 2007. Records of all public consultations have been presented in the

Comment	EAP/Proponent Response
	scoping report, both in 2012 and again in 2022. The Environmental Commissioner has approved the scoping report as per the formal letter issued on the 30 August 2022 (Appendix M).
The classification of impacts has been immensely played down, under-estimated, throughout the process. Surreptitiously this changed from 'adverse major impacts' in the presently reported 2012 and 2014 processes to 'adverse low impacts' in the current version. This appears utterly untenable, unjustifiable and inconsistent.	It is noted that the current 2022 assessment report is based on current updated specialist impact assessments now supersedes the 2012 and 2014 report findings. The 2012 and 2014 verification study reports form part of the baseline information that has been considered in the current assessment, along with additional more recent supplementary information in the form of additional specialist's studies as per the ruling of the high court in June 2021, the previous application submitted by the Proponent for environmental clearance was invalidated. The current updated specialist impact assessment has included reviewing and refining of the assessment methodology (chapter 6, chapter 7 section 7.3 and 7.6), particularly with reference to scale of the proposed operations. Additionally, an impact score to significance was introduced. The 2012 and 2014 impacts previously were not conducted in this manner and the current 2022 assessment was adjusted and improved to ensure consistency with the methodology approaches. Additionally, for impacts that have reduced impact significance as determined during the 2022 assessment, this is also a result of confidence in the previous specialist studies conducted as more information becomes available to base the assessment outcomes on. Therefore, these impacts are

Comment	EAP/Proponent Response
	lower than initially assessed.
The gazetted moratorium instituted, defended and confirmed by the Namibian Government seems to have been disregarded throughout.	This statement is factually incorrect. The "moratorium" was proposed by the Minister of Fisheries and Marine Resources and approved by Cabinet for a period of 18 months, expiring April 2015. The moratorium was never gazetted in accordance with the relevant legislation being either the Minerals Act 1992 or the EMA 2007. There is no moratorium in force at the time of the current application, hence the comment is moot.
The appendixes are not provided in order, but in a very confusing, jumbled fashion.	An appendix list is provided in the table of contents and referred to throughout the report.
The NMP Environmental Management Plan which is alleged to form part of the Verification Study advocates adaptively managing marine mining impacts, with NMP undertaking environmental monitoring and providing results to Government. From a procedural point of view this is entirely unacceptable, as self-regulation by industry has proven time and again to be ineffective and toothless, as it contains an inherent 'conflict of interest' element. Worldwide, it has become undeniable, how ineffective and flawed such an approach is. If it were not so, we would not be faced with the continuing sagas of mining disasters resulting in significant harm to human lives and the environment.	The statement relates to the current legislation in Namibia which falls outside of the scope or responsibility of the Proponent. As such the comment is noted as an opinion. In regard to compliance, as noted, per the ruling of the High Court, the previous application for environmental clearance was set aside hence the related documents including the verification study form part of the background information. The current 2022 application and related EMP is the only document of relevance and in this regard a comprehensive environmental management plan (EMP) has been compiled by and in accordance with the recommendations of the specialist consultants engaged to complete the relevant components of the ESIA. The EMP is regulated and managed in accordance with the provisions of Namibian legislation including the requirements of the

Comment	EAP/Proponent Response
	Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations as well as the Minerals (Prospecting and Mining) Act, No. 33 of 1992. Assessment of the EMP and any related approval or amendment thereof, as well as enforcement falls under the authority of the Environmental Commissioner, not the Proponent.
In addition to the point above, adaptively managing marine mining environmental impacts does not work in an ocean ecosystem, because once the adaptive measures have been identified the harm has already been done. Hence the legally and constitutionally required precautionary approach requires cautionary measures and approaches to be adopted and enforced, as a guarantee BEFORE ANY environmental harm has been caused. This is also legally required in the international context, which has become extremely pertinent in the marine phosphate mining issue. Namibia would do great harm to her reputation, as a law-abiding constitutional democracy, and international relations by allowing such to go ahead, at the cost of her widely acclaimed and lucrative fishing industry, which is based on a renewable resource, as well as the safety of Walvis Bay and coastal regions.	The statement relates to the current legislation in Namibia which falls outside of the scope or responsibility of the proponent. As such the comment is noted as an opinion. The EAP and the Proponent has followed all the requirements as expected of them as required in the EMA 2007. The Environmental Commissioner has approved the scoping report as per the formal letter issued on the 30 August 2022 (Appendix M). All potential impacts have been assessed as discussed in chapter 7 and mitigation measures included in the EMP (Appendix A).
Namibian Marine Phosphates proposes mining in the area south of Walvis Bay where there is potential direct overlap with valuable juvenile fish that are specifically protected from fishing in that area, at 200 metre depth. Harm caused by mining and prospecting activities could be irreversible, once its impacts to Namibia's economically invaluable fishing grounds, stocks and nurseries has been detected and quantified. It is undeniable, and needs to be acknowledged, that mitigating measures for certain kinds of	The potential impacts of the proposed operations on the marine environment and commercial fishing industry have been considered in the current 2022 assessment. With regards to the impacts on fisheries and fish, reference is made to the impacts assessed in section 7.6.1 and 7.6.2 of the 2022 ESIA report. Particularly section 7.6.2.3 refers to recruitment impacts. The most recent data available to the specialist Japp (2022) was utilised in his specialist

Comment	EAP/Proponent Response
harm are not possible nor effective. Namibia's fishing industry is based on a renewable resource, directly provides 16800 persons with employment, many of them female. This is in addition to approximately 60 000 indirect jobs. According to Namibia's Statistic's Agency, Namibia exported N$ 7,03 billion in seafood exports in 2016	report (Appendix F). Data was sourced from the Ministry of Fisheries and Marine Resources and the transboundary survey undertaken through the FAO/NORAD programme (Boyer et al., 2019).
The feasibility of phosphate markets has not been established. Even if these were economically proven, in this day and age it does not justify endangering the fishing industry and valuable fishing grounds for the sake of a non-renewable resource. It is commonly and widely, scientifically accepted, that all forms of mining do cause environmental harm, due to the very nature of mining activities. In addition to this, phosphate mining activities require highly industrialised equipment, being outsourced, and are, relatively speaking, not very labour intensive, vis a vis the alleged employment creation and provision of jobs for local Namibians. The present horse-mackerel fishing sector already contributes significantly to employment as well as food security in the SADC region: an existing, renewable industry, which does not result in the destruction of ecosystem habitats, nor pose direct threats to the health and safety of the environment and Namibian people, unlike the proposed phosphate mining activities, which could potentially destroy this fishery and cause significant harm to people and the environment.	In the absence of any supporting commercial evidence or literature, the statement is recorded as an opinion. The feasibility of the phosphate market and the Sandpiper Project was established in the Definitive Feasibility Study of 2012 and prior to that for the award of the mining licence in 2011. Subsequently the feasibility of phosphate market was also assessed in 2018 where reference can be given to Appendix L (supplementary study on the phosphate industry within Namibia). The potential impacts on the fishing industry has been assessed in the specialist study by Japp (2022) and in chapter 7 of the ESIA report, with reference to sections 7.6.2.1 and 7.8.1. Previous responses issued above refer in this regard.

Comment	EAP/Proponent Response
The methodology, quantification and reflection of socio-economic benefits in the report is fundamentally flawed, highly overdramatized and manipulated, as it is based on including the land-based operations, which have yet to be assessed in their entirety. Arguably the land-based operations of the project may well pose much higher direct dangers to members of the public than the marine component. In addition, the employment numbers have been radically overinflated by the proponent, and do not make sense in relation to NMP's proposed operations.	The methodology has been defined in chapter 6 of the 2022 ESIA report. As noted in Section 7.8 of the ESIA report, the socio-economic impacts assessed in this document are related directly to the offshore marine operations component in ML 170. By far the greater part of the socio-economic benefits related to jobs and employment reside in the land-based component of the Project, which is projected to generate up to 600 direct and indirect jobs during the construction and operational phase of the project. The overall socio-economic impacts of the Project will be reassessed as part of the land-based component and the full scale of potential impacts will be determined thereafter (for example the total figures related to job creation and skills development will increase in numbers).
Legally, the EIA process is incomplete, as the on-land / coastal processing issues have not been sufficiently addressed, if at all, nor any transporting of ore and other materials.	As stated in the response to comment 1 mining involves two key processes 1) ore recovery (excavation of mineral bearing rock or sediment) and 2) processing of ore to produce a concentrate. Under normal (on-land) circumstances both these processes occur within the confines of the mining licence boundaries (i.e. the area within which the mineral deposit occurs and is extracted from). This is not the case for this Project which is not the same as a normal land-based mining project. The mining licence ML 170 is located in the ocean 160 km southwest of Walvis Bay. The law requires that an environmental clearance certificate must be issued for the proposed operations in mining

Comment	EAP/Proponent Response
	licence ML 170, a) in compliance with the attached licence conditions and b) for authorisation of any operations in the mining licence area. The ESIA for ML 170 is directly related to the assessment of impacts in the offshore marine environment related to the recovery of the ore. No processing is done in the ML 170 at sea. Award of an environmental clearance certificate does not in any way permit any processing activities to be undertaken on-land. The processing of the landed ore takes place at a separate on-land location and does not involve any mining activity and hence does not require a mining licence for the area of the processing plant. As an industrial process, a separate environmental clearance certificate is therefore required for the proposed land-based processing and product handing operations and associated land sites allocated for these activities. While related, in this instance the land-based component of the project cannot proceed without environmental permitting for the mining licence ML 170. Mining operations in ML 170 cannot commence without completion of a full ESIA and environmental permitting of the land-based processing and product handling component infrastructure which is required for commencement of construction. There can be no investment in progressing the land component of the Project if there is no valid authorisation to conduct operations in the mining licence where the vessel and mineral deposits are located. Therefore, it is a requirement to have two separate EIA processes.

Comment	EAP/Proponent Response
	Staged application for environmental approval for project development is not contrary to any laws in Namibia and has been done both previously and currently. The Environmental Management Act, No.7 of 2007 and associated 2012 Regulations ("EMA 2007") is comprehensive in its requirements for assessment which will be done for each location.
The so-called 'verification programme report' does not appear to have any legal identity in law, unless there is a formal, Ministerial agreement regarding said report, in which case such contractual, Ministerial agreement should also be made available to public scrutiny.	In regard to compliance, as noted, per the ruling of the High Court, the previous application for environmental clearance was set aside hence the related documents including the verification study now forms part of the background information for the current 2022 application process. In this regard the verification assessment report was included as an appendix (Appendix D) in the scoping report issued to all registered interested and affected parties, as well as to the public in April 2022. This information is available on the EAP's website and on the Ministry of Environment and Tourism portal.
Many concerns have been raised by internationally re-knowned scientists, lawyers, community activists and IAPs (Interested and Affected Parties). Most of these have been largely ignored and brushed over. No mitigating measures have been listed for numerous concerns raised.	Per the requirements of the EMA 2007 Regulations (2012), all submissions received from registered interested and affected parties relating to the scoping report and the ESIA report have been recorded and responded to by the EAP. These comments and responses have been compiled in Addendum Reports for submission to the Environmental Commissioner in accordance with the relevant regulations. As such no comments by any party have been ignored or brushed over. Mitigation measures have been

Comment	EAP/Proponent Response
	considered in the impact assessments provided in chapter 7 of the ESIA, in the EMP (Appendix A) and in the specialist reports in Appendix E and F.
The documents made available reveal a fragmented, non-collated and unconsolidated EIA. There is massive repetition of selected opinions of the mining company's appointed consultants and reviewers, which is extremely tedious to analyse and process. In the so-called "verification report", not only are the different sections dealing with the various aspects of impacts not integrated; they are also divided into different volumes, adding to the repetition, lack of collation, and confusion regarding alleged planned activities.	The EAP and the Proponent has followed all the requirements as expected of them as required in the EMA 2007. The Environmental Commissioner has approved the scoping report as per the formal letter issued on the 30 August 2022 (Appendix M). In regard to compliance, as noted, per the ruling of the High Court, the previous application for environmental clearance was set aside hence the related documents including the Verification Study now forms part of the background information for the current 2022 ESIA application process.
The scientific methodology in many of the presented studies is faulty and lacking, so that interpretation of the results obtained is invalid and irrelevant to the alleged assessment of impacts. For example, assessing sediment toxicity in tanks is not satisfactorily comparable to the ever-variable nature of ocean currents and the marine environment. Simply put, it is not good science either. Many graphs, illustrations and tables are both outdated, unclear and confusing.	In the absence of any supporting scientific evidence or literature or details of the qualifications and specific experience of the commentator in this instance, the statement is recorded as an opinion. With regard to the professional qualifications, scientific acumen and experience engaged for the purposes of conducing the specialist impact assessment studies for this application, the CV's of the EAP and specialist environmental consultants as well as the external peer reviewer, with over 50 years are available in Appendix G of the ESIA.
The logic employed in the interpretation of the impacts does not always make sense and is erroneous in many places; this was however not identified by the so-called 'independent' reviewers, who are, in actual fact,	The statement as presented carries the institution that the professional opinions and hence integrity of independent reviewers is compromised by the fact that their services are paid by the

Comment	EAP/Proponent Response
appointed, commissioned and paid for by the proponent.	Proponent. In this regard is it noted that in terms of Nambian law under the provisions of the EMA 2007, it is specifically stated that the Proponent is required to all costs of completing the application and assessment including the services of the EAP as well as all specialist studies and any independent external review that may be required by the Environmental Commissioner following submission of the final documents. Further it is a requirement of the EMA 2007 that the proponent must appoint an Environmental Assessment Practitioner to carry out the assessment and the EMA 2007 requires the EAP and any contracted specialists to disclose their full and complete independence from the proponent and the proposed activities. The EAP as well as scientists utilised for the various studies and for the independent review are registered with professional associations and are internationally respected as professionals and specialists in their respective fields. The ESIA process has been applied utilizing a well-defined quantitative methodology as described in chapter 6 and chapter 7, sections 7.3 and 7.6. The significance of the impact was scored, which is an objective and not subjective approach.
A common ploy has been adopted by the proponent, in punting the term 'dredging' in all aspects, whereas, materially, the activities pursued and sought after relate to full-scale mining activities. Again, the link to the over-	Dredging is the primary mining method utilised in seabed mining for recovery of mineralised ore or sediments for processing and recovery of the targeted mineral (s).

Comment	EAP/Proponent Response
inflated, alleged socioeconomic benefits has been entirely manipulated and misrepresented, as 'dredging' may not lead to the economic benefits claimed.	Dredging is a process utilising suction for removing sediments from the bottom of a body of water and transporting the material to the surface. Different types of dredging equipment and vessel are used. Marine diamond mining utilises specialised crawler mounted dredging equipment and vessels. The proposed marine phosphate mining will utilise a standard trailing suction hopper dredge.
In actual fact, the activities for which environmental clearance is being sought, including the marine area and depth concerned, are classified and commonly recognised as deep-sea mining.	The proposed NMP project is not a deep sea mining project. No definitive reference has as yet been provided clearly articulating the justification for the application of the nominal depth of 200 m and the definitive criterion for classifying deep-sea mining. As noted by Ingels et al 2016 in "Open Ocean Deep Sea - First Global Marine Assessment, Chapter: 36F, Publisher: Oceans and Law of the Sea, United Nations) "*The deep sea comprises the seafloor, water column and biota therein below a specified depth contour.* ***There are differences in views among experts and agencies regarding the appropriate depth to delineate the "deep sea"***. This chapter uses a 200 metre depth contour as a starting point. In the Namibian context, by application of this nominal criterion, the demersal hake and monk fisheries in Namibia which are conducted in 200-600 m water depth, would then also be classified as deep-sea trawling. Additionally, the recent oil and gas discoveries off Namibia earmarked for development would equally be classified as deep-sea mineral resource extraction.

Comment	EAP/Proponent Response
	The NMP project does not target the seabed mining of deep sea minerals, which are a specific types of mineral deposits (polymetallic nodules, deep sea massive sulphides and cobalt crusts) that are found only in extremely deep waters (deep sea environments) on the continental slope, rise and abyssal plains at water depths of 800-6000m. The proposed NMP project involves the exploitation of a placer deposit containing phosphatic sands located on the continental shelf and EEZ of Namibia in water depths of 190-250 m in the SP 1 area of ML 170. Qualified review of the Assessment report and related studies is included under the provisions of the Environmental Management Act 2007.

Table 6 – Comments and feedback from the ESIA report public review period submitted 20 September 2022: Bronwen Currie (Private)

Comment	EAP/Proponent and Specialists Response
Kindly provide a copy of the official registration for the ESIA from the proponent with MEFT	All documents relevant to this application are available on MEFT website and ECC website
If the proponent insists that the ESIA is a dredging operation in SP1 this must be clearly stated on the official application and registration WITH THE OFFICIAL AUTHORITY. To date stakeholders have been informed that the ESIA is for a mining licence in MINING licenced area 170. Likewise if any special conditions and allowances have been officially granted to the proponent in this regard, registered stakeholders must be provided with the official documents outlining this allowance Ref: *"The operation proposed by NMP is a standard dredging operation that has been managed and monitored already on many occasions through government agencies reporting to MEFT for developments such as NamPort harbour expansion. As far as monitoring and mitigation the Namibian government has put in place adequate and proper legislation. In relation to the proposed project, the environmental monitoring, mitigation and management actions are captured in the environmental management plan (EMP) which must be approved by the Environmental Commissioner. "*	Stakeholders have been correctly informed that the application relates to the proposed mining activities in Mining Licence ML 170 and the information presented in the ESIA is accurate. For clarity, mining is the extraction of valuable minerals or other geological materials from the earth, usually from an ore body, lode, vein, seam, reef or placer deposit. Dredging is the primary mining method utilised in seabed mining for recovery of mineralised ore or sediments for processing and recovery of the targeted mineral (s). Dredging is a process utilising suction for removing sediments from the bottom of a body of water and transporting the material to the surface. Different types of dredging equipment and vessel are used. Marine diamond mining utilises specialised crawler mounted dredging equipment and vessels. The proposed marine phosphate mining will utilise a standard trailing suction hopper dredge (TSHD). Accordingly, no special allowances are required, nor have been applied for or granted.
There are multiple un-answered stakeholder comments and multiple wrong responses by the EAP.	This statement is noted but the claims made are not substantially supported with facts or references.

Comment	EAP/Proponent and Specialists Response
For example EAP responses: Sediment plumes from excavating sediment to a depth of 2.5 metres at the intensity of over-track removal taking place 3 times a week in the soft sediment is totally different and incomparable to fish trawls fishing over the area at the intensity of perhaps once a year over the same area (fishing over one location not more than several hours per year). **The EAP is misleading public stakeholders and IAPs by trying to compare sediment plumes with trawl plumes: they are incomparable in both intensity and impact.**	The example quoted refers as it relates to statements on the EAP responses regarding sediment plumes from trawling vs the proposed mining: Comparison of sediment plumes from mining or trawling is justified and is not misleading to public stakeholders or IAPs, with due consideration of proper context notably: • Sediment plumes and seabed disruption generated from any activity (trawling or mining) do impact the marine environment, particularly water column quality, seabed habitat and benthic environment. • The intensity of plume generation and impact on the marine environment is directly related to scale and frequency of the bottom trawling and proposed mining operations. While the frequency of bottom trawling may be low (few times/year) within the 34 km^2 area of the 20 year mine plan itself compared to the proposed mining (3 times/week), the annual intensity and total area of bottom trawling operations comprises many thousands of trawls and many thousands of km^2 every year. • Compared to the average annual area of 1.7 km^2/year that will be affected by the proposed phosphate mining, an estimated area of 18,600 km^2 of seabed being affected annually by bottom trawling and related sediment plumes in Namibia. This estimate is substantiated by estimates in published scientific literature. • A 2018 publication co-authored by 2 members of the Ministry of

Comment	EAP/Proponent and Specialists Response
	Fisheries and Marine Resources presents estimates of the bottom trawling footprint (seabed area impacted by trawling) on the seabed at depths of 200 – 1,000 m in the Northern Benguela to be 110,938 km^2 (Fig 3). This calculation is derived from tow-by-tow data provided by MFMR for the period 2008 – 2013 (Amoroso RO et al 2018; Bottom trawl fishing footprints on the world's continental shelves. Proc Natl Acad Sci U S A. 2018 Oct 23;115(43): E10275-E10282. doi: 10.1073/pnas.1802379115. Epub 2018 Oct 8. PMID: 30297399; PMCID: PMC6205437).
The maximum penetration of trawl gear into sediment is never more than 30 cm for monk trawls and not more than 20 cm for hake trawls, if that.	The depth of penetration of trawl gear into sediment one of several variables including width of trawl and length of trawl does not minimise the overall impact on the marine environment. A global study on the recovery of seabed biota after bottom trawling reports that otter trawl gear removed up to 6 % of faunal biomass per pass. (Hiddink, J. et al. (2017) Global analysis of depletion and recovery of seabed biota after bottom trawling disturbance. Proceedings of the National Academy of Sciences 114(31):201618858)(Hiddink JG, Jennings S, Kaiser MJ (2006) Indicators of the ecological impact of bottom-trawl disturbance on seabed communities. Ecosystems 9:1190–1199).
The chief concern of the plumes generated from mining is the dispersal of sediments that lie more than 1 metre deep below the seabed: the character and heavy metal content is presently safely buried and controlled	This specific impact was assessed and the assessed outcomes are presented in in section 7.4.2.1 (Dredging generates plumes of suspended sediments) of the 2022 ESIA and in the specialist report

Comment	EAP/Proponent and Specialists Response
by microbial processes in the undisturbed sediment at those depths and poses no danger to sealife. However, if excavated during mining, dispersal into the pelagic water via plumes, the substances (gases, particles, uranium and heavy metal complexes) are dangerous. It is totally erroneous to attempt to confuse or compare trawl "plumes" to mining plumes.	by Dr Robin Carter and Dr Nina Steffani (Appendix E, section 3.4). The specialist studies completed and assessed outcomes of the impact scale and significance for this report are subjected to independent peer review by suitably qualified and accredited specialists. In terms of the marine environment, comparison of plumes is justified on the basis of scale, intensity and impacts, regardless of the depth of seabed penetration of trawling (>18,000km2/year at 20-30cm) and the proposed mining operations(1.7 km2/year to max 2.5m) . The scale, dispersion dynamics and cumulative footprint of the sediment plume from the proposed operations for both annual and life of mine (20 years) have been quantitatively defined based on in situ data from ML 170. The supplementary sediment plume dispersion model specialist study was conducted by HR Wallingford (2020) and can be found attached as Appendix I. It is factually correct that no trawling sediment plume dispersion models have been conducted in Namibian waters and there is no data to confirm the actual impacts of this activity. Only assumptions can be drawn for these potential impacts.

Comment	EAP/Proponent and Specialists Response
	A BCLME 2008 report notes: "In terms of seabed area affected, hake-targeted bottom trawling has the greatest impact on the Benguela region continental shelf". (Penney et al 2008: Completed for the Benguela Current Large Marine Ecosystem (BCLME) Programme in 2008.)
Toxicity testing The impacts of the finest plume particles from deep cores (1-3 m deep sediment) when injested by filter feeding organisms in the food web in the pelagic waters of the mining licence area HAS NOT BEEN CORRECTLY TESTED. This is a critical aspect of plume toxicity so to make the statement in the "new"2020 toxicity testing report is unacceptable, that "*To address the issue of assessing toxicity in the deeper sediment profile, provision is made in the EMPR for a new set of baseline reference samples to be collected following award of the Environmental Clearance Certificate (ECC) !!!! and prior to commencement of mining, given the findings of the EIA Verification Study. This material will be subjected to toxicity testing across the planned mining depth*	The comment is noted but is not supported by any evidence of incorrect testing. The toxicity test work, including assessment of risk related to ingestion has been undertaken by Drs Robin Carter and Nina Steffani as presented in Appendix E of the ESIA (Water column, sediments and benthos specialist study 2021 (Appendix E)). Both scientists have considerable expertise in their respective fields, and knowledge of the Benguela Large Marine Ecosystem. Nina Steffani has authored and co-authored several peer reviewed scientific publications on the topic of BCLME benthos. With due consideration of the date of the initial baseline data surveys, updating of the baseline reference data prior to commencement of mining to support the committed obligations withing the Environmental Management Program is entirely appropriate. The 2020 toxicity study results corroborate the findings of the 2014 Verification assessment in regard to the anticipated concentrations and bioavailability of deleterious elements and associated toxicity

Comment	EAP/Proponent and Specialists Response
(sediment surface to the clay footwall) to add to the sediment toxicity analyses reported on here etc.)	impacts for the full core analyses that were completed. The updated baseline data surveys and analyses will be completed after award of an environmental clearance and in the 3 year period prior to commencement of mining, during which time renewal of the current environmental clearance will be required. Renewal of the clearance certificate will be subject to compliance with and results of the updated baseline data and any monitoring activities. With any monitoring programme within the mining and marine environment, it is required to routinely update baseline and reference data in order to enhance the monitoring programme, better understand associated changes and improve management decisions that are made during operational activities.
The many unanswered valid stakeholder comments are either ignored or transferred into the monitoring plan for the future. This is unacceptable: in seabed mining many impacts are unavoidably harmful and can only be assessed as serious: requiring both proper scientific investigation and proper assessment BEFORE any mining is allowed.	Comment is noted but is unsupported with any evidence or detail to support the statements made. Accordingly, the allegation cannot be answered without specific context. In this regard it is also noted that details of the comprehensive scientific studies completed within ML170 from 2012 to 2022 and the credentials of the specialist marine environmental scientists with relevant experience in the BCLME that have been engaged under the management of an accredited Environmental Assessment Practitioner have been made available as part of this current

Comment	EAP/Proponent and Specialists Response
	application. The scope of work for the assessment has been reviewed and approved by the Environmental Commissioner. The 28 studies included in the set of baseline data completed from 2012 to 2014 were conducted with inclusion of independent observers from University of Namibia, participation of members of Ministry of Fisheries and Marine Resources in specific activities and have been internally peer reviewed by a panel of independent specialists with expertise in the BCLME prior to completion and submission. Additionally, these prior impact and baseline studies have also been subjected to independent external review by agencies appointed by the Environmental Commissioner on 3 occasions in the period 2012 to 2018. All relative impacts are assessed based on these studies conducted and in accordance with the process and manner as prescribed in the Environmental Management Act 2007. The assessment chapter can be located in chapter 7 of the 2022 ESIA report.
The "new "2020 + reports add nothing to the "old" reports 2012 – 2014: Therefore in the same style of NMP resubmitting all their previous information in a new ESIA please attend to comments previously submitted.	The Studies completed in 2019/2020 were undertaken in compliance with the recommendations submitted by international external advisors appointed by the Environmental Commissioner (Newall & Muhape 2018). The additional specialist studies comprised new information considered by the EC's appointed reviewers, to be necessary to close out gaps in the 2012 ESIA and 2014 Verification

Comment	EAP/Proponent and Specialists Response
	assessments. Scientific studies are available from 2012 to 2022. All relative impacts are assessed based on these studies conducted. The assessment chapter can be located in chapter 7 of the 2022 ESIA report.
With regard to the 2014 EIA studies, missing are: 1. a realistic study of the cumulative impacts for the mining activity over the 20- year licence period 2. an in-depth socio-economic study, that will potentially direct the intensity of the dredge-mining activity (referred to in appendix D6) 3. impacts from transport of sediment and land-processing, as per definition of mining in the Mineral Act (1992). Mining as a whole is subject to an EIA; not only the excavation ("digging") stage. A study of transport of mother-ore, unloading, and processing of mined material is missing: these are known to have considerable impacts of concern in any mining activity. All 3 missing studies should be included in assessment of environmental impacts, to be considered by interested and affected parties, which of course include the public. The scale of excavation in ML 170 to reach production goals will affect the intensity of all impacts.	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. The 2014 EIA studies are now superseded by the 2022 ESIA assessment report which includes a current assessment of all current and best available information including studies. The current assessment covers the points raised in the comment which are addressed in the following sections: 1. Chapter 7, section 7.10 2. Chapter 7, sections 7.8 and 7.9. Appendix H (JDN socio-economic specialist study) Appendix L (Phosphate industry socio-economic supplementary study) 3. Chapter 8, section 8.1

Comment	EAP/Proponent and Specialists Response
The Environmental Management Plan (revised) is not commented on because the EIA upon which the management plan is based, has no credible scientific base. Monitoring according to wrongly identified and assessed impacts, wrongly identified monitoring needs, and continued faulty sampling, would allow impacts to worsen, and would mislead future monitoring efforts. Before a management plan is proposed the impacts of the mining activity must be properly assessed.	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. The statements made in this comment are not supported with any scientific evidence or details of relevant qualification or experience. It is noted that the EMP has been formulated by the relevant accredited and qualified specialists with substantial experience and knowledge of the BCLME based on their specific assessments which in turn have been peer reviewed by an international external expert Dr Andrew Payne (Appendix G). The updated EMP is based off of the assessment outcomes of chapter 7, which has taken into account all specialist studies conducted from 2012 to 2022. The recommendations made by Drs Robin Carter, Nina Steffani and Dave Japp in the current 2022 Assessment are incorporated in the updated environmental management plan accordingly.
Impacts in the deep ocean are notoriously difficult to recognize within a short period after an activity begins (in this case mining), even with sophisticated and intensive monitoring. Damage to the ocean is even more difficult, often impossible, to reverse.	Comment is noted and recorded as an opinion in the absence of any supporting evidence or information. This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process

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That apart, a capacitated national authority to regulate deep sea mining would be needed to oversee and inspect monitoring. Without the necessary legal framework or infrastructure and trained national personnel operating independently of the mining companies, an EMP is of no value and ineffective.	completed by order of the Minister MEFT. The Proponent is required to comply with the relevant laws of Namibia and in accordance with the provisions of the Mining Licence issued by the Minister of Mines and Energy under the Minerals Act (Prospecting and Mining), No. 33 of 1992. Mining Licence (ML) 170 lies within the exclusive economic zone of Namibia and therefore under the law and regulatory management of the state of Namibia. Regulatory decisions do not lie with the Proponent. The Proponent has followed the requirements of the Environmental Management Act, No. 7 of 2007 and associated Regulations published in 2012, whereby an environmental management plan is required to be produced based off of the environmental impact assessment outcomes.
Some in situ investigations were carried out by NMP on the small portion SP1 of the Mining Licence area 170, and are reported in parts of section C of the otherwise bulky "Verification Programme report", submitted to the Ministry of Environment and Tourism in 2014. Only sections of major scientific concern regarding these assessments are selected below for comment	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 Assessment which now supersedes the 2014 report findings. Subsequent to the verification programme from 2014, additional supplementary and specialist studies were carried out and concluded in 2022, with the updated

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	2022 ESIA process. Therefore, the conclusions or relevance for the current application are to be drawn from the current 2022 ESIA assessment and should not be based alone on the 2014 verification assessment outcomes.
SUMMARY The Summary Impact Assessment tables (Section B) importantly appear to present the proponent's final impact assessments as presented to the environmental authority. **These assessments are challenged on scientific grounds, due misinterpretation or lack of targeted and proper scientific investigation. Ignorance of correct scientific methodology and analytical techniques is inexcusable for some of the studies carried out (reported in section C). The effort to justify the failed 2012 EIA is scientifically not convincing.** Some key issues of concern for impact assessment of seabed mining are still missing: primarily plume modeling which will dictate the intensity of most other impacts. Sediment suspended in the water can cause multiple direct or indirect biological impacts associated with mining, and detailed plume studies are an essential pre-requisite for any marine mining impact assessment. Impact assessments rely on targeted data, which is lacking. Experimental work on the impacts is totally lacking. Contradictions in the report between findings of studies on the different aspects (section C) detract further from the credibility of the assessments. Of greater relevance to the wider, non-scientific Namibian community, is	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 Assessment which now supersedes the 2014 report findings. The statements are noted as opinion in the absence of supporting scientific evidence or details in regard to assertions made. The plume modelling study has been completed and utilised for purposes of the current assessment. The sediment plume dispersion model was conducted by HR Wallingford in 2020 and is available as Appendix I. Conclusions drawn from this specialist report was included in the 2021/2022 specialist assessment reports for water column, sediments and benthos (Appendix E) and Fisheries, mammals and seabirds (Appendix F). This information was used in the 2022 assessment and outcomes per impact are discussed in

Comment	EAP/Proponent and Specialists Response
that mitigation for the proposed mining activity is assessed in both the 2012 and 2014 reports mostly as "not necessary" or - in most cases – "not possible" for the listed impacts. It is true than many aspects of seabed mining are not possible to mitigate, which is dangerous to the environment. However difficulty to mitigate mining harm does not mean that there is not danger of serious harm. The general public is aware that any mining activity anywhere (terrestrial or marine) damages the environment. Mining damage in the ocean, due to the liquid 3-4-dimensional environment that is interconnected by ocean currents, cannot be confined to a small excavation "mine" site pit on the seabed. Unlike land mining, the activity cannot be contained only to the seabed, nor fenced nor walled-in to confine impacts to the seabed excavation site. Because impacts are spread around and dispersed by the seawater does not mean they are any less severe: they are simply carried much further from the excavation site. Impacts are far more difficult to measure and assess in the marine environment than on land. There are long time lapses (decades) between the time of impact, until the result of that impact shows up in monitoring, therefore immediate adaptive management is theoretical only and practically impossible to be effective in the ocean. For the same reason it is absolutely essential to know the condition of the receiving marine environment, and the sensitivities of ecosystems to mining-related impacts. By having such knowledge before mining is	detail in chapter 7 of the report, per respective section. Impacts identified as not requiring further mitigation in the 2012 and 2014 assessments were reassessed in the 2022 ESIA report. Where the significance of the impact is determined a low, no further mitigation is required, unless the specialist study in Appendix E or F details otherwise, whereby these mitigation measures are included in the updated EMP. A baseline chapter is available as chapter 5 in the 2022 ESIA report, in line of the requirements of the EMA regulations. NMP has therefore produced the required initial baseline information in Namibia for the phosphate industry within ML 170 and will continue to enhance this information through the monitoring programme various surveys. Recommendations for the monitoring programme are included in the EMP. For example, the water sediments and benthos associated monitoring includes a monitoring survey designed to build on the baseline data and information acquired for the baseline characterization in the verification surveys but focused on the more localized target dredging area of the initial three-year period of dredging.

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allowed, makes it possible, at a minimum, to recognize mining impacts when they eventually appear. Namibia does not yet have pre-mining baselines, nor reliable knowledge of how the marine environment would respond to mining of phosphates, and the reports submitted by NMP fail to supply this knowledge. For that reason caution must be applied to a venture that is presently risky in its benefits, and unknown in its impacts.	Of related importance in regard to the impacts/damage in the ocean and the liquid 3-4 dimensional environment interconnected by ocean currents is the surrounding impacts of bottom trawling. It is factually correct that no trawling sediment plume dispersion models have been conducted in Namibian waters and there is no data to confirm the actual impacts of this activity. Only assumptions can be drawn for these potential impacts. A BCLME 2008 report notes: “In terms of seabed area affected, hake-targeted bottom trawling has the greatest impact on the Benguela region continental shelf”. (Penney et al 2008: Completed for the Benguela Current Large Marine Ecosystem (BCLME) Programme in 2008).
COMMENTS to the 2014 EIA reports (the so-called Verification Programme Reports of Namibian Marine Phosphate) as advertised post-submission to MET Volume 1: Section 1 fails to refer to any legal documents or official agreements that permitted a second report, a “Verification Programme Report” to be submitted without re-registration or public consultation, 2 years after the first (failed) EIA report. The “high” confidence level expressed regarding assessments from the previously submitted 2012 EIA is challenged on scientific grounds. The Impact Assessment Tables structured and compiled by the proponent are found in Volume 1, Section B, headed "Impact Assessment Verification" and appear to be key to	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot.

Comment	EAP/Proponent and Specialists Response
decision making. It is difficult to reconcile the subjective assessments presented (section B) with much of the new scientific study presented (section C), which is padded with much theoretical and desktop information. For ease of reference, the comments submitted below refer to the interpretation of the scientific studies in Section C, that were used to feed into these assessment tables in section B.	It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment, which now supersedes the 2014 report findings. As background the following refers: The Environmental Commissioner engaged independent external reviewers to assess the EIA (2012). The reviewers identified that the conclusions of the report were unsubstantiated, in that the assessment of impacts were presented largely against regional data extrapolated to the mine site and not based on site-specific data. In general the reviewers supported the recommendations of the EIA (2012) specialists as presented in the EMP (2012), i.e. requiring a verification survey to be undertaken prior to project commencement. The Verification Programme as detailed in the EMP (2012) was expanded in response to the concerns raised by the Ministry of Fisheries and Marine Resources (MFMR), MET (and the external reviewers), representatives of the fishing industry, I&APs and the Chamber of Mines. The expanded Verification Programme was submitted to the authorities in December 2012.

Comment	EAP/Proponent and Specialists Response
	The Verification Programme reported the results of the various specialist studies completed during 2013 and 2014. These studies provide evidence supporting the findings of the impact assessments contained in the EIA (2012).
COMMENT: Impact Assessment Criteria Table 1.0 require explanation The Impact Assessment Criteria listed in Vol.1, Table 1.0 are questioned: • Whilst of primary important to impact assessment, there is no evidence of the listed "environmental functions" being used or applied to the assessments. There is no identification of which marine "environmental functions" (is this supposed to be equivalent to "ecosystem functions"?) are used in the assessments. Please explain where and how this criterion has been applied to the assessment tables, especially as the opinion provided in section C3.3 where "Ecosystem Assessment" fails to elaborate on which ecosystem functions are being assessed, and why, in the mining area. • It is contended that the grading for a "serious effect" is abused (see rather Levin et al. 2016 regarding the term "Serious harm" for marine mining). According to Table 1.0 a serious effect is recognized only when: "Environmental functions and processes are altered to such an extent that they permanently cease". Clearly this is a ridiculously impossible criterion in the context of other criteria of either regional or national marine waters for impacts in the ocean: to consider impacts serious	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings

Comment	EAP/Proponent and Specialists Response
only if environmental functions (which are not defined) in the Benguela upwelling shelf off Namibia or the "Namibian ecosystem" or as quoted in places the report "the northern Benguela shelf and southern slope environments as a whole". By applying unrealistic and impossible criteria, the assessment is openly biased to play down serious impacts. • Nowhere is the scoring system shown, therefore it is difficult to understand how the criteria were scored to arrive at the puzzling final assessments: scoring transparency would be helpful to pinpoint queries and comments.	
COMMENT: **CONTRADICTIONS** in assessments are noted between the different tables presented, and in the scientific information provided in the different studies. This does not inspire confidence in either the science nor in the assessments. A few of the many examples are: ◦ the duration of the mining plume is estimated at 1-3 days for Table 1.1 but for 20 years for Table 1.2? ◦ hydrogen sulphide is recorded as either absent or present, important or not important in the (same) sediment (tables 1.1, 1.2 and 1.3)? ◦ the same currents either disperse or confine the sediment plume (table 1.1 to table 1.3 and C3, C2.2)? ◦ Elevated heavy metals from the sediment are high but available or not (in the same sediment) (table 1.1, C2.4)? ◦ sediment is described as both high in silt /low in silt content (table 1.3,	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with

Comment	EAP/Proponent and Specialists Response
meiofaunal study)? ◦ benthic habitats are described as both homogeneous (Table 1.3, C2.6) or heterogeneous (C2.4)? ◦ etc. with continued contradictions throughout the report.	additional information for the 2022 assessment which now supersedes the 2014 report findings. Conclusions to impacts assessed are available in chapter 7 of the ESIA report, particularly for points raised (section 7.3 – 7.5).
COMMENT to Table 1.1 Across all sections 1.1.3 to 1.1.11: The mining frequency of a 3-day turnaround cycle for a 20-year period (see NMP 2012) does not fit the impact duration descriptor given as "very short-, short, or medium-term". The sediment plumes and turbidity will be continual in the seawater at/near the excavation site; and additionally at the coast if waste from land-processing is returned to the sea (as yet not predicted; EIA for land-processing is missing). The duration accordingly should be listed as "long term" over the lifetime of the proposed mining activity. A turbid plume will be generated every 3 days during mining activities so to indicate plume dispersal as "short-term" because the plume might be dispersed in 1-2 days (only to re-commence with the next cycle of excavation after 3 days) is nonsense. As described in the report C3: "Four 4 km-long lanes will be dredged over a period of approximately 16 hours, this being the time required to fill the vessel's hopper, after which it will leave the site for a period of approximately 20 hours to discharge the dredged sediments, and then return to start dredging again." Dispersal of the plume according to current prediction and table 1.3 will be wide and not confined to the mine site. There is no evidence presented that the sediment plume will be confined to the dredge area (as claimed), because the currents there are	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings Subsequent to the verification programme from 2014, additional supplementary and specialist studies were carried out and concluded in 2022, with the updated 2022 ESIA process. This

Comment	EAP/Proponent and Specialists Response
considerable and the plume size is assessed to be 2-5 times larger than originally assessed in the 2012 EIA. There is no information or evidence supplied regarding vertical mixing for plume distribution and movement of the plume through the water column, so it must be assumed that the plume will affect the whole water column and all the animals there. This will influence the impacts in Tables 1.2. and 1.3. Clearly there is no reliable prediction about the size or spread or seasonal variability of sediment plumes. Plume modeling is a basic and very important pre-requisite for all marine 6 mining related impacts because it contributes to and affects all other impacts, but modeling of plumes has not been done by NMP: missing. With plume dimensions reassessed as being "2-5 times larger than expected" and bottom current velocities being "higher" than first assessed it is clear that assessed impacts related to plumes cannot be 5 reliable. As quoted in the report "In summary, the two key metrics of relevance in terms of plume dynamics are the extent of the plume and the persistence (or duration) of the plume. The duration of the plume potentially has implications for biogeochemical transformation processes that may result in ecological impacts (e.g. oxygen demand and/or toxicity in the upper water column". Without, it is not possible to assess the impacts in the manner presented in this report.	included reviewing and refining the assessment methodology (chapter 6, chapter 7 section 7.3 and 7.6). Additionally, an impact score to significance was introduced. Furthermore, the methodology utilised in the previous 2012 and 2014 assessments were deemed acceptable by an independent scientific review panel.
Across all sections in the table 1.1.3 to 1.1.11, and the last row headed "Reasons" there is misrepresentation of results obtained. Faulty logic and misinterpretation are used to provide the impact assessment. Significance of impact is HIGH unless otherwise proven.	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT.

Comment	EAP/Proponent and Specialists Response
	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings Additionally, an impact score to significance was introduced and checked against the conclusions from the 2012 EIA and 2014 verification assessments, as part of the 2022 impact assessment review process. All conclusions per impact classified as low, medium and high were confirmed to be accurate with that of the scoring matrix utilised.
COMMENT to Table 1.1: 1.1.3, 1.1.7, 1.1.8. The header-term chosen "heavy-metal toxicity" should include all impacts from heavy metals and rare earth metals. The danger of suspended heavy metals or rare earth metals suspended on particles in the sediment cloud/plume, is that they will slowly (over many i.e. 20 years, with the continual plume that will be generated) be taken into the food web to build up in the flesh of the animals, including	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous

Comment	EAP/Proponent and Specialists Response
fish. A sediment plume will be generated both in bottom waters during excavation, and from overflow from the dredger vessel, (and from later processing); to likely affect the whole water column from top to bottom, because there is no barrier between surface and bottom waters, and there is active biological benthic-pelagic coupling between the benthic animals and those higher up in the water. (as an example, In the mining area juvenile hake, horse mackerel and juvenile monk all feed largely on the gobies that live and breed near the bottom). The statement in study C2.7 is nonsense, that : " the proposed mining area off central Namibia is not within any important spawning or nursery grounds, particularly for the commercially important species." The mining licence does fall within an important nursery and recruitment area for hake, and is heavily populated by gobies that are the major food eaten by juvenile hake and other fish species such as monk. Furthermore, as stated in the study there is evidence from the acoustic scattering layers within the mining licence area that there is a large zooplankton community that migrates vertically, that could be impacted in various ways, by the mining plume. The mesopelagic fish have not been investigated. Some arguments used in the studies throughout section C for dismissing the mining area as "unique" or not having "unique" species are avoiding and missing the real and critically important ecosystem importance (environmental function) of this area which may well be unique in the northern Benguela. There is no scientific evidence presented in the report, neither record of any experimental work, to show that suspended sediment particles will not	application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings Subsequent to the verification programme from 2014, additional supplementary and specialist studies were carried out and concluded in 2022, with the updated 2022 ESIA process. Conclusions to impacts assessed as per the points raised are available in chapter 7 (assessment chapter) of the ESIA report. Potential impacts from metals are dealt with in the following sections of chapter 7 for the water column; section 7.4.2.5 and 7.4.3.1. With regards to the impacts of fish, reference is made to the impacts assessed in section 7.6.1 and 7.6.2 of the 2022 ESIA report. Particularly section 7.6.2.3 refers to recruitment impacts. The most recent data available to the specialist Japp (2022) was utilised in his

Comment	EAP/Proponent and Specialists Response
have heavy metals and other compounds ionically bound to them, which could introduce dangerous levels into the marine food web. It is known that heavy metals and radionuclide concentrations are especially high in the mining area, 7 associated with the phosphate deposits (section C, repeatedly). This could seriously affect the food quality of harvested sealife. The so-called elutriation experiments presented in the study in section C are pathetic and useless: to filter the seawater for a few hours then look for dissolved heavy metals is invalid indication of uptake of heavy metals by filter feeding animals . The "reason" given in the tables is a total misrepresentation of the danger of uptake of heavy metals into the food chain: neither understandable nor acceptable: to quote: "Dredge area >20 mg/l suspended sediment concentration. Plume disperses 1 to 2 days'?. Effects are not usually immediately "toxic" (in that they cause death), but they can cause many other problems including decreased growth, deformities, disease and decreased breeding. If the flesh of marine animals (e.g. marketable fish, oysters,) slowly build-up heavy metal concentrations in their bodies, this would spell disaster for the export of these Namibian products, because of very strict food safety limits on the amount of heavy metals allowed. Hake and monk and forage animals move around in ML 170 continually; and oysters are cultured near to where processing 6 of the mined sediments is proposed. The impacts from dispersal of plume particles will likely be considerable. With a mining licence of 20 years, the reasoning given to assess the possible impact as low is totally unsubstantiated by any sampling or experimental work. This aspect is not covered at all in the impact assessment and is one of the most important	specialist report (Appendix F). Data was sourced from the Ministry of Fisheries and Marine Resources and the transboundary survey undertaken through the FAO/NORAD programme (Boyer et al., 2019).

Comment	EAP/Proponent and Specialists Response
probable impacts from the mining activity. A serious omission is that no experimental work has been has been carried out. No mitigation is possible because the high metal concentration that is presently safely buried in the sediments is a natural characteristic of these undisturbed sediments, with e.g high concentrations of Uranium and Cadmium in the Mining Licence area. This is a serious situation, risking a slow but continual transfer of contaminants from suspended sediment. The assessment by the proponent of low impact is scientifically not acceptable. Until proven otherwise, predicted negative impacts should be assessed as HIGH.	
COMMENT to Table 1.1: 1.1.4, 1.1.5, 1.1.8, 1.1.9, 1.1.10 and 1.1.11: Invalid scientific basis for the assessment. The danger of liberating hydrogen sulphide (H2S) when excavating sediments to the proposed >2.5 m sediment depth, is that H2S and other toxic anaerobic substances in the deep sediments will suddenly be exposed to the overlying water, and be present in the plume, where they will strip the water of oxygen, and supply the water column with some toxic substances. The issue is not present natural flux from the surface sediments. The expected impacts are mainly to the lower and middle water column rather than at the surface where of course H2S has had time to oxidize; so again the listed indicator description of "toxicity" for impact in the assessment tables is inappropriate and shows ignorance regarding the relevance of H2S as an indicator of anaerobic products. The focus is liberation of H2S when deep sediments are excavated. The scientific reasoning and studies to investigate H2S avoid the issue and are scientifically unacceptable:	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings

Comment	EAP/Proponent and Specialists Response
• wrong processing of the sediment cores (frozen and not stored anaerobically therefore analyses are invalid) • no analysis of H2S but instead an invalid proxy used • no standard sediment profiles of gravity cores to show properties of interest in deep sediment i.e. missing data no investigation of the sediments for the presence of dangerous anaerobic products in deep sediments • invalid measurement of redox potential: frozen core used – scientifically invalid There are multiple scientific publications in primary scientific literature in the last decade that outline correct methodology for sampling biogeochemical parameters in sediments on the Namibian shelf. Likewise published profiles showing H2S in the Namibian sediments in sediment depths of 1+m over the shelf and on the slope. It is therefore inexcusable that correct processing and methodology on the sediment cores sampled was not followed by the appointed NMP consultants for the 2014 study (NMP 2014). By not storing, processing or analyzing the sediment cores correctly, the results presented are meaningless and scientifically invalid. Until proper analyses are carried out, the potential impact should be assessed as HIGH.	Conclusions to impacts assessed as per the points raised are available in chapter 7 (assessment chapter) of the ESIA report. Potential impacts from hydrogen sulphide and anoxic conditions are dealt with in the following sections of chapter 7 for the water column and benthos; sections 7.4.2.2, 7.4.2.3, 7.4.3.2, 7.4.3.3, 7.4.3.4, 7.5.1.4 and 7.5.1.9.
Note contradictions in section C3 for surface sediments: “Smaller forms including Thiobacillus spp….were present; however, indicating that although the concentration was estimated to be low (hydrogen) sulphide was present in the sediments.” Hydrogen sulphide is mentioned to	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated.

Comment	EAP/Proponent and Specialists Response
precipitate metals in the sediments. Repeated contradictions in findings. 1.1.6 Pore water nutrient concentrations are known to be high on the Namibian shelf sediments and therefore will inject considerable nutrients into the water when excavated. It is not valid to argue that the amount of pore water is low and therefore little impact. There is considerable sediment excavation (at least to 2.5m depth according to NMP 2012) so the total amount of pore-water is similarly considerable irrespective of porosity. There is no evidence presented to show that the increase nutrient load released from loaded dredged material will not lead to increased phytoplankton blooms. Faulty reasoning used in this argument; assessment flawed and therefore no confidence in assessment.	The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 Assessment which now supersedes the 2014 report findings. Conclusions to impacts assessed as per the points raised are available in chapter 7 (assessment chapter) section 7.4.2.4 of the ESIA report.
COMMENTS: C 2.4. Studies on Meiofauna It is agreed that " meiofaunal assemblages will provide a robust means of assessing and tracking any changes in the seabed habitats that are associated with the proposed dredging operations and enable these to be placed into context with any changes in background conditions. Similarly, the same approach will enable recovery of mined areas to be documented."	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 Assessment which now supersedes the 2014 report findings. Meiofauna are included in the suite of monitoring variables (refer section 7.5.1.1 ESIA report) and are included in the EMP.
COMMENTS: Table 1.2 "Fish Mammals and Seabirds" COMMENT: Table	This comment is a repeat of the comment submitted to the

Comment	EAP/Proponent and Specialists Response
1.2.1: considering the effect of turbidity from sediment plumes - on fishing activity, ecologically important species, recruitment of key commercial species, biodiversity, and seabirds and mammals – the duration is estimated as long-term to permanent. Comparing to all comments made regarding sediment plume for Table 1:1. Impacts should be assessed as HIGH.	Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Impacts listed were reassessed in 2022 by Japp (2022) (Appendix F) and assessment outcomes are recorded in chapter 7, sections 7.6.1 – 7.6.4. Additionally, an impact score to significance was introduced and checked against the conclusions from the 2012 EIA and 2014 verification assessments, as part of the 2022 impact assessment review process. All conclusions per impact classified were confirmed to be accurate with that of the scoring matrix utilised.

Comment	EAP/Proponent and Specialists Response
COMMENT: Table 1.2.3 The site is within a key recruitment area for hake and gobies as discussed for table 1.1. Impacts should be assessed as HIGH with mitigation strategies provided.	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Conclusions to impacts assessed as per the points raised are available in chapter 7 (assessment chapter) of the ESIA report. With regards to the impacts of fish, section 7.6.2.3 refers particularly to recruitment impacts. The most recent data available to the specialist Japp (2022) was utilised in his specialist report (Appendix F). Data was sourced from the Ministry of Fisheries and Marine Resources and the transboundary survey undertaken through the FAO/NORAD programme (Boyer et al., 2019).

Comment	EAP/Proponent and Specialists Response
COMMENT: Table 1.2.5 The EIA is very deficient on noise impacts to marine mammals which are known to abound in the mining area. Missing are estimates of noise from the proposed dredger-hopper activity and estimates of effects/impacts of noise on at least some of the species.	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings With regards to the impacts of noise, reference is made to sections 7.6.4 and 7.6.4.1 of the assessment chapter (chapter 7), Appendix F (Japp, 2020) and Appendix K (Noise modelling supplementary study by Jan de Nul, 2020).
COMMENTS: Table 1.3 “Macrofauna” COMMENT 1:3.1 It is well known that the substrate (texture, grain size, organic matter etc.) is important to softsediment fauna. The deep sediments are markedly different from the surface sediments in the targeted mine area. For that reason leaving a bottom layer of sediment will likely result in a completely different	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT

Comment	EAP/Proponent and Specialists Response
community, with likely different ecosystem functions. It is questioned whether this is a valid mitigating effort or simply a consequence of mining that is being used as a mitigating factor.	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings This recommendation has been made in the previous assessments and again by Drs Robin Carter and Nina Steffani in the Water column, sediments and benthos specialist study 2021 (Appendix E). Both scientists have expertise in their respective fields and have been actively involved in the project from commencement of the 2012 EIA assessment. Evidence from marine diamond mining in Namibia and from UK aggregate mining shows that functional benthic recovery of seabed occurs over time (I Penney et al 2008: Completed for the Benguela Current Large Marine Ecosystem (BCLME) Programme in 2008). Studies from DebMarine have shown that these communities re-establish, have similar ecological functions, however the

Comment	EAP/Proponent and Specialists Response
	assemblages differ in species. Reference can be made to chapter 7 section 7.5.1.1 in the 2022 ESIA report.
COMMENT 1.3.6, 1.3.7 Even the short period of current measurement showed variability in direction, with higher velocities than predicted near the seabed, implying considerable turbulence at the seafloor. So dispersal of sediment will not necessarily be confined to mine site.	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings Subsequent to the verification programme from 2014, additional supplementary and specialist studies were carried out and concluded in 2022, with the updated 2022 ESIA process. A sediment plume dispersion modelling study was conducted by HR Wallingford in 2020.

Comment	EAP/Proponent and Specialists Response
	Reference can be made to the specialist study by Carter & Steffani (2021) (Appendix E) and discussed in chapter 7, sections 7.4.2.1 and 7.5.1.3.
COMMENT 1.3.4 Sulphide-oxidizing bacteria. No proof of the absence of the large sulphide oxidizing bacteria Beggiatoacea was presented. Wrong sampling and the wrong analytical technique was used for detection (see Salman et al., 2011 for correct methodology) so these bacteria of course could not and were not detected. Absence of evidence is no evidence of absence. Thus using wrong sampling and wrong analytical technique the results are useless and there is zero confidence in the assessment. Until proven otherwise it is 8 assumed that hydrogen sulphide is available in surface sediments and confined there by sulphide-oxidizing bacteria. This is important for oxygen dynamics. Relevant is the admission that hydrogen sulphide was present even in the surface sediment, to quote: "Smaller forms including Thiobacillus spp. With relatively lower growth yields were present; however, indicating that although the concentration was estimated to be low (hydrogen) sulphide was present in the sediments." The presence of sulphide is also supposed in the discussion of heavy metal precipitation by sulphide	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Subsequent to the verification programme from 2014, additional supplementary and specialist studies were carried out and concluded in 2022, with the updated 2022 ESIA process. Reference can be made to the specialist study by Carter & Steffani

Comment	EAP/Proponent and Specialists Response
	(2021) (Appendix E) and discussed in chapter 7, sections 7.4.3.4 and 7.5.1.4.
COMMENT 1.3.6. To quote "re-suspended sediment should disperse only over short distances." Although bottom current speeds found up to 3 times greater than originally predicted?	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Reference can be made to the specialist study by Carter & Steffani (2021) (Appendix E) and discussed in chapter 7, section 7.5.1.6.
COMMENT Table 1.3.9: Assessment not acceptable due to faulty sampling and analysis. If anaerobic products are released into the hypoxic bottom water this can only make the situation worse for animals already living in a low oxygen environment. No information given of tolerances to oxygen	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT.

Comment	EAP/Proponent and Specialists Response
depletion or "tipping points" of animals living at the bottom with regard to reduced oxygen. Worthless assessment, requiring proper investigation	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Reference can be made to the specialist study by Carter & Steffani (2021) (Appendix E) and discussed in chapter 7, section 7.5.1.9.
COMMENTS Table: 1.4 Please explained why jellyfish were required for environmental impact assessment whilst meiofauna (Specialist study included in section C) are an excellent indicator of sediment change, were left out from impact assessment?	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings.

Comment	EAP/Proponent and Specialists Response
	Specialists response: Meiofauna in the planned operations area were surveyed exactly because they are excellent indicators of habitat change and recovery from disturbances. The group is primarily employed for these purposes as opposed to assessing ecological impacts of seabed disturbances as benthic macrofauna are. The obtained baseline data and updates thereof are to be used for these purposes in conjunction with benthic macrofauna distributions.
COMMENT: Missing assessment table: There are no impact assessments for Meiofauna (section C) as this is of the few good baseline studies presented that would be useful for showing changes over relatively short time period and a worthwhile and sensitive indicator of benthic faunal change	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. **Specialists response:** Meiofauna in the planned operations area were surveyed exactly because they are excellent indicators of habitat change and recovery from disturbances. The group is primarily employed for these purposes as opposed to assessing ecological impacts of seabed disturbances as benthic macrofauna are. The obtained baseline data and updates thereof are to be used for these purposes in

Comment	EAP/Proponent and Specialists Response
	conjunction with benthic macrofauna distributions.
COMMENT: Missing assessment tables: There is noticeably no "Cumulative Impacts from mining" table. This is an essential part of the impact assessment	This comment is a repeat of the comment submitted to the Environmental Commissioner on 28 September 2018 as part of the July 2018 Public Consultation Process completed by order of the Minister MEFT. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 Verification assessment now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Cumulative impacts are addressed in the 2022 ESIA report. Reference can be made to chapter 7, section 7.10.

Table 7 – Comments and feedback from the ESIA report public review period submitted 20 September 2022: Bertchen Kohrs (Earthlife)

Comment	EAP/Proponent and Specialists Response
Namibia's marine environment is driven by the cold Benguela Current and localized upwellings which bring nutrient-rich water from the depth to the surface. Namibia is known for its abundant fish population with one of the world richest fisheries. One of the four main sectors in order of contribution to national Gross Domestic Product is the fishing industry. No wonder that Namibia is particularly dependent on the fishing industry and relies on good and healthy catches. This requires a scientific understanding resulting in a document that has been studied to the minutest detail. Earthlife Namibia strongly condemns the plan of off-shore phosphate mining. Mining activities, especially dredging, will undoubtedly disturb the delicate biological balance of marine life, which will most certainly lead to unpredictable consequences. Unpredictable also because no comparable activity has happened anywhere in the world. Be that as it may, what is foreseeable is considerable loss for the profitable fishing industry and the loss of many work places. Through responsible utilisation the fishing industry will be sustainable and bring significant revenue and nutrition in the long term, while the income from phosphate mining will only be	No scientific evidence or studies have been provided in support of the statements made relating to potential impacts to the environment or loss of jobs or profits by the fishing industry or the Namibian economy. The statement is noted as an unsupported opinion. Seabed mining is a well established and expanding industry in Namibia, which makes a significant contribution to employment and national Gross Domestic Profit. As part of this application for environmental clearance certificate, the receiving environment being the Benguela Large Marine Ecosystem off Namibia as well as the potential impacts of the proposed marine phosphate mining project on both the marine environment and the fishing industry have been comprehensively assessed in compliance with the Environmental Management Act, No. 7 of 2007 (referred to as "the Act") and associated 2012 Regulations, The impacts to the fishing industry were assessed in chapter 7, section 7.8.1 in the 2022 ESIA report, as part of the socio-economic impacts of the ESIA, please see below: 'The mining and fishing industries, particularly seabed diamond mining and fish trawling activities, have coexisted for a number of years in the Namibian waters. This section discusses the potential impact of a possible loss of jobs due to phosphate mining occurring or coinciding in commercial fishing

for a limited period of time and only a few people will benefit from it., not the entire nation and its people	grounds and/or in nursery/recruitment areas. Additionally, toxicity concerns from turbidity plumes are included in this assessment. Additional specialist studies have been undertaken in 2019/2020 to review the previous water column, benthos and fisheries specialist work conducted in 2012 and 2014, to add confidence to the results that impacts will be minimal on the fishing industry (refer to Sections 7.4 and 7.5.1). The dredging activities are constrained to an area of 34 km^2 within ML 170, although the scale of the proposed operations represents a fractional portion of the Namibian continental shelf area, nevertheless the proposed activities within this area will have a direct but proportionately limited impact on the fishing industry as the probability of these industries interacting is definite. The key outcomes of the various studies completed are that the fishing industry will be able to coexist with the phosphate industry.'
The Verification Study is a particularly technical document with a lot of information. Earthlife Namibia does not have the capacity to evaluate the technical issues. The short time frame given for comments does not allow the study to be intensively reviewed by an independent team of experts. In this submission, Earthlife will therefore address only some aspects of concern that apparently did not receive sufficient attention in the Verification Study.	It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. The Assessment process as required under the provision of the Act and due to the nature of the receiving environment off the Namibian coast, does require highly specialised studies and specific expertise to be applied, including international scientific experts. It is acknowledged that the scientific expertise required to fully comprehend and assess the related specialist environmental studies may be beyond the

	capabilities of IAP's and the general public. Qualified review of the 2022 assessment report and related studies is included under the provisions of the Environmental Management Act 2007. Independent review of the ESIA falls under the responsibility of the Environmental Commissioner ("EC"). The EC has been appointed by the Minister, Ministry of Environment and Tourism for this purpose, under the provision of the Act and carries appropriate qualifications and experience to manage the highly technical scientific evaluation process in terms of the Act. This review process includes provision for the EC to appoint suitably qualified specialists to conduct an independent external review of the assessment report and related documents if required. Accordingly, it is the responsibility of the Environmental Commissioner to independently assess or consider the merits of the scientific documents submitted in the assessment report for the project. All concerns raised and submitted by registered I&APs as part of the current 2022 ESIA report review process, have been considered and addressed.
Benguela Current The Benguela Current is one of the world's cold-water systems and is characterized by strong coastal upwelling and high level of plankton production. No other feature dominates Namibia's coastal environment as much as the Benguela Current. Even small changes in temperature can have disastrous	The receiving environment and potential site specific impacts of the proposed dredging operations in ML170 including water column, benthos, fish, mammals, vessel traffic and climate as well as potential cumulative impacts on the BCLME have been considered in the current 2022 ESIA. In regard to the specific point noted in the comment, these impacts listed were assessed under cumulative impacts and can be refenced in chapter 7, section 7.10 of the 2022 ESIA report.

consequences for marine life and the entire eco-system. Earthlife feels that the impact of dredging and increased traffic of vessels on the Benguela Current has not been tackled according to its importance.	The impact related to changes in temperature as a result CO_2 emissions from planned mining operations (dredging and sailing) was assessed by Carter & Steffani (2021) (Appendix E) and can be referenced under chapter 7, section 7.10.2.1 of the 2022 ESIA report. 'Carbon dioxide emissions at the sea surface can arise from mobilization of sea bottom rich CO_2 waters during dredging activities of the seabed. A simple observation-based model can be used to evaluate the change of partial pressure of CO_2 (pCO_2) from the bottom/interstitial waters to surface waters by analysing temperature. Temperature and CO_2 solubility changes from 11°C at the seabed (NMP provided data) to two SST scenarios of 12 °C and 18 °C was assessed by Carter and Steffani (2021). These two likely extremes of surface warming increase pCO_2, which is instantaneously re-equilibrated with an atmospheric pCO_2 of 410 µatm. Note that under the assumption that the pCO_2 equilibrates rapidly at the surface, the impact on ocean acidification from the translocation of bottom waters to the sea surface by the proposed dredging operations is predicted to be limited (Carter and Steffani, 2021). The impact related to increased vessel traffic is referenced in sections 7.10.1.6 (Shipping interactions - interactions with fishing vessels) and 7.10.1.7 (Shipping interactions - operational discharges from the dredger). 'The location of the SP1 target dredging area will be advertised by means of a Notice to Mariners and will be marked on hydrographic charts as to inform fishing and other vessels that the dredging vessel with restricted ability to manoeuvre, will be operating in the area. The specific 20-year mine plan site (in

	SP1 - 34 km^2), makes an insignificant contribution to the total annual Namibian bottom trawl catch, primarily of monkfish, since almost no bottom trawling is, or has been, undertaken in the area. During 2005 to 2021 there was no monk bottom trawling within SP1 (Japp, 2022). The dredging activity in SP1, therefore, will have an insignificant operational impact on bottom trawling activities. Similarly, activities are limited for horse mackerel mid-water trawl and purse seine, with the majority of fishing occurring in Zone 4, northwards of SP1, along the 200 m contour. Additionally, the dredger does not operate continuously, a current dredge cycle runs for 16 hrs to 20 hrs, therefore operating three times a week.' 'The dredging vessel will be MARPOL compliant in terms of all operational emissions and discharges from the vessel. The vessel is expected to have a minimal individual impact and similarly will make a negligible contribution to the cumulative emissions and discharges from vessels currently operating in the Namibian EEZ. However, the EMP has made provision for the recording of emissions, which will be reported on annually to the required authorities.'
Plankton The possible impact of the dredging activities on phytoplankton and zooplankton have not been measured in depth. Phytoplankton are a source of food for microscopic faunae, called zooplankton, which in turn provide food for higher levels of invertebrates and vertebrates ranging from crabs and lobsters to shrimps, fish and sharks widely distributed in pelagic waters. The continual massive production of phytoplankton in	It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. The impacts assessed can be referenced in the specialist study by Carter & Steffani (2021) (Appendix E) and in chapter 7, sections 7.4.2.4 (Nutrients (ammonium and phosphorus) added at surface promote phytoplankton growth) and 7.5.1.8 (Dredging may mobilise dissolved nutrients from the sediments which could be released into the water column) of the 2022 ESIA report.

Benguela waters does not only provide high-volume food webs but also consumes a significant amount of atmospheric carbon dioxide. In the Verification Study it is stated: *Overall, although the waters off central Namibia are productive and support large communities of plankton, the proposed dredging site does not occur within any identifiably important area for phytoplankton, zooplankton or ichthyoplankton growth and development.* This statement appears very nebulous. Can this be verified throughout all seasons? And under increasing climate change conditions? How can you determine the area of influence without taking all involved parameters into account?	**<u>Specialists response:</u>** During dredging, there will be repeat traverses over the defined dredging lanes in order to mine to the required depth of sediment below seabed (leaving ~30 cm above the footwall) in the mine plan area. If fine sediment discharge is released at the seabed during the traverses, an amount of the fine sediment discharged would then fall back into the active dredge lanes and will need to be double handled and removed during the next traverse. Ore recovery efficiency would possibly be affected and reduced which would result in increased onsite dredging time and related fine sediment discharge. Comparisons when using an environmental valve of surface (40 m to 50 m depth), mid depth and bottom turbidity distributions against no valve, indicates an improvement in total suspended solids (TSS) concentrations in the surface layers to <7.6 mg/l but no or little change in the subsurface layers (HR Wallingford, 2020). This is beneficial as the 1 % light depth would be around -50 m at this sediment concentration, therefore negative effects of reduced light levels on phytoplankton production should be mostly avoided. Also, as there is little or no change in the near seabed TSS load, it can be assumed that the sediment deposition would be similar between the valve and no-valve scenarios which, according to modelling, is predicted to be 0.3 mm or less per dredge cycle. This is a factor of 20 below the HL5 threshold of effects on marine benthos reported by Smit et al. (2008). Note that the environmental valve is recommended as a mitigation measure during mining operations. Whether such deposition patterns would occur with a near-seabed discharge is uncertain, as behavioural aspects of the discharge in terms of jet momentum,

	dynamic plume collapse, associated mixing with the receiving water body along with possible turbidity flows and local currents will affect deposition rates and distributions. This may result in considerably higher instantaneous sediment deposition thickness in places, possibly approaching centimeters, with correspondingly higher risks of negative effects on benthic macrofauna as Smit et al (2008) determined a median hazardous effect level (HL50) of 5.4 cm for instantaneous burial on benthos. Therefore, the environmental benefit of a near seabed fine sediment discharge is moot and will most likely not warrant the linked cost and potential operational risks and uncertainties.
Noise Verification Study: *A literature-based assessment of the potential impacts of sound from dredging vessels on a variety of species showed that sound levels in all cases are well below those known to cause damage to marine life.* Some marine species are known to be extremely sensitive to extraneous sounds, in some cases to the extent of losing their orientation and or lose the ability of hearing. The dredging vessels will cause continuous noise. This will certainly have an impact on the general condition of marine life. The negative impact on the general condition of marine life has been greatly neglected and should be viewed more seriously.	It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. The associated potential impact was assessed in 2012 and reassessed in 2014 during the verification programme, whereby infield surveys were conducted (Japp in Midgley 2012 and 2014). As part of this current assessment report, the appointed specialist Japp (2022) has expanded the baseline information and re-assessed the potential impacts accordingly, per species group (Appendix F). Additionally, Carter & Steffani (2021) have assessed the potential impacts of noise in their specialist study for this assessment (Appendix E), which includes new quantitative noise generation and attenuation data for dredge vessels operated by the dredging contractor JDN (Appendix K). Results from this study are for a similar dredging vessel that will be used for mining activities in SP1 which generates sound pressure levels (SPL) of 180-190 dB re 1 µPa at 1m. Note: the dredging

	contractor, JDN, operates dredgers internationally and has significant experience in quantifying and managing vessel noise levels in order to comply with international standards in regard to noise levels and related impacts. Due to the numerous site specific variables affecting the noise propagation and attenuation (e.g. water temperature, seabed type, seasonal variations, turbidity etc.) it is only possible to do accurate profiling of the dredger once it is onsite in ML 170. Provision is therefore made as part of the environmental management and monitoring program for the additional direct noise measurements to be taken when the dredger is operating onsite. Reference can be made to chapter 7, section 7.6.4.1 in the 2022 ESIA report. (Pg213) 'Carter and Steffani (2021) further concluded that modelled sound attenuation predicts that attenuation to 100 dB re 1 µPa at 1m will be attained at an average range of 15 km. **<u>Specialist Response:</u>** Sound receptors in the operations area will be mainly cetaceans, seals, and fish. Temporary (hearing) threshold shift (TTS) in cetaceans and seals are reported as being 175 dB re 1µPa at 1 m SPL received level and above. Mortality can be caused in fishes at SPL >207 dB re 1µPa at 1m for fish with swim bladders and >213 for fish without bladders, TTS thresholds are ≥186 dB; mortality in fish eggs and larvae can occurs after exposure to 207 dB. Mortality or potentially mortal injury to sea turtles can follow exposures to similarly high SPLs. Given the dredger sound source level (above) such effects are unlikely. Received sound level thresholds causing moderate behavioural shifts for

	baleen and odontocete cetaceans and seals range from 130 to 180 dB re 1μPa at 1 m. Modelled sound attenuation for the TSHD Gerardus Mercator provided by Jan de Nul (Jan De Nul N.V., 2020) indicate that received sound levels >130 dB will be restricted to within a radius of 2-3 km from the operating dredger while sound levels >150 dB will be restricted to within 100 m. According to published literature the sound levels are in all cases far below those which would or could pose any threat to marine life. **<u>Specialists Response:</u>** Thank you for your concerns relating to sound effects and their low significance rating. We would ask in addition to the information provided in the assessments, that you compare impacts related to seismic surveys and the extensive research undertaken on threshold levels for fish with and without swim bladders and the horizontal distances from sound source (see the table below extracted from SLR, 2021 for example). Noise associated with shipping, dredging and other maritime anthropogenic activities occur throughout the marine environment – this is not to say there is no impact – however many "noise" types affect the overall ambient noise levels in the ocean. With some "sound" such as the seismic air guns will have much higher intensity and sound sources than for example dredging or fishing operations. The impacts on fish of dredging operations is highly unlikely to be anywhere as close to the thresholds as suggested in the table below, which supports the work done by Carter and Stefani (2021).

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Table 4.6: Zones of immediate impact from single pulses (2D / 3D seismic airgun arrays) for mortality and recoverable injury for fish, fish eggs and fish larvae (SLR, 2021).

<table>
<tr><th rowspan="3">Type of animal</th><th colspan="4">Zones of impact – maximum horizontal distances from source to impact threshold levels</th></tr>
<tr><th colspan="2">Mortality and potential mortal injury</th><th colspan="2">Recovery injury</th></tr>
<tr><th>Criteria - Pk SPL dB re 1µPa</th><th>Maximum threshold distance, m</th><th>Criteria - Pk SPL dB re 1µPa</th><th>Maximum threshold distance, m</th></tr>
<tr><td>Fish: no swim bladder (particle motion detection)</td><td>> 213</td><td>70 / 80</td><td>>213</td><td>70 / 80</td></tr>
<tr><td>Fish: swim bladder is not involved in hearing (particle motion detection)</td><td>>207</td><td>140 / 160</td><td>>207</td><td>140 / 160</td></tr>
<tr><td>Fish: swim bladder involved in hearing (primarily pressure detection)</td><td>>207</td><td>140 / 160</td><td>>207</td><td>140 / 160</td></tr>
<tr><td>Fish eggs and fish larvae</td><td>>207</td><td>140 / 160</td><td>-</td><td>-</td></tr>
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Toxic influence of heavy metals

Phosphates are used in the fertilizer industry. Their processing and extraction can have harmful environmental consequences as they contain heavy metals such as uranium, cadmium, lead, arsenic, and other heavy metals which are all toxic if consumed in certain quantities.

Verification Study: Heavy metal concentrations in both surficial and subsurface sediments reflect relatively high concentrations of arsenic, cadmium, chromium, copper and nickel. High concentrations of cadmium and nickel were predicted in the EIA. The low release of the metals into the dissolved phase indicates that although their natural concentrations exceeded the sediment

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It is noted that the proposed Sandpiper Project is not and industrial fertilizer manufacturing project.

It is further noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings.

The impacts on the water column have been assessed in chapter 7 of the ESIA report based off of the specialist study by Carter & Steffani (2021) (Appendix E). This study took into account the conclusions drawn from the sediment plume dispersion model conducted by HR Wallingford (2020) (Appendix I). HR Wallingford conducted a detailed ocean and plume sediment dispersion

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</table>

quality guidelines for the region, they do not represent a toxicity risk in this phase either in situ or following physical disturbance. The bioavailability of these heavy metals in the dissolved phase was investigated by elutriation tests and negligible proportions were released. The study acknowledges that relatively high concentrations of heavy metals are released through the activities. Yet, the consequences are severely ignored. The flippancy with which the study addresses this important issue is alarming. It is decided that the toxic metals are excreted through the defecation and thus regarded as harmless to marine life. The ingestion of toxic heavy metals over a long period of time leads to absorption in different organs and throughout the whole body in different concentrations and with different health effects. Finally, the contaminated fish end up on the plates of the consumers, thus having a negative effect on the health of the people. Can NMP justify this in clear conscience? It is most important that the heavy metals will be extracted from the raw material before the phosphate is processed into fertilizer in order to prevent soil contamination. The heavy metals would otherwise be taken up by the plants and in the	modelling with a focus on the mining target zone utilising site specific data of dredge plume behaviour in the 20-year mine plan area based on their existing comprehensive regional and local metocean data bases, in-situ measurements of sediment properties as well as water column and bottom currents in the 20-year target mining area (2014 verification assessment) along with the technical details on the proposed dredging programme production rates and equipment specifications provided by the dredging contractor (JDN). Reference can be made to sections 7.4.2.1 (Dredging generates plumes of suspended sediments), 7.4.2.5 (Trace/metal toxicity at surface), 7.4.3.1 (Trace/metal toxicity on seabed - target dredge area trace metals are remobilized). **<u>Specialists response:</u>** Bioaccumulation occurs mainly through feeding i.e. it is associated with the trophic structure of the fish communities and their prey. The mining area is localised and fish occurring in the area mobile and it is assumed will move clear of the disturbed area. It would be useful if the toxicity levels of the main commercial species sampled by the fishing sector can be provided as they need to be regularly tested for human consumption. This would allow for comparison in and around the mining area when mining occurs. Impaired seafood quality requires that heavy metals that may be liberated from the mined sediment are assimilated by fish. This can be via direct uptake of dissolved heavy metals across gills and/or via diet. Both routes require that heavy metals are in the dissolved form. Elutriation tests on mine area sediments showed that minimal amounts (<1%) of particulate heavy metals are

meat of animals, all ending up on the consumer's plate which eventually creates an unhealthy community. The impact of sediment plumes and heavy metals for the entire food web has not been assessed.	likely to enter the dissolved phase (Verification assessment, Section C, Specialist studies C2.1 Water Column and Sediments, Subsection 4.2.3). The dietary route of dissolved metals would be via phytoplankton to zooplankton to fish. Zooplankton reduce metal body burdens by ecdysis hence further limiting this pathway. Hence the probability of this occurring is low. Cadmium along with other metals is predicted to have a low bioavailability due to formation of sparingly soluble metal sulphides as AVS > SEM (Verification assessment, Section C, Specialist studies C2.1 Water Column and Sediments, Subsection 4.2.3). This is supported by negligible proportions of sedimentary metals entering dissolved phase on elutriation testing. Toxicity risks are determined from comparisons with BCLME sediment and water quality guidelines. These are inherently precautionary being derived from the international scientific literature on toxicity effects. Typically, chronic effects are included in the derivations being determined from acute/chronic ratios. The precautionary aspect is based on application of assessment factors to no observed effect concentrations (NOECs). Depending on the quality and extent of the source data, e.g., the number of taxa covered, assessment factors can range between 10 and 1 000. Thus, when toxicity data are extensive the guideline can be 0.1 x the NOEC and, when restricted 0.001 x the NOEC. The guidelines are thus protective.
Accumulative influences The subsequent processing of the mined phosphate raw material has to be carried out on land and will have further negative effects, both on land and on marine life, but also on the	A separate environmental clearance certificate is required for the sites allocated for the land-based activities which will include the processing plant and management of waste. The ESIA for the land based component of the project will include specialist assessment of any potential radiation risk related to personnel engaged in material processing and handling due to the low

people who work with the uranium-containing material. How will the workers be protected? A lot of toxic waste will be produced, which will have to be disposed of properly. These problems have not been addressed in the study.	levels of Uranium that are commonly associated with phosphorites, as well as other mineral commodities such as heavy mineral sands.
Holistically approach There is another issue of concern. The increasing impacts of climate change must be accounted for. The ocean is getting warmer, the water is getting more acidic, the conditions for marine life are getting worse. Furthermore, the construction of desalination plants in Luederitz and Walvis Bay is on the agenda. Negative environmental impact from the release of concentrated brine is to be expected. Furthermore, a technical problem could arise when marine phosphate mining triggers algae blooms, which could clog up the desalination plant.	The general statements and issues raised are addressed in the current 2022 assessment and ESIA report in context of the proposed operations in ML 170. The assessment includes consideration of cumulative effects related to the project. No comment can be provided here on the potential impact of other proposed activities in the Walvis Bay and Lüderitz region. The climate change impacts related to changes in temperature as a result CO_2 emissions from planned mining operations (dredging and sailing) was assessed by Carter & Steffani (2021) (Appendix E) and can be referenced under chapter 7, section 7.10.2.1 of the 2022 ESIA report. The impacts on the water column and benthos have been assessed in chapter 7 of the ESIA report based off of the specialist study by Carter & Steffani (2021) (Appendix E), reference can be made to sections 7.4.2.4 (Nutrients (ammonium and phosphorus) added at surface promote phytoplankton growth), 7.4.3.2 (Sulphidic sediment pore-water is exposed by dredging, and the flux of dissolved H2S into the lower water column is increased), 7.4.3.3 (Exposure of anoxic sediments by dredging reduces the already low concentrations of oxygen that occur in the lower water column), 7.4.3.4 (Removal of thio-bacteria mats by dredging increases the flux of H2S to the lower water column). 7.5.1.4 (Dredging removes mats of large sulphur-oxidising bacteria from the sediment surface and from the upper layer) and particularly 7.5.1.8 (Dredging may

	mobilise dissolved nutrients from the sediments which could be released into the water column). At the seabed, there are moderately high nutrient levels in the dredge area sediments (moderate nitrate-nitrogen and high phosphate-phosphorus concentrations) but generally low pore water volumes (~35 litres/m3 sediment) that could release nutrients when disturbed. The Redfield ratio measured was 8.2 vs 17.7 and the measured moisture content of the sediment was low. Therefore, nutrient loading to the euphotic zone through dredging will be unlikely. On completion of the 2014 verification assessment, the confidence level for this impact assessment was increased to high and remains unchanged for the current 2022 assessment (Carter & Steffani, 2021). The effects are local as the released nutrients will spread with the fine sediment discharge plume and are expected to be very short term as the fine sediment discharge plumes will only be generated during dredging which occurs within a 37-hour dredge cycle for approximately 16 hrs. Therefore no algal plumes are expected to be created by the dredging activities. Additionally, the presence of anoxic sediments in the dredge area was not apparent from the available samples or indicated in the sediment properties measurements (Carter in Midgley, 2014). Additionally, the presence of large epibenthic organisms observed during the verification trawl survey in and adjacent to the mine target site indicate the absence of anoxic sediments (Japp in Midgley 2014). Therefore, the risk of reducing oxygen concentrations in the lower water column and potential effects on biota are considered unlikely.

Pollution through mining activities - offshore and onshore - contribute to contamination and need to be considered in the wider context. The overall scenario with all factors involved must be approached holistically to avoid accumulation of pollution and negative impacts on our environment as much as possible. ALARA – As Low as Reasonably Achievable – is a guiding principle for safety for the environment and its people and should be strictly adhered to.	The impacts from the pollution of the dredger vessel was assessed in the 2022 ESIA report in chapter 7, section 7.4.1.1 (Potential deterioration in water quality from liquid discharges to sea of vessel wastes). The cumulative impact related to discharges from the vessel is assessed under chapter 7, section 7.10.1.7 (Shipping interactions - operational discharges from the dredger). The dredging vessel will be MARPOL compliant in terms of all operational emissions and discharges from the vessel. Mitigation required includes ensuring that the vessel discharge/retention systems are in good working condition and do not malfunction and the waste management procedures and protocols are strictly applied. These measures have been incorporated in the EMP.
The above submission reflects only some of Earthlife Namibia's views on the proposed phosphate project. It is expected that the points addressed will be acknowledged and considered.	Opportunity has been provided in the prescribed process under EMA 2007 for stakeholders to make relevant submissions prior to submission of the ESIA. All points that have been raised have been acknowledged and addressed in full.
It can only be reiterated that Earthlife Namibia opposes the project due to the expected risks on the fishing industry and the environment, both off-shore and on-shore.	The position taken by Earthlife Namibia is noted. The EMA 2007 and associated Regulations require that all expected risks, including risks posed to the fishing industry and the marine environment are fully assessed. The assessed impacts by relevant specialists under the management of an appointed Environmental Assessment Practitioner have been presented in the ESIA for submission to the designated competent authorities for qualified review .

Table 8 – Comments and feedback from the ESIA report public review period submitted 20 September 2022: Confederation of Namibian Fishing Associations

Comments	EAP/Proponent and Specialists response
The NMP ESIA is of both national and international precedent setting importance in terms of deep sea mining, so must be allowed to be reviewed properly as it has the potential to impact future generations of Namibians. Including all annexures, the draft NMP ESIA amounts to thousands of pages. The annexures in particular are very technical scientific documents which require review by international scientists with the necessary technical expertise as the average layman I&AP is not capable of doing this. NMP in drafting its ESIA was very reliant on utilising technical scientists. I&APS should also be given the opportunity to call on international scientific experts to properly review the document that form part of the draft ESIA.	The proposed NMP project is not a deep sea mining project. The project does not target the seabed mining of deep sea minerals, which are a specific types of mineral deposits (polymetallic nodules, deep sea massive sulphides and cobalt crusts) that are found only in extremely deep waters (deep sea environments) on the continental slope, rise and abyssal plains at water depths of 800-6000 m typically in international waters (high seas). The proposed NMP project involves the exploitation of a placer deposit containing phosphatic sands located on the continental shelf within the Exclusive Economic Zone ("EEZ") of Namibia in water depths of 190-250 m in the SP 1 area of ML170. Qualified review of the assessment report and related studies is included under the provisions of the Environmental Management Act 2007 ("the Act"). The assessment process as required under the provision of the Act and due to the nature of the receiving environment off the Namibian coast, does require highly specialised studies and specific expertise to be applied, including international scientific experts. Independent review of the ESIA falls under the responsibility of the Environmental Commissioner ("EC"). The EC has been appointed by the Minister, Ministry of Environment and Tourism for this purpose, under the provision of the Act and carries appropriate qualifications and experience to manage the highly technical scientific evaluation process in terms of the Act. This review process includes provision for the EC to appoint suitably qualified specialists to conduct an independent external review of the Assessment Report and related documents if required. Accordingly, it is the responsibility of the Environmental Commissioner, not the layman or IAP's, to

Comments	EAP/Proponent and Specialists response
	independently assess or consider the merits of the scientific documents submitted in the assessment report for the Project.
Over three months ago, in early June the CNFA asked if we could obtain the 2020 technical reports on Plume modelling, sediment toxicity and noise impacts etc, that NMP had commissioned as far back as 2020 as responses to gaps in the original Environmental Impact Assessment (EIA). We requested these so that we could circulate them to international experts with the necessary expertise to assess these documents. However, we were told that "the reports form part of the current assessment process and will be circulated to all registered IAPs in due course, in accordance with the regulations."	The 2020 technical reports had not been released to any parties prior to this application. These reports were provided directly only to the EC only at that time in 2020 as the then current application was formally suspended by the MEFT pending the outcome of the legal proceedings initiated by CNFA. In June 2021 the High Court ruled upholding the validity of ML 170 and that the pending 2012 application was invalid, and further instructed that NMP should apply in the prescribed manner for an environmental clearance certificate. These technical 2020 reports now form part of the current application process undertaken in compliance with the order of the High Court and have been made available to all parties at the same time, without preference, as part of the requirements defined in Environmental Management Act, No.7 of 2007 and associated 2012 Regulations. I&AP's have therefore not been denied access to the 2020 technical reports. All reports related to the current 2022 application have been provided to all the registered I&APs including to the CNFA and the general public in accordance with the prescribed process for the present application.
A two-week period for review is way too short. International scientists with the necessary specialist expertise to review these documents are very busy people and cannot be expected to do a proper review of these documents with a deadline of two weeks. To get a good response form IAPs where international expert scientists can have proper input, requires at least a three-	The period provided for comment by I&APs of 14 days was defined in consultation with the office of the Environmental Commissioner and is in accordance with both the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations. This is a reasonable allocation of time for comment on the content of the assessment report prior to submission to the EC as required under Regulation 23 of the Act (7 days).

Comments	EAP/Proponent and Specialists response
month period.	
A recurring theme through the Namibian Marine Phosphate ESIA is that there will be little or no damage, suggesting no adverse impacts. **This submission disagrees and points to areas of real environmental concern.**	The statement is noted but is not supported with any scientific studies, information, or evidence. In this regard it is noted that: • The assessment of impact on the environment is directly related to the scale and intensity of the proposed operations. In this instance the scale of operations will involve 1 dredging vessel dredging an area of 1.7 km^2 on average per year at a frequency of 3 dredge cycles per week, each cycle comprising 16-20 hrs onsite in ML 170. This represents less than 1 % of the total mining licence area of 2,233 km^2. A cumulative total area of 34 km^2 will be covered over a 20 year period. • In comparison, the 6 vessel marine diamond mining fleet operate on a 24/7 and dredge an area estimated at more than 15km2/year. • The demersal (bottom trawling) fleet in Namibia comprises more than 90 registered vessels which operate across the full length of the Namibian Coast in water depths of 200-600 m. • Compared to the average annual area of 1.7 km^2/year that will be affected by the proposed phosphate mining, an estimated area of 18,600 km^2 of seabed being affected annually by bottom trawling and related sediment plumes in Namibia. This estimate is substantiated by estimates in published scientific literature. **<u>Specialists response:</u>** • Comparatively, the South African hake trawl sector undertook an intensive trawling impact assessment as part of their requirement for MSC assessment. The outcomes of that study showed clearly that trawling

Comments	EAP/Proponent and Specialists response
	intensity was very high in places and that most areas trawled were trawled repeatedly and intensively and that this altered the habitat significantly by systematically removing surficial flora and fauna. This resulted in trawling areas to be ringfenced so as to limit expansion of trawling impacts into unknown or sensitive areas. Namibian bottom trawls use identical gear to their South African counterparts and there is no doubt that trawling in Namibian waters is as intensive and extensive as reported in the southern Benguela. • A 2018 publication co-authored by 2 members of the Ministry of Fisheries and Marine Resources presents estimates of the bottom trawling footprint (seabed area impacted by trawling) on the seabed at depths of 200 – 1,000 m in the Northern Benguela to be 110,938 km^2. This calculation is derived from tow-by-tow data provided by MFMR for the period 2008 – 2013. (Amoroso RO et al 2018; Bottom trawl fishing footprints on the world's continental shelves. Proc Natl Acad Sci U S A. 2018 Oct 23;115(43): E10275-E10282. doi: 10.1073/pnas.1802379115. Epub 2018 Oct 8. PMID: 30297399; PMCID: PMC6205437.)
Separation of "at-sea mining" and "onshore processing" ESIAs While it is understood that NMP argues that it is necessary for them to receive environmental clearance approval for the at-sea mining operation first, so that they have security to then go ahead with the on-shore processing ESIA, the CNFA is very concerned that separating them does not give a clear picture in	Mining involves two key processes 1) ore recovery (excavation of mineral bearing rock or sediment) and 2) processing of ore to produce a concentrate. Under normal (on land) circumstances both these processes occur within the confines of the mining license boundaries (i.e. the area within which the mineral deposit occurs and is extracted from). This is not the case for this project which is not the same as a normal land-based mining project. The mining licence ML 170 is located in the ocean 160 km southwest of Walvis

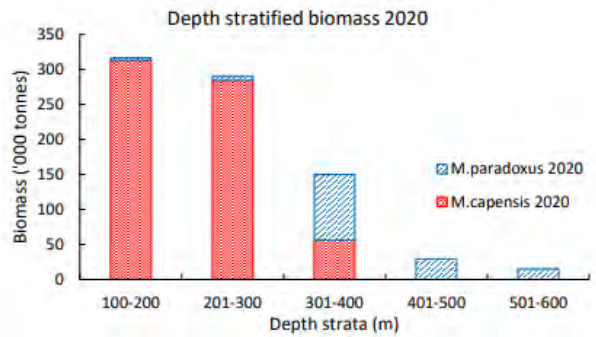
Comments	EAP/Proponent and Specialists response
terms of environmental impacts upon which environmental clearance is approved or not. In any normal mining ESIA environmental clearance approval process, the mining operation and how mine waste is dealt with is handled together. In the case of the NMP operation, mining and how mine waste is dealt with is mostly separated into two ESIAs. This presents a problem in assessing the mining operations as the at-sea ESIA does not assess the bulk of the mining waste, which is part of the onshore operation. As in the case of the Frank Sinatra song, Love and Marriage you can't have one without the other, if one is to assess the mining operation in a holistic way properly. The CNFA does not accept the ESIA as being complete and ready for submission for clearance without all the on-shore processing land component included. They are all part and parcel of the actual mine, and all aspects will have cumulative effects that have to be taken into account before any clearance can actually be given. Separately undertaking EIAs for the at-sea mining component of the Namibia Marine Phosphate and the onshore process creates assessment problems.	Bay. The law requires that an environmental clearance certificate must be issued for the proposed operations in mining licence ML 170, a) in compliance with the attached licence conditions and b) for authorisation of any operations in the mining licence area. The ESIA for ML170 is directly related to the assessment of impacts in the offshore marine environment related to the recovery of the ore. No processing is done in the ML170 at sea. Award of an environmental clearance certificate does not in any way permit any processing activities to be undertaken on land. The processing of the landed ore takes place at a separate on land location and does not involve any mining activity and hence does not require a mining license for the area of the processing plant. As an industrial process, a separate environmental clearance certificate is therefore required for the proposed land-based processing and product handing operations and associated land sites allocated for these activities. While related, in this instance the land-based component of the project cannot proceed without environmental permitting for the mining licence ML 170. Therefore, it is a requirement to have two separate EIA processes. Mining operations in ML170 cannot commence without completion of a full ESIA and environmental permitting of the land-based processing and product handling component infrastructure which is required for commencement of construction.

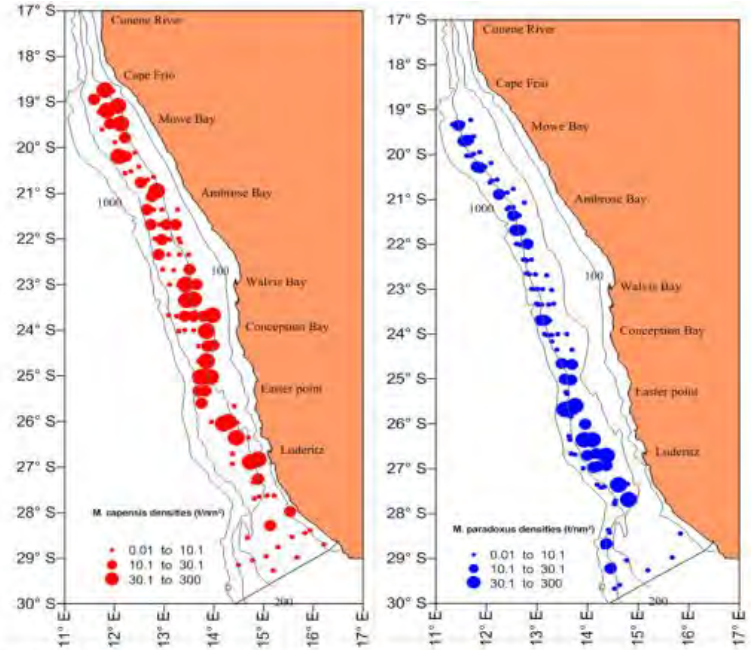
Comments	EAP/Proponent and Specialists response
	There can be no investment in progressing the land component of the Project if there is no valid authorisation to conduct operations in the mining licence where the vessel and mineral deposits are located. Therefore, it is a requirement to have two separate EIA processes. Staged application for environmental approval for project development is not contrary to any laws in Namibia and has been done both previously and currently. The EMA2007 is comprehensive in its requirements for Assessment which will be done for each location.
The onshore processing element of 5 million tonnes of unprocessed material which must be brought ashore annually for processing into and around 3 million tonnes of raw marine phosphate rock will require huge amounts of water washing the sludge (potentially including heavy metals and radioactive material) off the marine phosphate. This water will have to go somewhere, which includes back into that Walvis Bay harbour " marine environment", where the aquaculture sector grows, in particular oysters. Oysters are filter feeders, which means they are perfect indicators for pollution as they suck up everything in the water. Since Oysters are grown for human consumption concentration of heavy metals into oysters would make these oysters unviable as a commercial product	Comment is noted and as detailed in the response above, is not applicable to the marine based environmental clearance certificate application and thus this ESIA report. The proposed onshore processing and product handling component will follow the process for application for environmental clearance certificate as defined in the EMA, No. 7 of 2007, which will entail comprehensive assessment of all related activities.
Key Development Principles Two principles of overriding importance must at all times be	The comments provided address matters of legislation and policy which lie outside of the authority of the Proponent in regard to this application. The comments are noted as opinion. The processes and purpose of the

Comments	EAP/Proponent and Specialists response
borne in mind: Firstly: It must be ensured that the environment holding these resources is not subjected to irrevocable damage which could lead to economic and social disadvantages for Namibia at a later stage Secondly: new industrial endeavours should not be developed at the expense of existing economic activity providing a mainstay for the national economy and upon which livelihood of regions and communities depend The Namibian fishing industry is currently worth $10 billion annually of which the hake sector contributes 60%. The hake sector currently directly employs 12 027 people. With a total allowable catch (TAC) of over 150000 tonnes annually, the hake fishery today is only at 50% of its potential maximum sustainable yield (MSY). The Namibian Ministry of Fisheries and Marine Resources (MFMR) have a policy to grow the hake fishery to MSY in a number of years, which will substantially increase economic benefits to Namibia. As detailed shortly in this submission it is the shallow water hake, *Merluccius capensis*, through which growth will occur in Namibia hake stock to reach MSY, as it breeds and lives its life in Namibian waters. Much of life cycle of *M. capensis* occurs inside of 200 meters depth, where the bulk of the fish stock lives. Marine phosphate mining must	Environmental Management Act 2007 is designed to address these issues as noted, and has been complied with by the proponent No scientific references, evidence or data have been provided to substantiate the statements made here or for the points 1 – 8 raised thereafter. The assessment of impact on the fishing industry is directly related to the scale and intensity of the proposed operations. In this instance the scale of operations will involve 1 dredging vessel dredging an area of 1.7 km^2 on average per year at a frequency of 3 dredge cycles per week, each cycle comprising 16-20hrs onsite in ML 170. This represents less than 1 % of the total Mining Licence Area of 2,233 km^2. A cumulative total area of 34 km^2 will be covered over a 20 year period. Conclusions to impacts assessed as per the points raised are available in the in chapter 7 (assessment chapter) of the 2022 ESIA report. With regards to the impacts on fisheries and fish, reference is made to the impacts assessed in section 7.6.1 and 7.6.2 of the 2022 ESIA report. Particularly section 7.6.2.3 refers to recruitment impacts. The most recent data available to the specialist Japp (2022) was utilised in his specialist report (Appendix F). Data was sourced from the Ministry of Fisheries and Marine Resources and the transboundary survey undertaken through the FAO/NORAD programme (Boyer et al., 2019). It is noted that the CNFA. was invited to meet with the EAP and the Proponent

Comments	EAP/Proponent and Specialists response
not be allowed to negatively impact the hake resource, or the monkfish resource which is also found close to where NMP propose to mine. The deep-water hake, *Mercluccius paradoxus* spawns in South Africa, which Namibia has no control over. In addition to fishing sectors, especially hake and monkfish mentioned in the EIA of 2012, the wetfish horse mackerel sector has developed since then, through the direction of the Namibian Government, as shown in the National Development Plan 5. Wetfish horse mackerel vessels land chilled horse mackerel to onshore processing plants in Walvis Bay, for further processing. Because the vessels cannot stay at sea for lengthy periods which factory freezer vessels can, they are particularly limited to fishing closer to Walvis Bay. Should SP1 be mined as a site, this would significantly negatively impact the wetfish horse mackerel sector in particular, to the point of threatening the sector's economic viability: 1. The Wet Landed Horse Mackerel (HM) Association object to the position indicated for phosphate mining above 2.5 degrees approximately, as it infringes into crucially important fishing areas for the sub-sector. 2. The Namibian HM resource is the largest fishing resource by species in Southern Africa/ SADC and at a total allowable catch (TAC) of 330000 tonnes in 2022, is critical food security in SADC.	to discuss their concerns with intent for constructive engagement towards resolution as part of the stakeholder engagement and consultation process required under the Act. It is noted that the Wet Landed Horse Mackerel Association was invited to meet with the EAP and the proponent to discuss their concerns with intent for constructive engagement towards resolution as part of the stakeholder engagement and consultation process required under the Act. Both associations declined to take up the invitation. **<u>Specialists response - Fishing Sector Hake and Monk:</u>** There is no disagreement regarding the socio-economic aspects of the hake or other fisheries in Namibian waters. The assessment on fisheries, based primarily on survey data and peer-reviewed scientific reports, many produced by Namibian scientists, articulate the spatial context of these fisheries relative to the proposed mining area. Scale and intensity is an important consideration in this regard. The data provided by MFMR and other independent surveys (e.g. NORAD) clearly shows that the scale and intensity of the proposed mining area will have low or negligible impact on fishery operations. The fishery assessment does not dispute that there are no impacts in or around the proposed mining area. In the same way the scale and intensity of all fishing operations is known, the comparative scale of the proposed mining is minimal. The assessment of mining on fish and fisheries must therefore necessarily consider this relative scale and the information available. The deemed risk to the fishing industry operations is minimal – the main caveat being that the

Comments	EAP/Proponent and Specialists response
3. However, due to current regulations, the HM sector (fishing only permitted deeper than 200m to protect inshore fish breeding and juvenile grow out areas) is squeezed into very limited zones to catch the TAC which becomes more and more difficult due to water temperatures and movement of HM during winter conditions. The area north of 25.5 degrees is the only area where catchable shoals of HM are found during specific winter months for wet fish HM vessels and hence the risk to allow phosphate mining at that position. The area is also known to be where the large adult HM concentrate, and if marine phosphate mining is allowed to go ahead, a bigger **risk of heavy metal contamination on this part of the HM resources.** 4. Considering that the proposed phosphate mining zone has also been squeezed in the southern part of the HM catching zone outside the 200m depth, this is unacceptable as it poses a direct threat to the HM sector which is known as the protein basket for the lower income in SADC countries. 5. Also considering the proposed zone for phosphate mining is the exact area of the large adult HM biomass and poses further treats for fishery. 6. Based on importance of food security as well as newly found job creation in the HM sector, the Wet Landed Horse Mackerel Association proposed that all fishing	scale of the proposed mining operations is contained within the stated areas. Any changes to that assumption used in the assessment will naturally alter the impact assessment as it changes the relative extent of impact that it could pose on the fisheries in the proximity of the mining or even if permitted in other areas. Namibian survey data suggests that the < 200 m depth area is an area where smaller hake are found. This indeed is a biologically known fact for hake globally (size depth relationship), though discreet spawning areas for hake and other species have not been described explicitly based on the historical and currently available information. Hake and monk for example are broadly distributed across the Namibian shelf. Sardine stocks have collapsed. The statement that shallow water hake is less than 50 % of MSY is incorrect – Namibian hake stocks have been in a process of rebuilding since independence – the strategy to rebuild (which has not always been followed) applies the RY strategy (replacement yield) i.e. the calculated allowable catch effectively replaces the catch each year, except that the allowed catch is reduced by 20 % (to allow surplus for rebuilding). Although the strategy is not the same for all stocks in Namibian waters, the state of the mainly commercial fish stocks is deemed generally good although stock dynamics varies between demersal and pelagic species. The figure below from the MFMR assessment made available for this assessment shows that the *M. capensis* stock in 100-200 m is high, similarly in the 2001 to 300 m depth zone. The fishable biomass is mainly deeper than

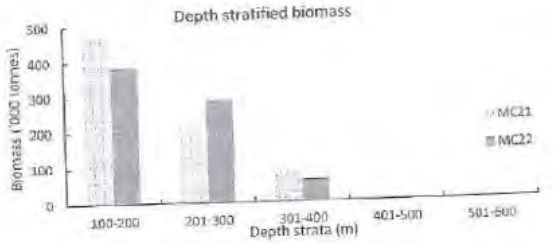
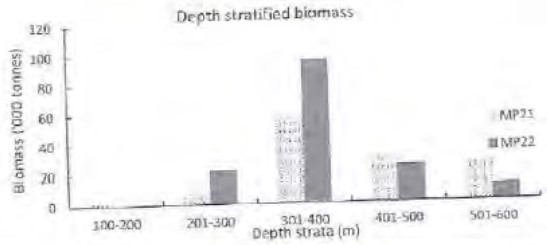
Comments	EAP/Proponent and Specialists response
areas outside the 200m depth restriction, where HM fishing takes place, be exclusively zoned for HM to ensure the survival of this important sector. The wet landed HM sector aligns 100% with the Namibian Blue Economy policy in terms of food security and job creation for Namibians, mining in these limited fishing areas posing a huge risk. 7. During winter months the HM resource moves closer to shore, which makes catching areas even more difficult 8. The risks to Southern Africa's largest fishing resources as well as the significant potential to grow employment in this sector outweigh benefits from mining in the limited areas of HM fishing. Also, government of fellow SADC countries have a vested interest in the wellbeing of the Namibian HM resource, due to the importance of food security provided to the people of Southern Africa.	200 m and in fact both hake species are targeted in deeper waters than 300 m. As mentioned earlier, scale is important – the impact of the mining, assuming the mining is constrained to the areas stated, on the hake biomass in and around the 200 m depth contour is therefore in the context of scale, low. Your figure provided on the MFMR 2022 survey is noted but this does not alter the inference based on the 2020 information.  The scale effect is further shown by MFMR survey data integrated over depth zones – the figure below shows the concentration of biomass of shallow water hake around the 200 m depth zone and deeper. Regarding recruitment – this is an area also monitored by MFMR. Recruitment in fisheries can have different interpretations – normally it means when fish "recruit" to the fishery – in the case of hake Namibia assumes fishable biomass is >32 cm total length. Again, referring to the MFMR survey data and stock assessments there is no indication of failing recruitment though it does, as expected, vary from year to year (using long-term average as a baseline). Recruitment in fisheries is

Comments	EAP/Proponent and Specialists response
	associated with many factors, not least of which is climate variability and also maintenance of a strong spawning biomass – both of these factors were considered in the fishery assessment – again scale needs to put in context. Impact on recruitment as a result of mining is highly likely not significant if the total recruitment distribution in Namibian waters is considered as well as the multiple risks – this would apply to shallow water hake and also to horse mackerel.  *Figure 3.8: Density distributions (t/nmi²) of M. capensis (left) and M. paradoxus (right) from the Jan/Feb 2020 swept-area survey. Depth contours represent 100, 200, 500 and 1000 m depths.* **<u>Specialist Response – Wet Horse Mackerel Sector:</u>**

Comments	EAP/Proponent and Specialists response
	Regarding the "wet horse mackerel" sector – the assessor (fishery) is very aware of the issues regarding the fishery, its socio-economic objectives and the stock dynamics – e.g. the availability of HM large or small inside the 200 m depth contour. The evidence provided on the fishery over the last 4 years does not support the supposition that there is a significant overlap with the fishery – on the contrary it appears minimal. The stock dynamics of HM is such that the bulk of the biomass fished by both the midwater and purse seine is north of the mining area. Scale is important – any negative impact, if it may occur, is likely extremely low. The plume effect is localised and the plume modelling suggests the plume disperses – this effect on horse mackerel is deemed to be low. Horse mackerel are mainly filter feeders, with adults targeting increasingly with age, large prey and filter feeding becomes less important to the diet of adults. The very localised and limited scale of the mining (in time and space) is deemed low or negligible impact **<u>Specialist Response – Heavy Metal risk to Horse Mackerel resources:</u>** Impaired seafood quality requires that heavy metals that may be liberated from the mined sediment are assimilated by fish. This can be via direct uptake of dissolved heavy metals across gills and/or via diet. Both routes require that heavy metals are in the dissolved form. Elutriation tests on mine area sediments showed that minimal amounts (<1%) of particulate heavy metals are likely to enter the dissolved phase (Verification assessment, Section C, Specialist studies C2.1 Water Column and Sediments, Subsection 4.2.3). The horse mackerel diet is primarily crustacean zooplankton comprising copepods and euphausiids. The dietary route of dissolved metals would be via phytoplankton to zooplankton to fish. Zooplankton reduce metal body

Comments	EAP/Proponent and Specialists response
	burdens by ecdysis hence further limiting this pathway. Hence the probability of this occurring is low. **<u>EAP/Proponent Response:</u>** It is noted also that demersal fishing activities in this area will also be generating sediment plumes which represent a potentially greater risk, as the scale and impacts of these plumes on the marine environment and fish stocks has not been quantified by the fishing industry in Namibia. These impacts of the current demersal fleet comprising more than 90 registered trawlers, should be acknowledged in proper context with the proposed activities in ML170 as detailed in the ESIA. A study in a Norwegian fjord showed that a single 1.8 km long trawl pass created a 3-5 million m (3) sediment plume containing around 9 t contaminated sediment and that substantial amounts of bioavailable contaminants (PCDD/Fs and non-ortho PCBs) were released from the sediments (Bradshaw et al 2012). Similar impacts on sediment plumes, release of dissolved elements and related impacts on water quality and biogeochemistry have been noted in several other studies (Du Madron et al 2005, De Borger et al 2021)
Impacts on breeding juvenile fish stocks, the marine food chain in the water column including heavy metals, plume and potential noise impacts The NMP proposed mine is right on the 200m depth restriction, which large commercial fishing vessels are not allowed to fish inside, to protect the inshore breeding grounds for fish as well	**<u>EAP/Proponent response:</u>** It is noted also that demersal fishing activities in this area also operate right on the 200m depth line (isobath) and will also be generating sediment plumes which represent a potentially greater risk, as the scale and impacts of these plumes on the marine environment and fish stocks has not been quantified by the fishing industry in Namibia. These impacts of the current Demersal fleet comprising more than 90 registered trawlers, should be acknowledged in

Comments	EAP/Proponent and Specialists response
as grounds for juvenile fish to grow in a protected environment. The mining operation, both through dredging and releasing of fine sediments from the dredging vessel when loading the phosphate sludge will impact the water column. In the graph below the Ministry of Fisheries and Marine Resources hake stock assessment documents, MC21 and 22 in the top graph refers to Merluccius capensis breed and grow. With currents impacting the mining sediment plume, as well as noise from the mining dredging operation, the Namibian Hake Association is very concerned about the potential impacts on the hake resources. The lower graph, MP 21 and 22, refer to *Mercluccius paradoxus*, which breeds in South Africa and only comes to Namibia after reaching a certain size, going back to South Africa to breed off the West Coast of Hondeklip Baai	proper context with the proposed activities in ML170 as detailed in the ESIA. A study in a Norwegian fjord showed that a single 1.8 km long trawl pass created a 3-5 million m (3) sediment plume containing around 9 t contaminated sediment and that substantial amounts of bioavailable contaminants (PCDD/Fs and non-ortho PCBs) were released from the sediments (Bradshaw et al 2012). Similar impacts on sediment plumes, release of dissolved elements and related impacts on water quality and biogeochemistry have been noted in several other studies (Du Madron et al 2005, De Borger et al 2021). **<u>Specialists response:</u>** Please see the responses above regarding recruitment. The comment of "breeding juvenile fish stocks" is confusing as juveniles do not breed. While a higher proportion of juvenile fish is expected around the 200 m depth contour and shallower – the scale is again significant - the mined area is relatively small and is contained around the 200 m bathymetric. MFMR sampling data, as with similar trawl fisheries for hake, show that numbers of juveniles and other bycatch species are caught – while it is not the intent of the assessment to compare mining with fishing, the relative (cumulative) mortality of juveniles of most species in trawls and purse seines will undoubtedly exceed the impact of the mining significantly (this could for example be tested if a strategic environmental assessment were done which would, for example, help understand cumulative impacts, including mining fishing and other anthropogenic activities). The assessment undertaken also accessed both NORAD and MFMR survey data (though we were not provided with the most recent surveys) – Namibia does not do random depth-stratified surveys as is typically done in the counterpart fishery in South Africa. Fixed

Comments	EAP/Proponent and Specialists response
  *Figure 5 Depth-stratified biomass distributions for the two species of hake: M. capensis (top) and M. paradoxus (bottom) from the2021 and 2022 (bottom) swept-area surveys* Proportion wise, *M. capensis* dominates the two shallower depth zones (100- 300 m) while *M. paradoxus* dominates from 401 to deeper, with normally no *M. capensis* deeper than 500 m. The two species occur almost on an equal basis in the intermediate depths of 301-400 m. *Source: NatMIRC 2022 Hake Demersal Working Group*	transects are mostly applied so this assessment. In order to approximate the information that might apply to the proposed mined area, we used a number of the closest survey trawls that best approximated depth and proximity to the mined area (please refer to the fisheries report) – the catch composition and catch rate, in addition to the commercial data, allowed for the assessor to provide a balance between commercial and independent fishery data. These data are the best available and we are confident in our assessment of the likely impacts in and around the planned mined area. With regards to the impacts noted here on fisheries and fish, reference is made to the impacts assessed in sections 7.6.1 and 7.6.2 of the 2022 ESIA report. The comment on *M. paradoxus* is unclear – if recruitment does indeed come from South Africa waters and is mainly in deeper water (>300 m) why would there be an impact on the fishery from the mined area on deep-water hake? **<u>EAP/Proponent response:</u>** A sediment plume dispersion model was conducted by HR Wallingford in 2020 and is available as Appendix I. Conclusions drawn from this specialist report was included in the 2021/2022 specialist assessment reports for water column, sediments and benthos (Appendix E) and Fisheries, mammals and seabirds (Appendix F). This information was used in the 2022 assessment and outcomes per impact are discussed in detail in chapter 7 of the report, per respective section.

Comments	EAP/Proponent and Specialists response
Heavy metals such as Cadmium, as well as radioactive material such as uranium, have been found in the sediments of ML 170 area and their pollution impacts need to be well understood, as well as impacts of fine particles in the plumes.	**Specialists response:** Cadmium along with other metals is predicted to have a low bioavailability due to formation of sparingly soluble metal sulphides as AVS > SEM (Verification assessment, Section C, Specialist studies C2.1 Water Column and Sediments, Subsection 4.2.3). This is supported by negligible proportions of sedimentary metals entering dissolved phase on elutriation testing. **EAP/Proponent response:** The impacts on the water column have been assessed in chapter 7 of the ESIA report based off of the specialist study by Carter & Steffani (2021) (Appendix E), reference can be made to sections 7.4.2.1 (Dredging generates plumes of suspended sediments), 7.4.2.5 (Trace/metal toxicity at surface), 7.4.3.1 (Trace/metal toxicity on seabed - target dredge area trace metals are remobilized). The radiation component is further discussed in section 7.4.3.1. 'Further the potential for the radioactive mineral uranium and its associated radionuclides to be dispersed in the water column from the sediment was assessed. The total uranium concentration in the ore sediment was quantified during the test work for the Sandpiper Project as part of the pre-feasibility study (Bateman, 2011) and defined. The natural uranium content is determined to be low (~100 ppm), which is in line with other mined phosphate sedimentary deposits globally. Currently there is very little international and local information and studies available on marine radioactivity levels and their potential impacts on marine organisms.

Comments	EAP/Proponent and Specialists response
	Specialist response: However, uranium itself is largely inert (Gillian M. Stewart, Scott W. Fowler, Nicholas S. Fisher, 2008. The Bioaccumulation of U- and Th-Series Radionuclides in Marine Organisms, Radioactivity in the Environment, Elsevier, Volume 13, Pages 269-305, ISSN 1569-4860, ISBN 9780080450124, https://doi.org/10.1016/S1569-4860(07)00008-3. https://www.sciencedirect.com/science/article/pii/S1569486007000083) and should have no direct toxicity or bioaccumulation effects on such organisms **EAP/Proponent response:** Furthermore, there is no evidence in available published literature of any known detrimental effects on demersal fish as yet recorded from radioactive components being released into the water column as a result of trawling activities, which dominate the Namibian EEZ. However, it is acknowledged that radioactive elements exist in the seabed and uranium, thorium and their associated radionuclides will be included as variables in the baseline monitoring required in the EMP for the sediments and water column.'
The mining operation will release these metals because of the deep disturbance of sediments. The N17 area in the ML 170 from an international research cruise, has the highest levels of arsenic and cadmium of all 22 sites examined (Oranit et. al., 2018). Mercury is also measured in this report. Should these heavy metal levels increase above world food safety standards in Namibian fish marketed to international markets, the Namibian fishery could potentially be closed down overnight,	The impacts on the water column have been assessed in chapter 7 of the ESIA report based off of the specialist study by Carter & Steffani (2021) (Appendix E), reference can be made to sections 7.4.2.1 (Dredging generates plumes of suspended sediments), 7.4.2.5 (Trace/metal toxicity at surface), 7.4.3.1 (Trace/metal toxicity on seabed - target dredge area trace metals are remobilized). **Specialist response:**

Comments	EAP/Proponent and Specialists response
until heavy metal levels dropped below international food safety standard.	Metals will be suspended in the fine sediment discharge plume during ore recovery but are predicted to be sparingly soluble with a low bioavailability. The potential for additions to regional fish heavy metal contaminant body burdens is considered to be low.
Page 95 of the draft ESIA report states that " the sediments of the Namibian Continental shelf are characterised by elevated cadmium concentrations. It is suspected that residential demersal fish such as hake and monkfish would have elevated cadmium concentrations in their livers. Therefore, dredging operations would not have an effect on these species." There needs to be data to support this assumption. The fish swim in the water column where at this stage the sediment containing the heavy metals remains mostly undisturbed. If the mining operation digs up the sea bottom, releasing heavy metals into the water column consequently the food chain, the likelihood that heavy metal levels in fish will increase is potentially significant. NMP proposed to sample after the ESIA is approved but this is a high risk to the fishing industry and one that internationally would be unlikely to be accepted.	**Specialists response:** Bioaccumulation occurs mainly through feeding i.e. it is associated with the trophic structure of the fish communities and their prey. The mining area is localised and fish occurring in the area mobile and it is assumed will move clear of the disturbed area. It would be useful if the toxicity levels of the main commercial species sampled by the fishing sector can be provided as they need to be regularly tested for human consumption. This would allow for comparison in and around the mining area when mining occurs.
While the ESIA studies on the water column plume downplay the impacts, If 5 million tonnes of phosphate sludge are mined annually, NMP have stated that around 10% or 500 000 tonnes will be released by the dredging vessel. As fine tailings about 15 meters below the surface. With around 200 meters to the sea bottom, these tailings will impact the turbidity, change in light	Potential impacts of all aspects related to the proposed operations in ML170, including the water column and plume impacts have been addressed in accordance with the approved work scope for the Assessment Report. The comment is noted but there this claim is unsupported without a scientific study to counter the work conducted by the specialists HR Wallingford (2020) (Appendix I) and Carter & Steffani (2022) (Appendix E).

Comments	EAP/Proponent and Specialists response
levels in the water and heavy metal and radioactive material being released into the water column. As a consequence, these tailings will be disbursed much more than if they were placed near the bottom.	Reference can be made to 2022 ESIA report, chapter 7, section 7.4.2.1 Dredging generates plumes of suspended sediments, pg 138&139: 'Additionally, the potential operational mitigation measure of discharging the fine sediment plume at or near the seabed was considered. Dredging contractor JDN has advised that such measured are not routinely done for any of their international coastal dredging projects (JDN personal comms, 2022). For the current operational depths (200 m to 225 m) in ML 170, while it would be technically feasible, there is no clear evidence that it would have any substantial environmental benefits, considering that the current assessed impacts significance is low for plume dispersion and sedimentation and operational mitigation measures for fine sediment discharge are already being applied (environmental valve and discharge at -15 m depth). During dredging, there will be repeat traverses over the defined dredging lanes in order to mine to the required depth of sediment below seabed (leaving ~30 cm above the footwall) in the mine plan area. If fine sediment discharge is released at the seabed during the traverses, an amount of the fine sediment discharged would then fall back into the active dredge lanes and will need to be double handled and removed during the next traverse. Ore recovery efficiency would possibly be affected and reduced which would result in increased onsite dredging time and related fine sediment discharge. Comparisons when using an environmental valve of surface (40 m to 50 m depth), mid depth and bottom turbidity distributions against no valve, indicates an improvement in total suspended solids (TSS) concentrations in the surface layers to <7.6 mg/l but no or little change in the subsurface layers (HR

Comments	EAP/Proponent and Specialists response
	Wallingford, 2020). This is beneficial as the 1 % light depth would be around -50 m at this sediment concentration, therefore negative effects of reduced light levels on phytoplankton production should be mostly avoided. Also, as there is little or no change in the near seabed TSS load, it can be assumed that the sediment deposition would be similar between the valve and no-valve scenarios which, according to modelling, is predicted to be 0.3 mm or less per dredge cycle. This is a factor of 20 below the HL5 threshold of effects on marine benthos reported by Smit et al. (2008). Note that the environmental valve is recommended as a mitigation measure during mining operations. Whether such deposition patterns would occur with a near-seabed discharge is uncertain, as behavioural aspects of the discharge in terms of jet momentum, dynamic plume collapse, associated mixing with the receiving water body along with possible turbidity flows and local currents will affect deposition rates and distributions. This may result in considerably higher instantaneous sediment deposition thickness in places, possibly approaching centimeters, with correspondingly higher risks of negative effects on benthic macrofauna as Smit et al (2008) determined a median hazardous effect level (HL50) of 5.4 cm for instantaneous burial on benthos. Therefore, the environmental benefit of a near seabed fine sediment discharge is moot and will most likely not warrant the linked cost and potential operational risks and uncertainties (Carter personal comms, 2022).'
Another concern is potential algal blooms resulting from	The impacts on the water column and benthos have been assessed in chapter

Comments	EAP/Proponent and Specialists response
exposing the rock phosphate on the ocean floor, and the mining operations' sediment plume, fertilising the sea. NMP state that the 1.7 square kilometres of the seabed will be dredged every year. An algal bloom every year from their SP1 site. This area will become cumulatively bigger every year. An algal bloom will deplete the seawater's oxygen. Separately but also of real concern, Namibia as it expands its economy on the coast will need to rely on investigating more freshwater desalination plants. Any increase in concentrations of algae in seawater could pose a threat to the effective operation of a desalination plant.	7 of the ESIA report based off of the specialist study by Carter & Steffani (2021) (Appendix E), reference can be made to sections 7.4.2.4 (Nutrients (ammonium and phosphorus) added at surface promote phytoplankton growth), 7.4.3.2 (Sulphidic sediment pore-water is exposed by dredging, and the flux of dissolved H_2S into the lower water column is increased), 7.4.3.3 (Exposure of anoxic sediments by dredging reduces the already low concentrations of oxygen that occur in the lower water column), 7.4.3.4 (Removal of thio-bacteria mats by dredging increases the flux of H2S to the lower water column). 7.5.1.4 (Dredging removes mats of large sulphur-oxidising bacteria from the sediment surface and from the upper layer) and particularly 7.5.1.8 (Dredging may mobilise dissolved nutrients from the sediments which could be released into the water column). During the 2014 verification assessment, *in situ* sediment core and grab samples were collected to a depth of up to 2 m below seabed at 26 stations across the mining target area in SP1 and analysed at CSIR laboratories in Cape Town (Stellenbosch). The results verified the that at the time of the measurement of proxy variables, all measurements show that H_2S concentrations in the pore water were low. The measurements included indicators of the presence or absence of H_2S, through AVS, POM C/N, sediment pore water nitrate-nitrogen and sediment oxidation/reduction potential (ORP). Measured pore water volumes were also low, a variable likely to be stable over time in the subsurface sediments, and therefore even if H_2S concentrations were relatively high the mass flux to the adjacent water body would be low. Consequently, effects on resident biota would also be low (Carter in Midgely, 2014).

Comments	EAP/Proponent and Specialists response
	At the seabed, there are moderately high nutrient levels in the dredge area sediments (moderate nitrate-nitrogen and high phosphate-phosphorus concentrations) but generally low pore water volumes (~35 litres/m3 sediment) that could release nutrients when disturbed. The Redfield ratio measured was 8.2 vs 17.7 and the measured moisture content of the sediment was low. Therefore, nutrient loading to the euphotic zone through dredging will be unlikely. On completion of the 2014 verification assessment, the confidence level for this impact assessment was increased to high and remains unchanged for the current 2022 assessment (Carter & Steffani, 2021). The effects are local as the released nutrients will spread with the fine sediment discharge plume and are expected to be very short term as the fine sediment discharge plumes will only be generated during dredging which occurs within a 37-hour dredge cycle for approximately 16 hrs. Therefore, no algal plumes are expected to be created by the dredging activities. Additionally, the presence of anoxic sediments in the dredge area was not apparent from the available samples or indicated in the sediment properties measurements (Carter in Midgley, 2014). Additionally, the presence of large epibenthic organisms observed during the verification trawl survey in and adjacent to the mine target site indicate the absence of anoxic sediments (Japp in Midgley 2014). Therefore, the risk of reducing oxygen concentrations in the lower water column and potential effects on biota are considered unlikely. **Specialist Response – comment on "claim":**

Comments	EAP/Proponent and Specialists response
	Desalinated seawater intakes are by definition very nearshore, distant from the operations area. Possible nutrient additions from rock phosphate to the euphotic zone will be minuscule compared to upwelling supply. Further, phytoplankton production is considered to be nitrogen limited, in general, and silica limited for diatoms so phosphate supply should have negligible effect.
With reference to Appendix E on the water column sediments and benthos specialist study, benthic faunal recovery in the SP1 mining area draws on the analysis of faunal recovery of shallow water dredging with high oxygen levels-very different to the SP1 deeper water with lower oxygen environment.	*In situ* samples (macrofauna and meiofauna) were analysed in SP1 target area during the 2014 verification assessment, whereby conclusions were made by Carter & Steffani in Midgley (2014) and outcomes reassessed by Carter & Steffani (2021). Reference has only been made to diamond mining activities extending to 150 m water depth during the review of this impact (which has been well studied and documented by DebMarine with reference to Risk-Based Solutions (RBS), 2021), as recovery rates of benthic communities from dredging disturbance at water depths similar to the proposed SP1 mine area (190-225 m) in Namibia have not been reported.
Work by Jones et. al. 2017, relating to faunal recovery was quoted in Annexure E as suggesting levels of recovery often in 1 year, with some sites being over ten years. The project significance of removing benthic fauna is given medium. However, an explanation is requested as to why this is not severe? What was not quoted in the study was that Jones stated that very few faunal groups return to baseline or control conditions after two decades." Jones et. al. concluded that "it is our view that insufficient information is currently available to generalise the observed biological effects to the long terms, larger scales, greater disturbance intensities (e.g., From	Further details regarding the assessment of the significance of this impact can be referenced in chapter 7, section 7.5.1.1 of the 2022 ESIA report. The conclusions are drawn after applying the assessment methodology described in 7.3, table 17. 'The removal of the upper layer of sediment may have an adverse impact, that will be limited to the annual mining area and the duration will be long term to permanent, depending on whether functional or complete recovery is attained. Note: A recovery to pre-mining conditions is commonly defined as the recolonization of previously mined areas by marine faunal communities to the point that they can be considered to have an ecological function equivalent to those that exist in comparable undisturbed reference sites. This is deemed

Comments	EAP/Proponent and Specialists response
sediment plumes) expected to result from full-scale mining activities. Recolonisation of seafloor communities clearly scales dependant, such that recolonization of vast mined areas of seafloor impacted repeatedly by sediment plumes which require much greater time scales that recovery of the relatively small experimental disturbances reviewed here." A consequence of this is that any strips of seabed left unmined in SP1 to help facilitate fauna recovery, will be severely affected by the plume.	to be achieved when the communities have, after a number of years, reached a similarity to the undisturbed sites of at least 80% (MacDonald, L. and Erickson, W., 1994; Newell, R., Seiderer, L. and Hitchcock, D., 1998). The probability of the impact occurring is high probable/definite as this upper layer is required to be removed to mine for phosphate from the seabed. The sensitivity of the benthos will be medium and the magnitude of change serious effects, as communities will re-establish and function, but the assemblages might differ. The level of confidence remains high. The significance of the impact is moderate. Take note that the significance of the impact has decreased from the 2012 and 2014 assessments, after applying the quantitative scoring methodology as described in Chapter 6 for the previous assessments (major to moderate). This is possible to due to confidence in the assessment outcomes, professional opinion, approach to the methodology, in which the scale of extent was refined. In the 2012 and 2014 assessments, the impact was assessed on a larger scale (specific mine site i.e., SP1) and in the 2022 assessment the impact is assessed based on the annual mining area (up to 2.5 km^2 (average 1.7 km^2/year)).
The sediment plume model in Annexure I relies on a limited 3-month deployment of an instrument at one location to measure currents. There is also no data presented by NMP on natural sediment movement, suspension and nepheloid layers. These will be magnified by redeposition from the mining plume as lighter muds settle later onto the seabed surface. As	The sediment plume modelling is based on HRW's comprehensive database of ocean current data. The data recorded in ML 170 was used as calibration for the HR Wallingford the ocean current model for the annual and cumulative 20 year plume dispersion modelling. **<u>Specialists response:</u>**

Comments	EAP/Proponent and Specialists response
consequence, turbid plumes can remain active during shelf break dissipation events, storms and other long period activity.	A minor fraction of the deposited material from the sediment plume may be resuspended by bottom mixed layer turbulence and incorporated into the nepheloid layer with a possibly wider deposition footprint. As the nepheloid layer is reported to be extensive on the Namibia continental shelf (Inthorn et al 2006) the contribution of resuspended material from overspill plume deposition will be an infinitesimally small proportion of the mass of the fine particulates transported off the continental shelf. Consequently, any far field deposition effects on benthos are predicted to be similarly small (Appendix-E, section 3.5).
Deposition of sediments in adjacent areas is a major concern for deep ocean mining. Mining deposits will be more susceptible to erosion and continues travel. Every effort should be made to discover available turbulence and sediment data to incorporate into the current models. This also brings to question what impacts will there be on nearby fish breeding and nursery grounds, as well as cumulative impacts if mining is expanded into SP2 and SP3 areas.	**Specialists response:** The HR Wallingford modelling employed a range of data bases and global models for the modelling exercise with the current data measured in ML 170 being used for calibration. It is considered to be robust. Sediment properties were taken from the extensive NMP data set derived from cores spread across the ML 170 area and the sediment sampling conducted as part of the verification study (Appendix-N-2014) to characterise the pre-mining sediment body. **EAP/Proponent response:** The potential impacts on fish has been discussed in chapter 7, section 7.6.2 of the 2022 ESIA report and in the specialist study of Japp (2022) (Appendix F). Data was sourced from the Ministry of Fisheries and Marine Resources and the transboundary survey undertaken through the FAO/NORAD programme (Boyer et al., 2019).

Comments	EAP/Proponent and Specialists response
	The cumulative impacts of mining have been discussed in the 2022 ESIA report with reference to chapter 7, section 7.10.2.9 (Dredging in SP2 or SP3 at the same time as SP1 - disturbance to the fish). This environmental clearance certificate application for mining activities is for SP1 only. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates. Please refer to the earlier responses regarding fish breeding and nursery areas.
Previous questions about lack of microbial studies have also not been answered as plumes are not the only issue.	It is noted that microbial studies have been addressed in the current assessment process. This impact is further addressed in the 2022 ESIA report in chapter 7, sections 7.4.3.4 and 7.5.1.4. Additionally, the independent review by Payne (2022) supports the conclusions made (Appendix G, pg.4) by Carter & Steffani (2021): 'Surficial organism removal (and notably of mats of sulphur-oxidising bacteria, crucial to oxidising toxic H_2S) will take place, but studies have shown such organisms not to be very common around and at the SP1 site. The significance rating of this subject to operational activity is not high, but monitoring pre-operation and regularly thereafter is recommended and supported.' **<u>Specialists response:</u>** Large sulphur oxidising bacteria were not represented in the sediment samples analysed that were taken from the surficial layers of sediment cores (Verification assessment. Appendix-N-2014, Section C2.3). However, as other oxidising species were present, there is a potential for Beggiatoa,

Comments	EAP/Proponent and Specialists response
	Thiomargarita, Thioplaca to colonise SP1 sediments. The varying migration within the sediment body will be taken account of in the environmental baseline update and monitoring programmes.
Noise disturbance of the marine environment is also a major concern to the fishing industry. Large fish can swim away, but how will this impact and potentially disrupt their breeding cycle given that they currently breed inshore of the proposed mine site? And juvenile fish which are particularly vulnerable to changing environmental conditions, are not able to swim away. Different fish also respond to different sound frequencies. Sound effects are given a low significance in the ESIA and review comments indicate sound measurements can only be carried out once the dredger is actively operating onsite on ML170. This response by NMP does not give the fishing industry and sense of security or peace of mind. Williams et. al. 2022, from a study by scientists for Ocean Initiative, the national institute of Advanced Industrial Science and Technology in Japan, the Curtin University in Australia, and the University of Hawaii, found that noise from one mine alone could travel approximately 500 kilometres in gentle weather conditions, creating a "cylinder of sound" from the surface to the seabed, with cumulative impacts likely in places where multiple mines operate. It is also noted that although mining companies	The associated potential impact was assessed in 2012 and reassessed in 2014 during the verification programme, whereby infield surveys were conducted (Japp in Midgley 2012 and 2014). As part of this current assessment report, the appointed specialist Japp (2022) has expanded the baseline information and re-assessed the potential impacts accordingly, per species group (Appendix F). Additionally, Carter & Steffani (2021) have assessed the potential impacts of noise in their specialist study for this assessment (Appendix E), which includes new quantitative noise generation and attenuation data for dredge vessels operated by the dredging contractor JDN (Appendix K). Results from this study are for a similar dredging vessel that will be used for mining activities in SP1. However it is further recommended as part of the monitoring program for additional direct noise measurements to be taken when the dredger is operating and has been included in the EMP as such. Reference can be made to chapter 7, section 7.6.4.1 in the 2022 ESIA report. Measured underwater sound (SPL) source levels for an operating TSHD in the Jan De Nul fleet are 180-190 dB re 1 µPa at 1 m, dominant sources are main engine (500 Hz) and propeller (300 Hz). (Pg213) 'Carter and Steffani (2021). Modelling indicates that attenuation to 100 dB re 1 µPa at 1 m will be attained

Comments	EAP/Proponent and Specialists response
are already testing smaller-scale prototypes and deep-sea mining systems, they have yet to share data on underwater noise pollution. So, the science article had to use noise levels from better studied industrial activities, including "coastal dredgers". It's also noted the science study joins a growing body of research where a number of countries, experts, corporations and environmental organisations are calling for a halt to any seabed mining, until science and management can be put in place that ensure that mining will not cause harm to the marine environment. The study "highlights how much remains unknown about mining's potential impacts, not just on deep ocean, but throughout the water column (University of Hawaii at Manoa, July 7, 2022).	at an average range of 15 km while received sound levels ≥130 dB will be restricted to within a radius of 2 km to 3 km from the operating dredger. **<u>Specialists response:</u>** Sound receptors in the operations area will be mainly cetaceans, seals, and fish. Temporary (hearing) threshold shift (TTS) in cetaceans and seals are reported as being 175 dB re 1μPa at 1 m SPL received level and above. Mortality can be caused in fishes at SPL >207 dB re 1μPa at 1m for fish with swim bladders and >213 for fish without bladders, TTS thresholds are ≥186 dB; mortality in fish eggs and larvae can occurs after exposure to 207 dB. Mortality or potentially mortal injury to sea turtles can follow exposures to similarly high SPLs. Given the dredger sound source level (above) such effects are unlikely. Received sound level thresholds causing moderate behavioural shifts for baleen and odontocete cetaceans and seals range from 130 to 180 dB re 1μPa at 1 m. Modelled sound attenuation for the TSHD Gerardus Mercator provided by Jan de Nul (Jan De Nul N.V., 2020) indicate that received sound levels >130 dB will be restricted to within a radius of 2-3 km from the operating dredger while sound levels >150 dB will be restricted to within 100 m. The sound levels are in all cases far below those which would or could pose any threat of injury to marine life. **<u>Specialists response:</u>** Thank you for your concerns relating to sound effects and their low significance rating. We would ask in addition to the information provided in the assessments, that you compare impacts related to seismic surveys and the

Comments	EAP/Proponent and Specialists response
	extensive research undertaken on threshold levels for fish with and without swim bladders and the horizontal distances from sound source (see the table below extracted from SLR, 2021 for example). Noise associated with shipping, dredging and other maritime anthropogenic activities occur throughout the marine environment – this is not to say there is no impact – however many "noise" types affect the overall ambient noise levels in the ocean. With some "sound" such as the seismic air guns will have much higher intensity and sound sources than for example dredging or fishing operations. The impacts on fish of dredging operations is highly unlikely to be anywhere as close to the thresholds as suggested in the table below, which supports the work done by Carter and Steffani (2021). Table 4.6: Zones of immediate impact from single pulses (2D / 3D seismic airgun arrays) for mortality and recoverable injury for fish, fish eggs and fish larvae (SLR, 2021). **Type of animal** — **Zones of impact – maximum horizontal distances from source to impact threshold levels** **Mortality and potential mortal injury** — Criteria - Pk SPL dB re 1µPa; Maximum threshold distance, m **Recovery injury** — Criteria - Pk SPL dB re 1µPa; Maximum threshold distance, m Fish: no swim bladder (particle motion detection) — > 213 — 70 / 80 — >213 — 70 / 80 Fish: swim bladder is not involved in hearing (particle motion detection) — >207 — 140 / 160 — >207 — 140 / 160 Fish: swim bladder involved in hearing (primarily pressure detection) — >207 — 140 / 160 — >207 — 140 / 160 Fish eggs and fish larvae — >207 — 140 / 160 — - — -

Comments	EAP/Proponent and Specialists response
Deep sea mining definition and the need for clarification on the term dredging with regards to the NMP operation NMP says that dredging for marine phosphate is on the continental shelf and a shallow water operation. Mining of phosphorites when below 200m is considered deep sea-mining. Phosphorites have been considered for deep sea resource extraction along with cobalt crust, polymetallic nodules and massive sulphides (Levin et.al., 2016). From an international definition's perspective, all mining deeper than 200meteres is considered deep sea mining and due to the Namibian 200-meter depth contour protecting fish breeding and nursery zones inside this depth, NMP will be mining in waters deeper than 200 meters. Due to the Benguela Current being very nutrient-rich, visibility and the ability for sunlight to penetrate the water below the surface reduces quickly with depth. In other words, the Namibian marine environmental ecosystem becomes deep quickly, also impacting water temperatures, food supply as well as animal taxonomic composition, morphologies, lifestyles and body sizes (Bindoff et.al., 2019). Also, the use of the term dredging by NMP deflects from the reality that this is a full-scale mining operation. Dredging is	No definitive reference has as yet been provided clearly articulating the justification for the application of the nominal depth of 200 m and the definitive criterion for classifying deep-sea mining. By application of this nominal criterion, the demersal hake and monk fisheries in Namibia which are conducted in 200-600 m water depth, would then also be classified as deep-sea trawling. Additionally, the recent oil and gas discoveries off Namibia earmarked for development would equally be classified as deep-sea mineral resource extraction. Deep sea minerals (polymetallic nodules, cobalt crusts and seabed massive sulphides) occur in deep sea environments which are located on the continental slope, continental rise and abyssal plain in water depths of 800 m to 6000 m typically in international waters. They do not occur on the continental shelf which typically lies within the Exclusive Economic Zone, which is where the Namibian marine placer deposits of phosphate are found and ML170 is located. The continental shelf off Namibia is one of the widest continental shelves in the world (Bremner 1981) with the continental shelf break occurring over 100km from the coast off ML170 at a depth of approximately 350-400m m at an average gradient of 0.16 degrees. As such the Namibian marine environmental ecosystem does not become deep quickly as stated. The seabed on the continental shelf off Namibia at water depths of 200 to 600m has been subjected to many years of extensive and repetitive bottom trawling operations and as such no longer represents a pristine seabed environment. **<u>Specialists response:</u>** This includes the deepwater fishery for orange roughy which focused on hard grounds and unlike in some other parts

Comments	EAP/Proponent and Specialists response
usually undertaken to remove unwanted sediment in harbours etc. The operational standards used to manage a harbour dredging operation, are quite different to the significant implications of mining marine phosphate. In the case of NMP, it will be removing the top 2.5 – 3m of the seabed, which will have a significant effect, impacting substrate type, grain size, water content, geochemistry of sediments and porewaters, water flow, pH, oxygen and suspended sediments among others.	of the world e.g. New Zealand, these deepwater species are caught in relatively shallow water on the Namibian continental shelf. That fishery has been suspended as the resource has been depleted to an extent that it is no longer commercially viable and the spawning aggregations on which the fishery depended have declined i.e. recruitment failure primarily due to unsustainable fishing pressure. **<u>EAP/Proponent response:</u>** Stakeholders have been correctly informed that the application relates to the proposed mining activities in Mining License ML 170 and the information presented in the ESIA is accurate. To be clear, mining is the extraction of valuable minerals or other geological materials from the earth, usually from an ore body, lode, vein, seam, reef, or placer deposit. Dredging is the primary mining method utilised in seabed mining for recovery of mineralised ore or sediments for processing and recovery of the targeted mineral (s). Dredging is a process utilising some form of suction for of removing sediments from the bottom of a body of water and transporting the material to the surface. Different types of dredging equipment and vessel are used. Marine diamond mining utilises specialised crawler mounted dredging equipment and vessels. The proposed marine phosphate mining will utilise a standard trailing suction hopper dredge.
Meeting international marine mining standards/guidelines versus Namibia's local standards	The comment that "*Namibian Marine Phosphate appear to want to avoid being accountable to international mining environmental standards. Why is that?*" is factually incorrect and misleading. As proponent, NMP is required to comply

Comments	EAP/Proponent and Specialists response
Namibia is a signatory to international agreements such as the United Nations Law of Sea agreement (UNCLOS), which covers both international waters and waters within national jurisdiction, following the precautionary principle. On page 34 Table 3 with reference to the territorial Sea and Exclusive Economic Zone Act no.3 of 1990, the draft ESIA states that Namibia legislation regulated the activities of proposed exploration and mining projects that fall withing these areas and "not" international guidelines or standards. Then with reference to UNCLOS on page 44, this "provide an international legal framework to govern the seas and oceans of the world. Namibia as the designated State is required to administer exploitation, protection and preservation of the marine environment and natural resources on the Namibian Continental Shelf and Exclusive Economic Zone by enforcing the State's specific regulatory requirements for preventing pollution and damage to marine resources." NMP then reinforce this on page 124 of the draft ESIA by stating that "The proposed Sandpiper Project is located on the Namibian continental shelf in water depths of less than 300m and which is deemed national jurisdiction falling within the Namibia Exclusive Economic Zone (EEZ) which extends to 200 nautical miles (370.4 km) offshore. This is consistent with the	the Laws of Namibia and any related international laws which prevail within Namibia's Exclusive Economic Zone (EEZ). The comments relating to Nambia's legal framework and related obligations under UNCLOS and applicable international law, is a matter of governance which is falls under the authority of the Namibian government and not that of the Proponent. The proposed Project in ML 170 is not a "deep sea mining" project and Namibia does have current environmental, fishing and mining laws and regulations in place, which have served to govern the fishing and marine diamond mining operations undertaken within the Namibian EEZ and territorial waters since independence in 1990. NMPs' ML 170 and the Sandpiper Project falls within the continental shelf of Namibia and in the EEZ zone. It does not lie withing the jurisdiction of the high seas under the authority of the International Seabed Authority. As noted the provision of Territorial Sea and Exclusive Economic Zone Act No.3 of 1990 apply in this regard, as to the provisions of the Minerals Act 1992 and Environmental Management Act 2007, all of which the proponent is compelled to comply with. As such the proponent is not avoiding any accountability under the relevant legislation covering ML170. The project is located on the Continental Shelf at water depths of 200-225m and does not target the extraction of deep sea minerals (cobalt crusts, manganese nodules or seabed massive sulphides). Regarding the adequacy of Namibian legislation , the Chamber of Mines, Namibia notes:" *CoM strongly rejects these insinuations as it implies that the Namibian Minerals (Exploration and Mining) Act 1992 ("Minerals Act 1992"), the Environmental Management Act (2007),*

Comments	EAP/Proponent and Specialists response
definitions and provisions of the Territorial Sea and Exclusive Economic Zone of Namibia Act, Act 3 of 1990, whereby international laws are not applicable, and Proponents are required to comply with the required Namibian regulations. At the international conference in Jamaica during July and August 2022, Senator Johnson Smith, with reference to the Montego Bay Convention (UNCLOS), stated that it serves as best which the "Interest of humanity have been elevated above State sovereignty and national interest and codified in international law' (Smith, A.August 2, 2022). The international Seabed Authority (ISA) has set out a mining Code comprising a comprehensive set of rules, regulations and procedures issued by ISA to regulate prospecting, exploration and exploitation of marine minerals in the international seabed "Area". All rules, regulations and procedures are issued within the general legal framework established by UNCLOS, in particular its Part XI on the Area, and its 1994 Agreement relating to the implementation of part XI of UNCLOS. Given that Namibia has obligations under UNCLOS, proper deep-sea mining regulations need to be drawn up, including applicable international law. Namibian Marine Phosphate appear to want to avoid being	*and the Namibian Territorial Sea and Exclusive Economic Zone of Namibia Act 3 1990 are deficient in their legislative function and that seabed mining is currently being conducted illegally as a self-regulated industry, being without a proper legal regulatory framework. The truth is that these Acts are well constructed and gazetted with very stringent contractual obligations placed on the proponents* (CoM media statement 2021).

Comments	EAP/Proponent and Specialists response
accountable to international mining environmental standards. Why is that?	
Socio-economic assessment of marine phosphate mining The August 2018 report by Stratecon on the Economic Assessment of the development of a Phosphate-Based Industry in Namibia, Appendix L, is based on assumptions which need to be challenged. The Stratecon Report sets out to analyse the economic benefits that could accrue to Namibia from opening country to an incipient phosphate industry. Stratecon recognises that a complete industry is not set up overnight, it is a process which evolves over time, yet in this study it is assumed to commence mining in 2012 and culminating in an integrated fertilizer industry by 2016. If one considers that Namibia Marine Phosphates, on whose request the Stratecon Report was conducted, in its terrestrial scoping report for the sandpiper project published in 2012, clearly sets out that it will require three years to ramp up its production to reach its target output of three million tons of final product annually, then one must question how realistic it is to assume that Namibia will have an integrated phosphate industry within four years.	The 2012 scoping report which is referenced in the comments provided, is superseded by the 2022 scoping report which forms part of the current application. The 2018 Stratecon report assesses the potential socio-economic impacts of a phosphate based industry in Namibia. The study is based on an assumed start point for production of phosphate in Namibian based on the companies holding mining licences producing at their projected production levels. The study does not address the Sandpiper Project specifically nor has it been presented as representing the project and is not specifically linked to at a project level to any related timelines. The comments therefore have no bearing on the overall objective of the Stratecon Report and the stated objectives thereof. Stratecon (formally Economics Information Services) is a company specializing in economic impact assessments and applied economic modelling. Stratecon has performed economic feasibility assessments for several government departments throughout Southern Africa as well as large private corporations. The 2018 Stratecon report was prepared by accredited specialists and has been independently vetted by the Chamber of Mines Namibia.

Comments	EAP/Proponent and Specialists response
The Stratecon Report states that: "The industry would expand in discreet steps as cost and market information becomes more certain within the Namibian context. First, there would be need for dredging and basic beneficiation. Firms would need to establish plants and secure markets for these products. This could be followed by additional beneficiation, which would also need additional expenditure on factories and securing of markets and then there is, finally, the option to expand into advanced levels of beneficiation." NMP in its Sandpiper Scoping Report 2012 states clearly that: "intention is to mine these deposits proven deep-water dredging techniques. The material will be transferred to shore at Walvis Bay, where minimal beneficiation is required to separate the phosphate sands from other marine sediments. The processed product is exportable in a particular form as "phosphate rock" concentrate, which is sufficiently reactive that it can be applied directly to the soil to assist plants to grow." It is apparent that the benefit of the Namibian phosphate deposits is that the mined material can, with a minimum beneficiation, be turned into a product there is a big demand. While the Sandpiper Project makes no commitment to further beneficiation other than producing rock-phosphate for fertilizer,	The Stratecon report is presented in Appendix L and notes as follows *"This research has been sponsored by NMP and covers a statistically developed hypothetical case study based on the development of an integrated fertiliser industry through the dredging of phosphate rock from the known resources along the Namibian Coast. Detractors may find motivation for inferring reporting bias. This is to be expected but there is no intent of bias from the authors. The authors hope that policy makers will recognise the potential importance of the available opportunity. Stratecon accepted this assignment on the clear condition that the research direction and scope would be dictated by ethical considerations and not by the wishes of the sponsors. This was accepted by NMP. Stratecon has no financial interest in NMP, LLNP or phosphate in Namibia".*

Comments	EAP/Proponent and Specialists response
the Stratecon study paints a picture of a fully developed phosphate industry. Phosphate and macro-economic indicators show an increasing GVA from " further beneficiated products" for the period 2012- 2016. Where does this increase come from? Have other operators appear out of the blue?	
Let us now take a look at some of the other benefits quoted in the Stratecon Report: ❖ Dredging Dredging of the phosphate deposits occurs at depths of around 200 meters. Dredging at that depth is a highly sophisticated operation requiring specialists in the field. The amount of trailing suction dredgers capable of working in this depth is limited to a very small number of specialist companies mainly from Belgium and Holland. These vessels will need to be chartered at a fee to be paid in US dollar, which will require large amounts of foreign reserves. ❖ Productivity gains in subsistence agriculture would have been boosted from 2010 With the project starting in 2012 we fail to see how productivity could have increased since 2010? Fertilizers including phosphate are available in Namibia and if subsistence farmers have not made use of them in the past why	Above comments refer. The Stratecon report is not linked or based specifically on NMP's project or any project related timelines. The Stratecon report has been compiled by qualified reputable professionals to assess the potential for development of a phosphate based industry in Namibia (not for NMP's project) and has been independently reviewed by the Chamber of Mines and other agencies. Chamber of Mines Namibia advise that for every 1 mining job there are 7 additional jobs created.

Comments	EAP/Proponent and Specialists response
would they now apply them once Namibia has phosphate mining? To claim responsibility for potentially doubtful gains in subsistence farming is far-fetched and not plausible! ❖ The data by Stratecon would like us to believe that phosphate mining will create 5 308 jobs in in the first year of operation rising to 18 900 in year four Sandpiper in their Scoping report 2012, put their full-time employee requirements as first-year 54, rising to 86 in year two with a final figure of 135 to produce 3,000,000 tons of rock phosphate! While there is talk of another 400 or so people, this is understood to just be in the construction phase. If we employ the Social Accounting Matrix as used by Namibian economists, then one new job will create 3.8 jobs in other industries, which means that phosphate mining will add to another 513 jobs in other sectors. <u>New jobs and induced jobs by phosphate mining will amount to 648 people</u>! We are at this stage dealing with one potential mining operation, but even if two or three additional mines were to start up, the labour requirements would be in line of those of Sandpiper, and nowhere near what is quoted in the Stratecon Study. Phosphate mining is a highly industrialised operation where	

Comments	EAP/Proponent and Specialists response
machinery plays a bigger role than people. Further beneficiation of the rock phosphate is an industrial/chemical process which requires a small amount of highly qualified operators and technicians to manage the process. The Stratecon Study, for obvious reasons, gives an overrated labour requirement to make phosphate mining be seen as the solution to the unemployment in the country, which is a false picture! A socio-economic analysis of benefits gained from phosphate mining by the Sandpiper Project should concentrate on the activities proposed by the project, and not be based on a possible scenario which might arise from mining. The potential scenario is based on an assumption of factors over which the proponents of the Sandpiper Project have no control. All too often international mining companies have made promises to Government that further beneficiation of the minerals will be undertaken in the country, but in the end, Africa always ends as raw material supplier and the beneficiation of the ore, jobs and profits are generated in the Northern hemisphere or the Far East!	
The Jan De Nul N.V. socio economic specialist study on the assessment of dredging works, Appendix H, provided	Infrastructure investments fall under the responsibility of the Proponent and not their contractors and/or sub-contractors. For the mining operations at sea,

Comments	EAP/Proponent and Specialists response
information on the JDN-scope which consists of a dredging vessel mining phosphate sand, a land-based buffer pond, an associated workshop, and a JDN Project Operations Support Office in **Walvis Bay, Namibia**. Paragraph 2.1.4 of the report states that: In the current project set-up, no infrastructure investments within the JDN scope are foreseen. As dredging provides raw material faster than processing can work it away, the dredger will be discharging its load into buffer storage from which the processing plant then will draw its raw material as required. It is planned to utilize the dredger for three months in the first year, six months in year two and, once the plant is fully operational, for nine months of the year. The dredger required will be chartered by Sandpiper from Jan de Nul for the required period, after which it departs to other dredging projects around the world. In the current project set-up, no local shareholders within the JDN scope are foreseen (paragraph 2.1.5) and, therefore, no profits retained and distributed to local shareholders and no taxes paid. Charter fees will be payable by Sandpiper in US Dollars, as is customary in the dredging industry. Deep-water dredging is a highly specialised sector of the dredging industry, and JDN will be providing the vessel with an	a land-based head office and a workshop is required. The buffer pond and further land-based infrastructure do not form part of this assessment report. JDN have been chosen as the dredging contractor due to renowned international experience in dredging and the suitability and availability of their vessels. The vessel is expected to remain in Namibian waters during the operational and shift change activities, and maintenance will take place in the Walvis Bay port. As per the current labour plan for operational activities, it is required for 40 local employees to operate on the vessel in shifts. Reference needs to be made to section 7.8 of the 2022 ESIA report, which discusses the potential economic impacts. The following sections are highlighted; 7.8.2 (Impacts to tourism), 7.8.3 (Impacts to local businesses), 7.8.4 (Impacts to NamPort), 7.8.5.1 (Impacts due to employment and job creation) and 7.8.6 (Impacts to gross domestic product).

Comments	EAP/Proponent and Specialists response
established, fully qualified crew, more so as the vessel will not be spending the entire year working in Namibia. Being a Belgian company, crew on board are recruited under European Union standards and mostly drawn from Europe. On completing their tour on board, the crew members are flown home to spend their rest period with their families. Support services of the local industry will be limited to providing provisions and crew transfers. The vessels are registered under a European Union flag and will obtain international bunker fuel which is duty-free, therefore, no taxes for the Namibian Government. Dredging supplies are highly specialised and not readily available in Walvis Bay, so it can be expected that the JDN head office will be shipping what is required out of Belgium. The impact of the dredging operations for phosphate will have a limited direct impact on the Namibian economy, but will require substantial funds to acquire foreign currency to pay the charter fees in US Dollars.	
NMP Environmental Management Plan This appears to be very self-regulating, which raises concerns in	The comments provided address matters of legislation and policy which lie outside of the authority of the Proponent in regard to this application. The comments are noted as opinion.

Comments	EAP/Proponent and Specialists response
terms of accountability from the perspective of regulating your operations. Is there a clear reporting structure including necessary regulations, and are there strict standards for non-compliance? Self-regulation contains inherent conflict of interest. Dr. Bjorn Serigstadt of the Institute of Marine Resources in Bergen, Norway, stated that when oil and gas was first discovered in Norway, industry undertook self-regulation. It was quickly realised, however, by the Norwegian Government, that the Government needed to organise independent environmental monitoring, and not the commercial industry, to endure accountability. Also, adaptively managing marine mining environmental impacts is very risky, because problems do not surface immediately in an ocean environment, but once they do, turning around the impacts of the harm done can take many years, if it is even possible to do so, as it may have caused an ecosystem regime shift.	Regulation of mining activities falls under authority of the Ministry of Mines and Energy, regulation of environmental matters falls under the authority of the Environmental Commissioner and the Minister of Environment, Forestry and Tourism. The proponent has no authority over regulation, only over management of its operations. The Environmental Management Act 2007 is designed to address these issues as noted including the requirements for drafting of Assessment and Environmental Management Plan and related statutory reporting of environmental monitoring results required for renewal of clearance certificates on a 3 yearly basis. Under Namibian law, the proponent is required to follow the defined processes. The Chamber of Mines has previously addressed the allegation by CNFA that the mining industry is self-regulating and the laws of Namibia are inadequate for regulation of seabed mining. Regarding the adequacy of Namibian legislation , the Chamber of Mines, Namibia notes:" *CoM strongly rejects these insinuations as it implies that the Namibian Minerals (Exploration and Mining) Act 1992 ("Minerals Act 1992"), the Environmental Management Act (2007), and the Namibian Territorial Sea and Exclusive Economic Zone of Namibia Act 3 1990 are deficient in their legislative function and that seabed mining is currently being conducted illegally as a self-regulated industry, being without a proper legal regulatory framework. The truth is that these Acts are well constructed and gazetted with very stringent contractual obligations placed on the proponents* (CoM media statement 2021).

Comments	EAP/Proponent and Specialists response
	The Environmental Management Plan is a legally binding document approval for rests with the environmental commissioner and includes regular statutory reporting to the Ministry of Environment, Forestry and Tourism for assessment and consideration for renewal of environmental clearance certificates every 3 years. . The Proponent has complied with the requirements of the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations, whereby an environmental management plan is required to be produced based off of the environmental impact assessment outcomes.
Review of Appendix N in the ESIA downloads (although not listed in the draft ESIA) – 2014 NMP Verification Study This is a key document forming baseline information for the ESIA of well over 1,000 pages of scientific reports, which should be listed in the ESIA contents pages, and currently is not, although it has been supplied as one of the download documents for ESIA assessment. The following are a compilation of comments from international expert scientists, who over a short period of time, did their best to review the Verification Study. 1. Overall Assessment Summary Tables that assess significance of impacts have down weighted the majority of impacts. In some cases, this is because they compare the scale of one	This comment is not correct, see image below of appendices in the 2022 ESIA report issued to I&APs: **APPENDICES** Appendix A – Environmental Management Plan ..... 264 Appendix B – Public consultation document ..... 265 Appendix C – Addendum report ..... 266 Appendix D – EAPs Cvs ..... 267 Appendix E – Specialist study BY Robin Carter ..... 268 Appendix F – Specialist study By Dave Japp ..... 269 Appendix G – independent REVIEW BY Andy Payne ..... 270 Appendix H – JDN socio-economic Specialist study ..... 271 Appendix I – Plume dispersion model Supplementary study ..... 272 Appendix J – Toxicity Supplementary study ..... 273 Appendix K – Noise modelling Supplementary study ..... 274 Appendix L – Phosphate industry socio-economic Supplementary study ..... 275 Appendix M – Scoping report MEFT letter of acceptance ..... 276 Appendix N - 2014 Verification study ..... 277 As per the ruling of the high court in June 2021, the previous application

Comments	EAP/Proponent and Specialists response
mining site to the entire Namibian coastline. This is not right. The impact should be assessed for the mining site and impact area. The Verification Study defines impact as being "high" if ecosystem functions cease. There is a need to undertake a proper assessment of environmental sensitivity to impacts. Where there are shown to be impacts of any significance in the Verification Study, no mitigation measures are offered. In other words, if the environmental clearance goes through based on the current Assessment Table grading's, Namibia Marine Phosphates (NMP) will not be accountable for any marine environment damage, unless it can be shown that the mining is causing irrevocable harm. All environmental impacts should consider those in the entire Mining License Area (MLA), not just SP-1 where they intend to start mining, as there is no guarantee that future mining will not expand to other areas of the MLA. On page 20 of the 2022 draft ESIA, NMP state that other sites SP2 and SP3 also contain phosphate resources, and may be considered at a later stage.	submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. This included reviewing and refining the assessment methodology (chapter 6, chapter 7 section 7.3 and 7.6), particularly with reference to scale. Mitigation measures are discussed in chapter 7 where appropriate to the rating outcome of the sensitivity of the impact and are further included in the updated EMP (Appendix A). This environmental clearance certificate application for mining activities is for SP1 only. If mining was to occur in SP2 and/or SP3, separate ESIA processes will need to be conducted for the application for separate environmental clearance certificates, as per the Environmental Management Act, No. 7 of 2007. Therefore impacts are correctly assessed for the SP1 mining area.
2. With regards benthic biota, the Verification Study states, "the removal of the upper 1 to 2.5 metres (possibly up to 3 metres) of sediment by dredging will result in the loss of the benthic biota associated with the sediment. The exposed sediments are likely to be different to the original superficial deposits, and sediment	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot.

Comments	EAP/Proponent and Specialists response
refill rates at this depth are likely to be very slow. Colonising assemblages are likely to differ to those present prior to the dredging activity". This means complete loss of benthic biota and regime shift likely / certain. Epibenthos are shown in the Verification Study to include large numbers of structure forming individuals - ascidians, sea pens and sponges. These provide nursery grounds and refuge for demersal and benthic fishes and fish larvae. They are also considered vulnerable marine ecosystems (VMEs) and in international waters have a protected status. Given the absence of knowledge about the location of early life stages of Monkfish and Goby, which occur in this area, it seems that the potentially highly significant role of the epibenthic invertebrates with regards to fish and biodiversity should be examined. There really needs to be remotely operated underwater vehicle (ROV) surveys to visualize these ecosystem engineer species, and appropriate sampling (e.g., to see if fish larvae are living among sea pen tentacles, and juveniles in sponges). The high incidence of monk juveniles in the Verification Study sample trawls, suggest there can be a key relationship. It would be important to consider a thorough ROV benthic survey with an eye to creating protected habitats that help sustain the fisheries.	It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Further details regarding the assessment of the significance of this impact can be referenced in chapter 7, section 7.5.1.1 of the 2022 ESIA report. In the specialist report (Appendix E) by Carter & Steffani (2021) it was concluded that a conservative approach is required. Additionally, the methodology to be used for future surveys for the environmental monitoring programme have been discussed in Appendix E and included in the EMP (Appendix A) under Table 2 and section 7.5 in detail. **<u>Specialists response:</u>** Your comments on ascidians and other species associated with the verification survey is interesting. Please review our fishery assessment. We compared our results with the data recorded by the nearby NORAD and MFMR surveys. It is clear that these surveys record similar fish and benthic species – but what is clear is that the monk gear used also gets higher quantities of certain benthic species. These species as well as those recorded by the surveys one would assume are typical of trawls for monk and hake. It is our view that the grounds tested (verification survey) following a random selection process in a relatively small area, is representative of the flora and fauna in the mined area. The high volume of ascidians is also likely to occur in monk trawls, though no doubt skippers of these vessels know how to avoid such grounds. Another feature of the surveys was the high incidence of jellyfish species. None of the species collected in the verification survey represented threatened groups, if so similar

Comments	EAP/Proponent and Specialists response
Low biodiversity of benthos does not mean low ecological significance. It is stated in Specialist Report Appendix 1 c of the Verification Study that "the available information indicated a benthic environment of generally sandy conditions in which benthic species diversity was generally low. This suggests that it is unlikely that the benthic habitat in the dredged area has a particularly key role in ecosystem processes". Low biodiversity does not mean low ecological significance. Low oxygen areas are highly productive and that productivity (among few species) sustains key fisheries and other services. There is also a wealth of epifauna being ignored with potential high ecological significance. The dominant species Diopatra monroi– a big polychaete that accounts for 54% of biomass is stated to be a direct developer with complete development inside its tube. This means it will not recover after mining (no planktonic larvae stage). It is likely to be a key trophic support species that is gone from the system for a long time. Its importance as fish food, sediment stabilization or other attributes should be investigated and addressed. All this indicates the need for a "precautionary approach".	would apply to grounds fished commercially in the proximity. The VME aspect is of course one which has a high relevance globally and certainly the presence of any VMEs in Namibian waters, either in SP1 or the full extent of the Namibian EEZ, is likely to capture international attention. *Diopatra monroi* is an endemic species in Namibian waters as you point out but there is no indication it is an IUCN red listed threatened species CFNA sub paragraph 4: Appendix-N-2014-Verification-Study, Section C2.5, Paragraph 4.4.1 indicates that the macrofauna community assemblage recorded in SP-1 is similar across the ML170 area, i.e., SP-1 is not spatially unique. The SP-1 area is therefore not a key component in the overall ecosystem processes in the region. CFNA sub paragraph 6: Corridors of unmined areas are to be left intact. These can provide habitat and nursery source for Diopatra and similar breeding species to colonise disturbed areas post-mining as mining will not be down to the clay footwall.
3. Where is the discussion of impacts on **mesopelagic fishes**?	As per the ruling of the high court in June 2021, the previous application

Comments	EAP/Proponent and Specialists response
The Verification Study states, "Little is known about the potential effects of marine dredging (in particular the potential impacts of sediment plumes) on scattering layers that include *inter alia* mesopelagic fish species, gobies, plankton and zooplankton. Thus, it is recommended that future monitoring surveys should attempt to track the scattering layer patterns and trends in order to infer the relative abundance and distribution of these species. This could be achieved using industrial or scientific echo sounders." - page 698. The turbidity and contaminants in the bottom plume and in the overflow sediment filled waters returned at the surface by the dredger, are sure to affect mesopelagic fishes. Namibia, like all other high productivity areas must have a wealth of myctophids, bristle mouths, (and krill), that serve as forage fish for other species in the ecosystem (including commercial fish species).	submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Reference can be made to the specialist study by Japp (2022) (Appendix F) and in the 2022 ESIA report under chapter 7, section 7.6.2. **<u>Specialist response:</u>** Regarding mesopelagic species you are referred to sections in the fishery assessment para 3.1.6, Figure 4, para 4.3.2.6 and Appendix 8. We believe this species group impacts have been adequately covered.
4. The different report sections contain many contradictions - about sediment texture (sandy vs silty vs mud), about heterogeneity (homogeneous vs environmental gradients), about metal contaminants. Some call the sediments sandy when in fact they have high silt content. The meiofauna study says it is likely, in this case, that the significant correlation between the sediment metals and the	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings.

Comments	EAP/Proponent and Specialists response
nematode community structures is coincidental (due to the metals' associations with the fine sediments) rather than causal. The epifauna section says about sponges that the brown coloration appears to have arisen from mud staining. Some areas refer to homogeneity of setting and fauna across the area. The meiofauna study refers to considerable heterogeneity. It says: This reveals a nematode community distribution pattern that is consistent with the presence of an environmental gradient. The closely-related Cluster D, E and F meiofaunal assemblages were present at sites located on the eastern side of the verification survey area. Amongst these, the Cluster F communities were confined to the five sampling stations that extended along the eastern side of the grid. The remaining nematode assemblages, i.e., those belonging to Clusters A, B and C, were identified at sites located in the western half of the survey area (Figure D4).	Definitive qualitative assessment of the sediment characteristics is provided in the HR Wallingford report, based on laboratory test work completed by Tenova Bateman. Discrepancies in classification terminology based on qualitative visual assessments of sample material during environmental sampling have no significant impact on the outcome of the specialist studies completed and environmental impact assessments provided. **<u>Specialists response:</u>** Meiofauna are known to respond to fine gradings in sediment properties which is why they are suitable indicators of such changes. The variation in sediment texture accounting for the observed distributions included the high shell content on the eastern side of the surveyed area compared to lower content to the west. Sediment particle size D50 distributions do not systematically show this (Figure 29 Appendix-N-2014-Verification-Study, Section C2.1) but are patchy as are the meiofauna community univariate distribution plots for the survey area (Appendix-N-2014-Verification-Study, Section C2.4, Annexure C). These is to be expected in this taxonomic group.
5. Water Column and Sediments. "The currents and circulation information in the Verification Study was primarily taken from regional scale circulation modelling and other published sources. There is uncertainty on the applicability of this to the proposed mining area" - (page 340). This is unacceptable. The Verification Study should have done	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings.

Comments	EAP/Proponent and Specialists response
current, tide and eddy assessments over at least 365 days at the site and at the depths needed. "Local oceanographic processes were assessed during a 90-day deployment of a fixed mooring fitted with an upward looking ADCP, two Aquadopp current metres as well as a RBR CTD fitted with turbidity and dissolved oxygen sensors (Figure 3). The 90-day period was selected, in part, to detect effects of internal tides with a ~14 day (lunar) periodicity shown by Monteiro et al. (2005) to be important features controlling fine sediment distributions on the central Namibian continental shelf. The 90-day period would be able to capture 5-6 of these events, should they be detectable at the measurement site." So, the Verification Study only measured 90 days. It is unclear whether this was on the sea floor (193 metres). And worse: • "Similarly, important features of the water column were generalised from regional and possibly outdated information; this needs to be focused on the mining area." • "Sediment characteristics vary zonally and longitudinally on the Namibian continental shelf, extrapolation from measurements to the north and south of the proposed mining area may not be sufficiently reliable leading to uncertainty …"	Supplementary studies were conducted by HR Wallingford (2020) (Appendix I) regarding detailed ocean and plume sediment dispersion modelling with a focus on the mining target zone utilising site specific data of dredge plume behaviour in the 20-year mine plan area based on their existing comprehensive regional and local metocean data bases, *in-situ* measurements of sediment properties as well as water column and bottom currents in the 20-year target mining area (2014 verification assessment) along with the technical details on the proposed dredging programme production rates and equipment specifications provided by the dredging contractor (JDN). These results were further analysed by Carter & Steffani (2021) in their specialist report (Appendix E). Further reference to this assessed impact can be located in chapter 7 of the 2022 ESIA report, under section 7.4.2.1 (Dredging generates plumes of suspended sediments). **<u>Specialists response:</u>** The measurement setup is clearly explained in Sub Section 3.1 Appendix-N-2014-Verification-Study, Section C2.1 The verification study did not address sediment plumes. Plume behaviour issues are covered in the HR Wallingford (2020) modelling.

Comments	EAP/Proponent and Specialists response
With regards a sediment plume, in the Verification Study it is stated there were "a few key assumptions, these being: • that the flows in the CSIR (2006) study were accurately simulated and that these flows are representative of those prevailing at the deeper 200 m to 225 m ML 170 sites; • the physical properties (grain size distributions, flocculated or unflocculated settling rates, etc.) of the material that was dredged was similar to that which will be dredged at the NMP operations site; • the quantities being discharged (particularly the fines component) by the NMP dredging operations will be less than that assessed in the CSIR (2006) study. The fact that the overall sediment discharge rates for the CSIR (2006) study were approximately 4 times those anticipated for the NMP dredging suggest that this will remain true even if there is a significantly increased fines component in the NMP dredging discharges; • the assumed initial plume behaviours in the CSIR (2006) study were correct and correctly accounted for in the modelling undertaken as part of that study; • that these initial plume behaviours reported in the CSIR (2006) study are also applicable for the assessment of the proposed NMP dredging discharges" These are big assumptions. Without accurate current/tide/eddy	

Comments	EAP/Proponent and Specialists response
measurements, and knowing (not guessing or assuming) the fines (resulting from mining), and the plume, you know very little.	
6. **Sediment Plumes. The EU MIDAS Consortium (www.eu-midas.net) in their study on Managing Impacts of Deep-Sea Resource Exploitation, stated that: "There is a risk that the mining process will release metal ions into the water column, either in the benthic plume created by mining vehicles or, following dewatering on the surface vessel, in a mid-water plume. Such plumes can potentially travel hundreds of kilometres, carrying potential toxicants with them. Mid-water plumes may impact photosynthetic microalgae or animals within the water column".** The **sediment plumes** associated with mining, are now recognized in the Verification Study to be 2 to 5 times larger than previously thought. On what basis do they come to 2 to 5 times larger? **The plume will clog and damage the filter feeding epibenthos (ascidians, sea pens, sponges) in a broad area surrounding the direct mining footprint. With continuous mining it will not dissipate quickly. If these epibenthos have a nursery function, their widespread loss could be very detrimental to fish stocks. The same is true for surface feeding macrofauna (annelids, molluscs,**	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. The comment provided again refer to statements of information related to proposed seabed mining of deep sea minerals located in water depths of 800 to 6000m on continental slope, rise and abyssal plain environments. As such their relevance to the proposed mining on the continental shelf is questionable in relation to the current project. Supplementary studies were conducted by HR Wallingford (2020) (Appendix I) regarding detailed ocean and plume sediment dispersion modelling with a focus on the mining target zone utilising site specific data of dredge plume behaviour in the 20-year mine plan area based on their existing comprehensive regional and local metocean data bases, *in-situ* measurements of sediment properties as well as water column and bottom currents in the 20-

Comments	EAP/Proponent and Specialists response
crustaceans). Hydrogen sulphide may also be toxic to these organisms. **The Verification Study states *"Sediment plumes are not expected to significantly affect recruitment as the area of dredging operations will be small and plumes should disperse quickly within a short distance from the dredging operations".* There is no sound evidence for this. Continuous mining with regular turnarounds will maintain a continuous plume. The sediment will result in a 'soup' in which no larvae can settle. No knowing for how long. Extensive modelling is needed to show how far the plume will go.** In both the Trans-Tasman Ironsands and Chatham Rock Phosphate resource applications off New Zealand, the plume modelling was a major issue.	year target mining area (2014 verification assessment) along with the technical details on the proposed dredging programme production rates and equipment specifications provided by the dredging contractor (JDN). These results were further analysed by Carter & Steffani (2021) in their specialist report (Appendix E). Further reference to this assessed impact can be located in chapter 7 of the 2022 ESIA report, under section 7.4.2.1 (Dredging generates plumes of suspended sediments).
Table 1.1.3. refers to mitigation, releasing sediments 10-15 metres below the dredging vessel hull as discharge point. Why is that mitigation? It is still going into the water, still going to spread out. There is no evidence that this is below the thermocline, or anything which might help a little.	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings.

Comments	EAP/Proponent and Specialists response
	Reference can be made to 2022 ESIA report, chapter 7, section 7.4.2.1 Dredging generates plumes of suspended sediments, pg 138&139 and is covered in detail in the HR Wallingford report. Discharge of sediments at any depth below the water line increases the dilution and dispersion dynamics. Discharge at a depth of 15m is therefore in itself a mitigation measure, coupled with the dredge operators environmental valve technology. Comparisons when using an environmental valve of surface (40 m to 50 m depth), mid depth and bottom turbidity distributions against no valve, indicates an improvement in total suspended solids (TSS) concentrations in the surface layers to <7.6 mg/l but no or little change in the subsurface layers (HR Wallingford, 2020). This is beneficial as the 1 % light depth would be around -50 m at this sediment concentration, therefore negative effects of reduced light levels on phytoplankton production should be mostly avoided. Also, as there is little or no change in the near seabed TSS load, it can be assumed that the sediment deposition would be similar between the valve and no-valve scenarios which, according to modelling, is predicted to be 0.3 mm or less per dredge cycle. Impacts from vessel operations were assessed and described in the 2022 ESIA in chapter 7, sections 7.4.1 (impacts from vessel operations), 7.4.1.1 (Potential deterioration in water quality from liquid discharges to sea of vessel wastes) and 7.4.1.2 (Alien marine species in ballast water). Mitigation measures have been incorporated into the EMP (Appendix A).

Comments	EAP/Proponent and Specialists response
	The listed impact is assessed and described in the 2022 ESIA report in chapter 7, section 7.4.2.4 (Nutrients (ammonium and phosphorus) added at surface promote phytoplankton growth). Measurements that were taken of the sediment properties in the proposed dredge site showed that subsurface sediment pore water contained moderate nitrate-nitrogen concentrations but high phosphate-phosphorous concentrations. Additionally, the pore water showed a considerate departure from the water column Redfield ratio observed in the survey area (8.2 vs 17.7). The measured moisture content of the sediment was low, indicating that the affected pore water volume is also low (~35 litres/m^3 sediment). Therefore, dilution in the dredged sediment slurry and with surface waters after discharge from the dredger will limit nutrient enrichment and elevated phytoplankton production (Carter in Midgely, 2014). This was reconfirmed by Carter & Steffani (2021) (Appendix E). This statement is not supported by scientific data. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Supplementary studies were conducted by HR Wallingford (2020) (Appendix I) regarding detailed ocean and plume sediment dispersion modelling with a focus on the mining target zone utilising site specific data of dredge plume behaviour in the 20-year mine plan area based on their existing comprehensive regional and local metocean data bases, *in-situ* measurements of sediment properties as well as water column and bottom currents in the 20-

Comments	EAP/Proponent and Specialists response
No ship operations can be expected to offer zero threat of pollution and alien species – there is always some. Overflow water from phosphorite slurry reintroduced to surface waters is sure to have some nutrients but this is listed as none. The Verification Study states: "In summary, the two key metrics of relevance in terms of plume dynamics are the extent of the plume and the persistence (or duration) of the plume. The duration of the plume potentially has implications for biogeochemical transformation processes that may result in ecological impacts (e.g., oxygen demand and/or toxicity in the upper water column)." This is exactly why the plume needs to be understood properly now, ahead of any decision on whether to mine or not. In the draft ESIA 2022 document, Appendix I on plume dynamics and dispersion, more research is required to properly understand the plume.	year target mining area (2014 verification assessment) along with the technical details on the proposed dredging programme production rates and equipment specifications provided by the dredging contractor (JDN). These results were further analysed by Carter & Steffani (2021) in their specialist report (Appendix E). Further reference to this assessed impact can be located in chapter 7 of the 2022 ESIA report, under section 7.4.2.1 (Dredging generates plumes of suspended sediments). Toxicity impacts were assessed and are described in the following sections 7.4.2.5 (Trace/metal toxicity at surface) and 7.4.3.1 (Trace/metal toxicity on seabed – target dredge area trace metals are remobilized). Hypoxic/anoxic conditions were assessed and are described in sections 7.4.2.3 (Hypoxic/anoxic bottom water is entrained in the discharged dredging overflow water so reducing dissolved oxygen concentrations in the upper water column) and 7.4.3.3 (Exposure of anoxic sediments by dredging reduces the already low concentrations of oxygen that occur in the lower water column).

Comments	EAP/Proponent and Specialists response
7. Hypoxia. "However, dissolved oxygen concentrations were, in many instances, significantly depressed towards the sea-bed. The natural periodic development of hypoxic conditions is well-documented in Namibian coastal waters" – p 639. So, with regards Table 1.1.10, what will adding a load of sediment and bacteria into these already low oxygen waters do? It is likely to use up all available oxygen, driving the system completely anoxic. An important factoid: each gram of sediment contains about 7 to 9 billion bacteria, most of whom are aerobes - they are very efficient at sucking the oxygen from the water. Especially when released from their anoxic world. What most people don't realize is that when you get just a few millimetres into the sediment there is no oxygen. Which is why animals make burrows and tubes to the surface. As a result, all the bacteria in those sediments are in a dormant state, and when oxygen becomes present, they start up the metabolic machinery and so use the oxygen that is available. Mining/plumes/disturbance can only make hypoxia a lot worse, and exposing bacteria when mining the sediments will use up whatever limited oxygen is there.	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Reference can be made to specialist study by Carter & Steffani (2021) (Appendix E). Hypoxic/anoxic conditions were assessed and are described in sections 7.4.2.3 (Hypoxic/anoxic bottom water is entrained in the discharged dredging overflow water so reducing dissolved oxygen concentrations in the upper water column) and 7.4.3.3 (Exposure of anoxic sediments by dredging reduces the already low concentrations of oxygen that occur in the lower water column). The presence of anoxic sediments in the dredge area was not apparent from the available samples or indicated in the sediment properties measurements (Carter in Midgley, 2014). Additionally, the presence of large epibenthic organisms observed during the verification trawl survey in and adjacent to the mine target site indicate the absence of anoxic sediments (Japp in Midgley 2014). Therefore, the risk of reducing oxygen concentrations in the lower water column and potential effects on biota are considered unlikely (Carter & Steffani, 2021).

Comments	EAP/Proponent and Specialists response
	Additional results in support of the above findings: ○ During the benthic study conducted in 2014 it was concluded that mats of large sulphur-oxidising bacteria in the target mining area is low to absent. ○ During the same verification survey seabed sediments were analysed and the measurements of proxy variables within the sediments in the target dredge area estimated that concentrations and thus possible fluxes of H_2S in sediment pore water is low (Carter & Steffani, 2021).
8. The potential for release of sulphide and contaminants into the water column by mining is a major concern for many components of the ecosystem. Loss of sulphide oxidizing bacteria will contribute. Hydrogen sulphide is an indicator of no oxygen, which is in turn an indicator of lots of dangerous compounds in the sediments, including heavy metals. We know that NMP's proposed mining site is not in shallow waters where the hydrogen sulphide eruptions are obvious, but there is still the risk of hydrogen sulphide conditions. The claim in the Verification Study that there is no sulphide, and no bacteria that use sulphide is almost certainly not correct as sampling and detection methods were not appropriate and the large amount of organic matter buried to 2-3 metres of dredged sea bottom sediment almost certainly generates sulphide (some small sulphide oxidizing bacteria were reported).	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. **<u>Specialists response:</u>** There is no such claim. Due to logistical issues the verification programme employed proxies to identify the probability of appreciable H_2S fluxes from the SP1 area sediments. These were based on the results of van der Plas et al (2007), Bruchert et al (2007) and the contributions of Dr P M S Monteiro (*in litt.*) to the Verification Programme. At the time of measurement, the presence of nitrate-nitrogen in

Comments	EAP/Proponent and Specialists response
The fact that NMP did not detect any acid volatile sulphur (AVS) is definitely not proof that there was no free hydrogen sulphide present in the pore water. With frozen core samples which NMP scientists were using, is that even if there were low amounts of AVS initially present in situ, they may have been oxidized during core storage if the cores were not stored anoxically under nitrogen or argon. It has been said that the method NMP scientists used for detecting hydrogen sulphide will not work at all. Dissolved sulphide really needs to be measured on fresh core material as soon as possible after coring, in the best case by means of rhizomes and immediate fixing of the liquid sample with zinc. AVS cannot be a proxy for H_2S. Measuring redox potential is also impossible in a frozen sample. One needs dissolved ions for that, and alterations after sampling and during freezing/thawing will seriously affect the redox potential. On the outer shelf there is probably plenty of Fe in the solid phase. The problem with AVS is not that there might not be Fe there, but that in most marine environments, AVS rapidly converts to pyrite, which you will not measure with an AVS treatment. You would need to do the Cr-II reduction to get at the total reduced inorganic S pool. The likely concentrations of pyrite S would be in the order of 100 umol S/g dry sediment. Pyrite oxidation (e.g., if the sediments are stirred up even in	the sediment pore water indicated minimal presence of H_2S while the refractory (high molar C/N ratio) particulate organic matter in the sub-seabed sediments suggested a low probability of its generation. In surficial sediments H_2S may have been present as organic matter C/N ratio was lower, but still elevated compared to that in the inshore mud belt, and sulphate reducing bacteria were recorded. AVS was below the level of detection in surficial sediments and <2 mM/kg sub-seabed. AVS is an indirect order of magnitude proxy for free sulphide fluxes in the presence of iron as iron mono-sulphides should form. Although AVS is operationally defined iron mono-sulphides can be important components of it. Thus, indirectly, high AVS is indicative of H_2S fluxes. Sediment samples for AVS were drawn from sub-seabed cores that had been sealed with taped plastic lids, encased in plastic wrapping and frozen in their core tubes for transport to onshore analytical facilities. Here they were defrosted under nitrogen and sub-sectioned for analyses. This follows EPA 2010 methods for volatile compounds although they state samples should be chilled at 4 degrees C as opposed to freezing. Loss of AVS through conversion to iron pyrites would only affect a proportion of the AVS and this is limited in anoxic conditions (Kraal, Peter & Burton, Edward & Bush, Richard. (2013). Iron monosulfide accumulation and pyrite formation in eutrophic estuarine sediments. Geochimica et Cosmochimica Acta. 122. 75-88. 10.1016/j.gca.2013.08.013). Loss of AVS post sampling due to exposure to oxygen may have occurred through oxidation to polysulphides and elemental sulphur. If this did occur it

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minimal amounts of oxygen) leads to acid generation and further enhancement of pyrite oxidation. In other words, acid mine reactions; loss of oxygen in the water. Potentially there is free Hydrogen Sulphide up to a few hundred uM, and maybe a substantial pool of reduced pyrite sulphur (1 umol/g of reduced sulphur in the solid phase is roughly equivalent to 1 mmol S/L in the solution phase). Hydrogen Sulphide is almost certainly present in mined sediments to 2 or 3 metres (despite claims based on inappropriate sampling methods). There are multiple lines of evidence for this. The sediment report refers to sulphide scavenging heavy metals. Thus, introduction at the seabed and into the water column remains a major concern despite claims of 'low' significance. The same is true for toxic trace metals. The removal of sulphur oxidizing mats should be assessing the removal of sulphur oxidizing bacteria, which may be distributed throughout the sediment column. The survey has not adequately demonstrated the absence of these bacteria. ROV visual surveys are needed. Similarly, appropriate sampling and analysis techniques are needed. If they are there, the significance of the removal is high. The microbial ecosystem in the sediment is primarily responsible for the phosphorite in the first place, and we don't	did not reduce AVS molar concentration below that of simultaneously extracted metals (SEM) (Appendix-N-2014-Verification-Study, Section C2.1,Table 5). **<u>EAP/Proponent response:</u>** Conclusions to impacts assessed as per the points raised are available in chapter 7 (assessment chapter) of the ESIA report, taken from the specialist report from Carter & Steffani (2021) (Appendix E). Potential impacts from hydrogen sulphide are dealt with in the following sections of chapter 7 for the water column and benthos; sections 7.4.2.2, (Sulphidic sediment pore-water entrained in the dredged sediment is discharged with the over-spill) 7.4.3.2 (Sulphidic sediment pore-water is exposed by dredging, and the flux of dissolved H2S into the lower water column is increased), 7.4.3.4 (Removal of thio-bacteria mats by dredging increases the flux of H2S to the lower water column), 7.5.1.4 (Dredging removes mats of large sulphur-oxidising bacteria from the sediment surface and from the upper layer) and 7.5.1.9 (Release of hydrogen sulphide from the sediments affects benthic communities). **<u>Specialists response:</u>** Sulphur oxidising bacteria are aerobic and should be restricted to the interface between the presence of H_2S and oxygen in the top few centimetres at most of the sediment. Filaments allow access to the sulphide at distances of ~8 mm (e.g., Hinck et al., (2007). Physiological adaptation of a nitrate storing Beggiatoa sp. to diel cycling in a trophic hypersaline mat. Applied and Environmental

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fully understand the controls in this process.	Microbiology, p 7013-7022. doi:10.1128/AEM.00548-07).
9. Fisheries biomass in SP-1 and the MLA. The extrapolation of catch rates from outside the area into it based on stratification by depth and area is an accepted technique. Average % of total biomass are presented in the summary, yet variance in catch rates can be high (and especially so for the non-target species). Stratification of the trawl survey will be directed mainly at the key commercial species, and the 95% confidence intervals presented in Table 1 look tight, but will likely be poor for less commercial or bycatch species. Survey design (and survey sampling gear) would also likely be structured around adult fish, not juveniles. Hence care is needed in talking generally about species populations. The report makes it clear that the expectation is that there is movement within the stock boundaries for a number of species. Hence an all-data compilation will not pick up seasonal variability in how fish use the area. A general point that comes up in the Summary section (p vii) is that the consultant scientists seem to be looking for "unique" situations in the area. With fish	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Conclusions to impacts assessed as per the points raised are available in chapter 7 (assessment chapter) of the ESIA report, taken from the specialist report from Japp (2022) (Appendix F). The assessment outcomes are recorded in chapter 7, sections 7.6.1 and 7.6.2. Section 7.6.2.3 refers particularly to recruitment impacts. The most recent data available to the specialist Japp (2022) was utilised in his specialist report (Appendix F). Data was sourced from the Ministry of Fisheries and Marine Resources and the transboundary survey undertaken through the FAO/NORAD programme (Boyer et al., 2019). **<u>Specialists response:</u>** We should stress that the aim of the verification study was to apply suitable survey and statistical techniques. Because we could not use the MFMR vessels with standardised gear, the survey used the next best alternative – namely a monk-directed vessel and gear. Yes – the survey was limited in extent to the MLA at the time – extrapolating (or interpolating) within a small area has its

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that is not the point, it is how different species use the area at different times, and at different life history stages. Plus, the nature and extent of secondary effects (sediment plume etc) is potentially much broader than just the SP-1 area, so comments about "negligible" seem unjustified (p. v).	challenges. As with MFMR surveys, seasonal variability determination is near impossible due to costs and logistics etc. Commercial fishery data is normally helpful in this regard, provided it is available and is of sufficient scientific rigour to be used. The assessment and surveys have all the same variability as other traditional surveys – they must be necessarily focused on target species. In the 2014 verification survey all flora and fauna were counted and quantified and we believe a very thorough job was done under difficult conditions.
With regards assessment of fisheries biomass and stock assessment, as mentioned above, Table 1 includes variance estimates for monk and hake. But no other species. Perhaps that was all that was asked for, one would have expected more than just 2 species.	We disagree, the intent is not to look for "unique" situations, the assessment for fisheries is intended to be impartial and cover as best possible all risks. The deemed risk associated with the plumes as a secondary effect we believe is correct.
It is noted on p.7 that recruitment will be driven by many factors, and will vary. That is quite correct, but without knowing the major drivers of some of the variability, it is hard to draw conclusions about whether or not disturbance in the mining area will be important. Juvenile hake are shallower and to the south, but obviously migrate within the general area. Hence the secondary plume effects need to be considered, as do seasonal differences in distribution of fish relative to mining. The general conclusion that recruitment is unlikely to be affected in a major way is reasonable, but as the authors concede at the bottom of p.7, the possible impact of dredging goes beyond knowing simply biomass.	You are correct, please refer to our previous discussion on recruitment. The reason recruitment was incorporated as a specific risk of impact is because its importance is recognised. Recruitment of fisheries in general, either expressed as recruitment to a fishery or what is more commonly understood as the biological process of spawning and development of eggs and larvae and juveniles is important. The information presented earlier in our response regarding scale is a critical consideration in our assessment.

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A critical element of understanding recruitment is the seasonality of sampling. Irrespective of trying to establish temporal changes on annual time scales, sampling of adult fish and evaluating gonad development needs to be structured to ensure peak spawning times are determined. It also needs to be analysed on an appropriately small spatial scale to pick up "pockets" of fish that spawn several times throughout the year. Serial rather than synchronous spawning is more difficult to detect and monitor from combined historical data.	We agree, refer to our previous responses. Hake are serial spawners, other species are batch spawners – all critical to understanding the dynamics of fish species and how they may or may not be impacted by mining, fishing, climate change and other variability in the ecosystem.
The review seems to have done a good job at picking up the main data on spawning. It is interesting to note that migration occurs for several species, and early life history stages (eggs, larvae, juveniles) can be significant in the MLA. A key aspect of understanding recruitment of fish stocks will be monitoring larval stages where pelagic mortality from both natural predation, lack of food, or effects from sedimentation plumes could be high.	Thank you. Monitoring of eggs and larvae is one of the most challenging aspects of fisheries science and management.
Depending on the type of gear used in trawl surveys, they may be poor at retaining small-sized fish, and hence juveniles can be underestimated.	This is true for commercial fishing operations as well.
Figure 5 shows high variability in the total catch, with D11 standing out. So, one can expect reasonably high cvs. Yet these	We are not sure which figures you refer to in the ESIA, certainly graphs and statistics can be presented differently. The relatively high amounts of jelly fish

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are not given. One wants to see where D11 was on Figure 6. Unfortunately, the binning of catch weights doesn't enable that - it would have been much more useful to have had a free-form graduated circle size without presenting 1360 kg as the same size as 11800 kg. Graduating the larger catches is often more useful than fine divisions of small catches.	and ascidians skew the overall catch – they are also generally poorly quantified relative to the smaller fish catch and other species such as crustaceans. Therefore, it was easier and more clearer to remove from the total catch of other species.
Table 4. Gear selectivity is worrying with regards relative catch rates. One would have expected more than 14 species, so does the retained list tell us anything about gear performance. The report notes the fish species diversity was less than the compiled list in the original EIA. Gear effects come up again with the length frequencies. The left-hand limb will be constrained by the relative catchability of small fish as well as gear retention issues. So, one can't say if small monkfish were largely absent from the survey area, or there but not caught. It highlights that specific small-fish gear is needed to address recruitment-juvenile distribution and abundance. The verification survey can't say much about this.	Both monk and hake directed gears differ, this is why we would have preferred to use the standardised gear used by MFMR in their surveys. We agree that catch rates are rough estimate only aimed to give us an indication only of catch using monk trawls. We would expect the heavier monk gear and cod end liner to be the best way to sample at the time. Note also we did 24 hours surveys – something not generally done by MFMR when directing at hake a hake are normally "off" the bottom at these times.
This one-off survey was carried out in June, yet peak spawning for hake is mid-July to September. So how does one interpret a figure like Fig17. Clearly stages 3 and 4 are close to, and actually, spawning. But can an active fish (stage 2) in June spawn later in the year (say, September). Peak spawning would also coincide with peak aggregation density, so simply from an objective of	This is true, in fact all surveys whether done by NORAD or MFMR will suffer from the same weaknesses. Year round surveys are needed to capture the full recruitment cycles and fish condition. As to the survey being longer, note that the design was intensive, 24 hour trawling and sampling in relatively small area. Typically, MFMR hake surveys for example are long (>month) and are widely spread along transects. To the fundamental nature of the verification

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evaluating the mining area for an objective to evaluate the importance of the area for spawning (of hake anyway), the survey should have been longer. The significance of impact on recruitment of key commercial demersal/benthic species cannot be low if all of their habitat and food is being removed, and if the locations of early life stages are not known (as for monkfish). The Verification Report states "Recruitment of monkfish is likely to be negatively affected but the extent of this impact could not be assessed". This is a major result. Missing – where are the benthic fish data for non-commercial species? The Verification Study states "No other major impacts on fish recruitment were identified". Where are the goby egg laying and nursery grounds? Where are the monkfish nursery grounds? Do they use the biological structure and refuge provided by the invertebrate epifauna (sea pens, sponges) as in other regions? The finding of 7% of L. vomerimusrecruits and 2% of biomass in the MLA is significant and of concern – giving that the mining impacts will spread well beyond this area via benthic plume and contaminants. If there are monkfish recruits and juveniles	survey compared to other surveys is expected to yield different results. Yes that is correct, again with respect to recruitment, scale and intensity is important. Extrapolating data from one small area is a sample designed to inform the impacts in the proposed mining area. So yes our result showed that juvenile monkfish are present in the mining area – to what extent this small area may impact monk recruitment over the entire range of the fishery which extends the full length of Namibian waters is difficult to say – extrapolating is dangerous and not statistically defensible. We concluded that as the area of impact is small, the total relative impact is likely to be insignificant.

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further inshore of the MLA, there is also a concern. The heavy occurrence of goby, goby larvae and juvenile monkfish (45% of catch?) within the MLA, as indicated by the spawning summary, is of major concern. These are critical forage species for others (and seed for the monk fishery) so their complete loss (as is inevitable) from the mining sites is of HIGH significance. Two approaches were considered when it came to assessing fisheries biomass and stock assessment: Approach 1: To use observations from within the region of interest itself to directly estimate densities in the SP-1 dredging site and surrounding MLA. Approach 2: To estimate biomass in appropriate strata in a larger area surrounding the region of interest, and to infer densities inside the MLA by appropriate weighting of strata in proportion to the areas represented by those strata. Later in the report, they say they preferred approach 2 (no reason given, although if asked, one would assume they will say that the estimates of approach 1 had greater variance. All results are based on approach 2. However, Table 6.a) in the Verification Study shows that the hake estimates for Merlucius capensis biomass (and recruit numbers) is much higher for approach 1 than approach 2 (e.g. 15 410 biomass recruits vs 3 869). That is,	

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for approach 1 their % of recruits in MLA would be roughly 4.5%, not 1.6%. This is of concern to the hake sector. Other benthic fish species (west coast sole, kingklip, etc.) should be surveyed in the study area – at least by ROV.	
10. There is no discussion of the loss of natural ecological services and functions provided by the ecosystem (e.g., what are these), although they are mentioned as a concern. Some of those functions include refugia, nursery grounds, and trophic support for fishes, habitat that promotes biodiversity and genetic diversity, Hydrogen Sulphide uptake and sequestration preventing release into the water, uptake of methane and sequestration of carbon, stabilization of sediment and prevention of turbidity, remineralization and nutrient cycling. As a reviewer in the Verification Study says, "whereas the impacts of fishing mortality, as simulated in the model, cease as soon as fishing is stopped, the impacts of dredging have a longer-lasting impact because of habitat destruction." Potentially this could mean that dredging could lead to a longer-term reduction in the maximum population size (carrying capacity) of a species strongly dependent on the benthic environment. In contrast, fishing mortality alone leads only to a reduction in the population size at the time.	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Conclusions to impacts assessed as per the points raised are available in chapter 7 (assessment chapter) of the ESIA report, taken from the specialist report from Japp (2022) (Appendix F). The assessment outcomes are recorded in chapter 7, section 7.6.3 (Species diversity: dredging operations will result in a reduction or loss in biodiversity because of 1) actual dredging and vessel operations 2) habitat destruction and the removal of substrate and 3) sediment plumes.). **<u>Specialists response:</u>** We agree, ecosystem effects, as with nearly every anthropogenic impact, (including fishing) is extremely difficult to assess. We identified that there is indisputable direct impact through the removal of substrate. Typically, the models used in the fishery stock assessments use carrying capacity as a

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	baseline reference point. Interestingly, for hake the reference points differ depending on what baseline is used. Namibian scientists seem to prefer using the baseline biomass from independence (1990) which shows greater stock improvement than if the pre independence data were used. It is known that the ICSEAF data reporting was problematic for all Namibian fisheries. Certainly benthic impacts is critical – so how would you compare the systematic trawling impacts with repeated removal of surface flora and fauna to the completed removal of substrate when subjected to mining in a small area? It is a question of scale again.
11. Sampling of the Seabed. Sampling done with a Day grab - neither Van Veen or Day are preferable as they have a bow wave that blows away the small organisms from the surface– normally a box core or multicorer would be used, or possibly tube cores via ROV (which can accommodate the shelly surface). Regarding sampling for Thiobacteria: absence of evidence is not evidence of absence. There are a lot of these bacteria, but if the Verification Study did not detect them, they were using inadequate techniques. With a grab you cannot sample for these bacteria at all. One has trouble getting a good feel for the nature of the trawl. The text says a 45m vertical opening-for a bottom trawl?? Or is that 4.5m? The ground gear is simple polypropylene with no bobbins as far as one can see. So bottom contact could be good, if a bit jerky. But the mesh size in the bellies is large, so wouldn't	The methodologies and equipment used in the surveys conducted during the EIA verification assessment are regularly used internationally. Further it is noted that the EIA Verification work programs were compiled with input from relevant ministries including the Ministry of Fisheries and Marine Resources prior to commencement of the surveys. The methodologies and equipment used were also endorsed by scientists from UNAM in the appointed role of Independent observers for all field and laboratory work completed in the EIA Verification studies as well as the Independent Peer Review panel appointed to review the specialists studies submitted in the EIA Verification Report. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. The comments and issues raised therein are therefore moot. It is noted that the 2014 verification study now forms part of the baseline

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retain small fish. The gear detail is important, especially how similar it is to the Ministry of Fisheries and Marine Resources NATMIRC trawl used in their surveys. Simple footropes can be effective if the seafloor is uniform and soft, but less effective if there are firmer areas where the gear can bounce. The fact the cod-end has a liner doesn't mean much given the larger fore-meshes. So, what herding versus escapement goes on could be variable between nets of a different design. It limits comparability with surveys outside the area covered. It also has its own selectivity parameters, for different types of fauna, so the biodiversity obtained, size of the fish and invertebrates, and catch rates are all "relative" to the gear used. One suspects this trawl is good for adult fish, less so for small fish, and not good for general benthic invertebrates. The authors (p.48) acknowledge that the species complexity reflects the availability of species typically caught in demersal fisheries. So, they are very correct in saying it is a subset, but potentially very incorrect in thinking it is an "indicator". The selectivity issues are limiting, and no one should argue that a single gear type is acceptable to monitor fish and benthic invertebrates.	information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. The grab deployment regimen required slow descent through the last 10 m of the water column to avoid bow wave development. Potential impacts from removal of bacteria oxidising matts are dealt with in the following sections of chapter 7 for the water column and benthos; 7.4.3.4 (Removal of thio-bacteria mats by dredging increases the flux of H_2S to the lower water column) and 7.5.1.4 (Dredging removes mats of large sulphur-oxidising bacteria from the sediment surface and from the upper layer). Additional baseline survey requirements are recommended in the specialist report by Carter & Steffani (2021) (Appendix E) and further incorporated into the EMP (Appendix A) in Table 2 and section 7.5 (Marine biodiversity monitoring). Details on the sampling methodology provided is described here. It is noted that the Ministry of Fisheries and Marine Resources (MFMR) withdrew their consent initially offered to the proponent, to utilise the fisheries research vessel "*RV Mirabilis*" to conduct comparative surveys in ML 170 for the EIA verification study. Subsequently MFMR recommended the proponent utilise a private trawling vessel and trawling gear to complete the survey. The vessel, equipment used and survey program was approved by MFMR with a requirement for two MFMR personnel to participate in the survey that was subsequently completed.

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	<u>Specialists response:</u> We agree regarding the selectivity element of gear, hearding, seasonality, footropes etc – all play a role and these are perennial problems when designing independent surveys. As a first survey using the available gear, it has provided a first attempt at an indicator. This is the reason we tried to compare with trawls undertaken in the proximity. It is an imperfect science as most fishery scientists would agree with trawl sampling no matter what gear is used, subject to considerable variability, not least of which is the ability of skippers to set gear efficiently.
On p.50 the Verification Study asserts in the second paragraph that the trawl survey was a suitable platform for a monitoring programme. Based on the observations above, this is not the case.	We disagree. It was what was available for the work to be undertaken and carried out by a highly competent team. As with most monitoring programmes they improve over time. Again, as mentioned previously, the MFMR vessels with standardised gear would remove some uncertainty, but this was not available at the time.
Why not a fine-mesh trawl, or an epibenthic sled which would be far superior? The "one size fits all" approach is flawed, and one would not like to see this survey retained as a "baseline" for future monitoring. It is "relative" to itself over time, and that is fine if you know what it is sampling well, and what it is not. So, comments about the area being "impoverished" (p.39) cannot be substantiated without much more evaluation work done.	We agree that improvements can be made, assuming there is the support of the Namibian scientific community. For now it the best baseline available which can be refined and tested over time.

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It is concerning that sponges are almost written off as being "simple, primitive, and somewhat characterless". But they should be well described, there are good poriferan taxonomists, and when one species occurred on 20 out of 24 stations, it should be identified. Sponges can be very important ecosystem elements. But they will not be well retained by such trawl gear.	They were not "written off" – everything was identified, sampled and weighed. Sponges, ascidians etc are indicators of habitat type which is perfectly understood by the sampling teams. We note that MFMR in their own surveys often do not separate or quantify many sponge species.
Sampling undertaken with fisheries trawl gear, tends to be very selective - it is designed to catch large commercial fish, so comparisons with other sorts of trawl gear or combining lots of different surveys, can be misleading, and to use it for benthic epifauna is highly questionable. Especially with limited mobility, destructive trawling to monitor benthic invertebrate abundance is flawed. Towed camera surveys would be a much better way to establish what is there, where, and how much.	We agree again, survey refinement and testing can give improved results.
The main point is, one needs to treat a one-off verification survey, with a particular type of trawl gear, with caution, and results are relative, not absolute.	We agree, we have not said the verification is absolute.
A further key criticism of their 'verification' fieldwork is that they only did short cruises/deployments in winter (June/July/August). So, in those cases no seasonal variability is accounted for. They assume that their winter sample is representative of all seasons. If they revisited this area in Feb/Mar/April, would they find the	At no point have we assumed the trawl verification survey represents seasons – yes as with all such surveys there are limitations, assumptions and caveats not only between seasons but also between years and months.

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same state of oxygen/sulphide in the sediments/water? The waters are likely to be better oxygenated during winter than in late summer. A full annual cycle of data is needed.	
12. Toxicology and heavy metals. The Verification Study states "Surficial and subsurface sediments supported relatively high concentrations of the heavy metals' arsenic, cadmium, chromium, copper and nickel. The bioavailability of these heavy metals was investigated by elutriation tests and negligible proportions entered the dissolved phase. The low release of the metals into the dissolved phase indicates that although their natural concentrations exceeded the sediment quality guidelines for the region, they do not represent a toxicity risk either in situ or following physical disturbance. This supports the assessment of toxicity risks in the EIA." This is pure guesswork: there is no analysis on the effects of the mining and associated processes on toxicity – what metals will be released and in what quantities. All this does is look at existing sediments. What we need to know is what metals will be released by the mining, in what quantities and what is the susceptibility of the organisms to them. The MIDAS Consortium argue that it will be necessary to assess the toxicity of individual mineral deposits independently to	As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated. It is noted that the 2014 verification study now forms part of the baseline information that has been considered along with additional information for the 2022 assessment which now supersedes the 2014 report findings. Reference is made to the specialist study conducted by Carter & Steffani (2021) (Appendix E). Conclusions to impacts assessed as per the points raised are available in chapter 7 (assessment chapter) of the ESIA report. Potential impacts from metals are dealt with in the following sections of chapter 7 for the water column; section 7.4.2.5 (Trace/metal toxicity at surface), 7.4.3.1 (Trace/metal toxicity on seabed - target dredge area trace metals are remobilized). The radiation component is further discussed in section 7.4.3.1. 'Further the potential for the radioactive mineral uranium and its associated radionuclides to be dispersed in the water column from the sediment was assessed. The total uranium concentration in the ore sediment was quantified during the test work for the Sandpiper Project as part of the pre-feasibility study (Bateman, 2011) and defined. The natural uranium content is determined to be low (~100 ppm), which is in line with other mined phosphate

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identify the potential toxic risk during mining. However, from a toxicological perspective, it may not be necessary to characterise the individual toxicity of each metal ion within each mineral deposit. It may only be necessary to determine – under controlled, ecologically relevant conditions – the bulk lethal toxicity of that ore deposit for a number of different biological proxy organisms in relevant physical phases (e.g., in solution/aqueous, as particulates, or adsorbed onto the surface of particulates). A similar approach could be adopted to determine the bulk lethal toxicity of any return waters from surface dewatering before any discharge into the ocean takes place. Metals released during mining will occur in different physical states. Metals may enter solution/aqueous phase and be taken up across the gills, body wall and digestive tracts of exposed animals. Alternatively, metals may adsorb onto sediment particles or flocculates and be ingested; this may be particularly the case for metals released during dewatering of the ore slurry. Lethal toxicity is conventionally assessed in terms of the '96-hour LC50': a measure that identifies the concentration of toxicant that kills 50% of the exposed organisms during a 96-hour period. However, 96-hour LC50 limits only indicate acute impacts. Mining within a licence block will continue for years to decades, and organisms will be subject to chronic metal exposures that	sedimentary deposits globally. Currently there is very little international and local information and studies available on marine radioactivity levels and their potential impacts on marine organisms. Additionally, currently there is no known expertise in this field in Southern Africa. Furthermore, there is no evidence in available published literature of any known detrimental effects on demersal fish as yet recorded from radioactive components being released into the water column as a result of trawling activities, which dominate the Namibian EEZ. However, it is acknowledged that radioactive elements exist in the seabed and uranium, thorium and their associated radionuclides will be included as variables in the baseline monitoring required in the EMP for the sediments and water column.' **<u>Specialists response:</u>** Toxicity risks are determined from comparisons with BCLME sediment and water quality guidelines. These are inherently precautionary being derived from the international scientific literature on toxicity effects. Typically, chronic effects are included in the derivations being determined from acute/chronic ratios. The precautionary aspect is based on application of assessment factors to no observed effect concentrations (NOECs). Depending on the quality and extent of the source data, e.g., the number of taxa covered, assessment factors can range between 10 and 1 000. Thus, when toxicity data are extensive the guideline can be 0.1 x the NOEC and, when restricted 0.001 x the NOEC. The guidelines are thus protective.

Comments	EAP/Proponent and Specialists response
might be orders of magnitude lower than the lethal dose and at a considerable distance from the mined site. The MIDAS project recommends that the bulk toxicity of each prospective resource should be established in advance, and at different times during the biological season cycle, for a suite of organisms relevant to the region surrounding the area of immediate impact. Such an approach should also be adopted to assess the potential toxicity of discharge waters from any dewatering of the ore slurry. This assessment could be conducted before an exploitation contract is granted (e.g., as part of an Environmental Impact Assessment). It makes sense that the NMP Verification Study should have done the above. If heavy metal concentrations increase in Namibian seafood above World Health Organisation standards, the Namibian fishing industry could be closed down. High concentrations of the heavy metals, uranium (approx. 52mg/kg) and cadmium (approx. 20mg/kg) in the sediments of ML170 (sampling station N17), have been documented in the scientific report: Anna Maria Orani et.al., 2018. Baseline study on trace and rare earth metals in marine sediments collected along the Namibian coast. Marine Pollution Bulletin 131 (2018) 386-395.	

Comments	EAP/Proponent and Specialists response
These results need to be assessed both in terms of possible impacts on the marine food chain (requiring plume modelling and tracing of contaminants through the food chain). Also, large amounts of sediment waste will build up near the NMP marine phosphate processing plant proposed to be established a little inland of Walvis Bay, with the possibility of leakage into the water table as well as back into Walvis Bay Harbour, and wind-blown dust impacting the Walvis Bay population. There is good consensus globally, that marine-origin phosphates have a higher radioactivity content than igneous phosphates. I am not aware of Namibian Marine Phosphate making public any results showing the radioactive levels of phosphates in ML170. Much of the US Florida phosphate wastes from fertilizer production exceeded permissible radioactivity levels, and have had to be stored in specially restricted areas in the USA. Togo is one country that has allowed on-land phosphate mining, without enforcing safety regulations. The result has been that waste produced from the phosphate mining has flowed into the sea, causing serious problems of contaminated seafood to coastal communities.	
Both the at-sea mining ESIA and onshore processing ESIA should be assessed as a holistic whole because one primarily addresses mining and the other handles what to do with the waste, before	This matter has been addressed in the response to comments under **Separation of "at-sea mining" and "onshore processing" ESIAs**.

Comments	EAP/Proponent and Specialists response
a decision is taken on whether or not to grant an environmental clearance. The Verification Study of 2014, together with the more recently commissioned reports of 2020 onwards on the sediment plume, sediment toxicity, noise impacts etc., are very technical documents. Rather than just being appended as part of the draft ESIA, they need to be properly reviewed by a panel of genuinely independent scientists with necessary specialist expertise, who are not financed by industry sectors, so that the interests of Namibia are properly catered for. Currently the mining impacts are significantly downplayed, relying on the Benguela Ecosystem to dilute them. Around 2016-18, other submissions on the NMP Verification Study were received by the Ministry of Environment, Forestry and Tourism, from interested and affected parties, including Government, and these should be incorporated in the ESIA. Given the potential ecosystem impacts of marine phosphate mining, that there are additional mining companies queuing up to do so, as well as the cumulative impacts of expanding marine diamond mining, it is also essential that a Strategic Environmental Assessment and a proper baseline study of critical environmental indicators occurs. These studies must take place before any decision is made on whether to proceed with	The Environmental Commissioner will determine the requirement for an independent review of the final submitted ESIA report. The Proponent is required to pay for specialist studies to be conducted as part of the ESIA process utilising the best scientists available to conduct this work. This statement is not substantiated. The ESIA methodology utilised was based on a scoring system, which is an objective and not subjective approach. As per the ruling of the high court in June 2021, the previous application submitted by the proponent for environmental clearance was invalidated All relevant documentation to the 2022 ESIA application process has been made available and is included. All requirements as per the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations requirements has been adhered to with the 2022 ESIA application. The same will apply to any other Proponent seeking environmental clearance for a mining project . The comment is noted as an opinion. Baseline information and strategic planning for incorporation of the current mining licences as well as other industry activities in the marine environment has already been undertaken as part of the Central Marine Spatial Plan initiative which has been ongoing since 2018. This process is already being managed by the Ministry of Fisheries and Marine Resources.

Comments	EAP/Proponent and Specialists response
marine phosphate mining or not. The Ministry of Fisheries and Marine Resources has the best capacity to be the lead agency in this. And with this there is also the need to develop proper deep- sea mining regulations that meet international standards, and independent monitoring to ensure proper compliance.	
The radioactivity and heavy metal levels of the sediments in ML170 need clearer definition as well, given their serious implications.	The radiation component is addressed in the 2022 Assessment report in section 7.4.3.1.
Civil Society should be kept informed along the way. This way the process will be transparent, and should include independent international expertise to help support a good end decision.	All required documents and processes related to the current application are publicly available. All requirements as per the Environmental Management Act, No. 7 of 2007 and associated 2012 Regulations requirements has been adhered too with the 2022 ESIA application, including adhering to regulations 21.
Thank you very much for the opportunity to provide input in this review process of the NMP ESIA.	Statement is noted.

Table 9 – Comments and feedback after the ESIA report public review period submitted 21 September 2022: Herbert Jauch (Economic and Social Justice Trust)

Comments	EAP/Proponent response
1. Including all annexures, the draft NMP ESIA amounts to thousands of pages. The annexures in particular are very technical scientific documents which require review by international scientists with the necessary technical expertise, as the average layman IAP is not capable of doing this. NMP in drafting its ESIA was very reliant on utilising technical scientists. IAPs should also be given the opportunity to call on international scientific experts to properly review the documents that form part of the draft ESIA.	Qualified review of the environmental assessment report and related studies is included under the provisions of the Environmental Management Act, No. 7 of 2007 ("the Act"). The assessment process as required under the provision of the Act and due to the nature of the receiving environment off the Namibian coast, requires highly specialised studies and specific expertise to be applied, including international scientific experts. Independent review of the ESIA falls under the responsibility of the Environmental Commissioner ("EC"). The EC has been appointed by the Minister of the Ministry of Environment and Tourism for this purpose, under the provision of the Act and carries appropriate qualifications and experience to manage the highly technical scientific evaluation process in terms of the Act. This review process includes provision for the EC to appoint suitably qualified specialists to conduct an independent external review of the assessment report and related documents if required. Accordingly, it is the responsibility of the Environmental Commissioner not the layman or I&APs to independently assess or consider the merits of the scientific documents submitted in the assessment report for the Project.
2. We wish to point out that a two-week period for review is way too short for a proposal of this nature. International scientists with the necessary specialist expertise to review these documents would be	The period provided for comment by I&APs of 14 days was defined in consultation with the office of the Environmental Commissioner and is in accordance with both the Environmental Management Act, No. 7 of

required to conduct a proper review of these documents and a reasonable minimum period to do so would be 3-4 months.	2007 and associated 2012 Regulations. This is a reasonable allocation of time for comment on the content of the assessment report prior to submission to the EC as required under Regulation 23 of the Act (7 days).
3. We have taken note of the concerns raised by the Confederation of Namibian Fishing Associations (CNFA) and agree that these concerns need to be addressed in detail. These include: 3.1 The separation of "at-sea mining" and "onshore processing" because the mining operation and how the waste is dealt with should be considered together in the environmental clearance approval process. It is essential that the environment holding these resources is not subjected to irrevocable damage which could lead to economic and social disadvantage for Namibia at a later stage.	The concerns raised by CNFA have been fully addressed. Mining involves two key processes 1) ore recovery (excavation of mineral bearing rock or sediment) and 2) processing of ore to produce a concentrate. Under normal (on land) circumstances both these processes occur within the confines of the mining license boundaries (i.e. the area within which the mineral deposit occurs and is extracted from). This is not the case for this project which is not the same as a normal land-based mining project. The mining licence ML 170 is located in the ocean 160 km southwest of Walvis Bay. The law requires that an environmental clearance certificate must be issued for the mining licence ML 170, a) in compliance with the attached licence conditions and b) for authorisation of any operations in the mining licence area. A separate environmental clearance certificate is required for the sites allocated for the land-based activities which will include the processing plant. Therefore, it is a requirement to have two separate EIA processes. Mining operations will not commence without the land-based infrastructure approved and constructed. The processing of the landed ore takes place at a separate on land

	location and does not involve any mining activity and hence does not require a mining licence for the area of the processing plant. As an industrial process, a separate environmental clearance certificate is therefore required for the proposed land-based processing and product handing operations, and associated land sites allocated for these activities. While related, in this instance the land-based component of the project cannot proceed without environmental permitting for the mining licence (ML 170). Therefore, it is a requirement to have two separate EIA processes. Mining operations in ML170 cannot commence without completion of a full ESIA and environmental permitting of the land-based processing and product handling component infrastructure which is required for commencement of construction. There can be no investment in progressing the land component of the Project if there is no valid authorisation to conduct operations in the mining licence where the vessel and mineral deposits are located. Staged application for environmental approval for project development is not contrary to any laws in Namibia and has been done both previously and currently. The EMA 2007 is comprehensive in its requirements for assessment which will be done for each location.
3.2 New industrial endeavours should not be developed at the expense	The comments provided address matters of legislation and policy which

of existing economic activities on which the national economy and especially the livelihood of regions and communities depend.	lie outside of the authority of the Proponent in regard to this application. The comments are noted as opinion. The processes and purpose of the Environmental Management Act 2007 is designed to address these issues as noted, and has been complied with by the Proponent
3.3 The impacts on breeding and juvenile fish stocks, the marine food chain in the water column including heavy metals, plume and potential noise impacts. A growing body of research points to the need for a halt to any seabed mining, until science and management can be put in place that ensure that mining will not cause harm to the marine environment. A recent study warned that "much remains unknown about mining's potential impacts, not just on the deep ocean, but throughout the water column".	The assessment of impact on the fishing industry have been fully addressed in the current environmental assessment process. In this regard potential impact is directly related to the scale and intensity of the proposed operations. In this instance the scale of operations will involve 1 dredging vessel dredging an area of 1.7 km^2 on average per year at a frequency of 3 dredge cycles per week, each cycle comprising 16-20 hours onsite in ML 170. This represents less than 1 % of the total mining licence area of 2,233 km^2. A cumulative total area of 34 km^2 will be covered over a 20 year period. A sediment plume dispersion model was conducted by HR Wallingford in 2020 and is available as Appendix I. Conclusions drawn from this specialist report was included in the 2021/2022 specialist assessment reports for water column, sediments and benthos (Appendix E) and Fisheries, mammals and seabirds (Appendix F). This information was used in the 2022 assessment and outcomes per impact are discussed in detail in chapter 7 of the report, per respective section. With regards to the impacts on fisheries and fish, reference is made to the impacts assessed in sections 7.6.1 and 7.6.2 of the 2022 ESIA report. The impacts on the water column have been assessed in chapter 7 of

	the ESIA report based off of the specialist study by Carter & Steffani (2021) (Appendix E), reference can be made to sections 7.4.2.1 (Dredging generates plumes of suspended sediments), 7.4.2.5 (Trace/metal toxicity at surface), 7.4.3.1 (Trace/metal toxicity on seabed - target dredge area trace metals are remobilized). Legislation and management structures are in place in Namibia for seabed mining on the continental shelf within the Exclusive Economic Zone. A substantial base of scientific data and published literature on the marine environment and the Benguela Large Marine Ecosystem already exists for the continental shelf off Namibia. Data is publicly available on sites such as the Benguela Current Commission Marima Project and presented in the BCC Current Status Report – National overview for Maine Spatial Planning and Knowledge Baseline for Namibia's first Marine Spatial Plan, published 2019 and released by the Ministry of Fisheries and Marine Resources. The seabed on the continental shelf off Namibia at water depths of 200 to 600 m has been subjected to many years of extensive and repetitive bottom trawling operations and as such no longer represents a pristine seabed environment. This includes the deep-water fishery for orange roughy which focused on hard grounds and unlike in some other parts of the world e.g. New Zealand, these deep-water species are caught in relatively shallow water on the Namibian continental shelf. That fishery has been suspended as the resource has been depleted to an extent

	that it is no longer commercially viable and the spawning aggregations on which the fishery depended have declined i.e. recruitment failure primarily due to unsustainable fishing pressure. As no details of the research and study referred to in the statement have been provided, no further comment can be provided in response thereto.
3.4 A clear definition of deep-sea mining and of the term "dredging" with regards the NMP operation. Based on international definitions, all mining deeper than 200 metres is considered as deep-sea mining. Also, the use of the term dredging by NMP deflects from the reality that this is a full-scale mining operation. NMP, it will be removing the top 2.5 - 3m of the seabed, which will have a significant effect, impacting substrate type, grain size, water content, geochemistry of sediments and porewaters, water flow, pH, oxygen, and suspended sediments amongst others.	For clarity, mining is the extraction of valuable minerals or other geological materials from the earth, usually from an ore body, lode, vein, seam, reef, or placer deposit. Dredging is the primary mining method utilised in seabed mining for recovery of mineralised ore or sediments for processing and recovery of the targeted mineral (s). Dredging is a process utilising suction for removing sediments from the bottom of a body of water and transporting the material to the surface. Different types of dredging equipment and vessel are used. Marine diamond mining utilises specialised crawler mounted dredging equipment and vessels. The proposed marine phosphate mining will utilise a standard trailing suction hopper dredger. A sediment plume dispersion model was conducted by HR Wallingford in 2020 and is available as Appendix I. Conclusions drawn from this specialist report was included in the 2021/2022 specialist assessment reports for water column, sediments and benthos (Appendix E) and Fisheries, mammals and seabirds (Appendix F). This information was used in the 2022 assessment and outcomes per impact are discussed in detail in chapter 7 of the report, per respective section.

	With regards to the impacts on fisheries and fish, reference is made to the impacts assessed in sections 7.6.1 and 7.6.2 of the 2022 ESIA report. The impacts on the water column have been assessed in chapter 7 of the ESIA report based off of the specialist study by Carter & Steffani (2021) (Appendix E), reference can be made to sections 7.4.2.1 (Dredging generates plumes of suspended sediments), 7.4.2.5 (Trace/metal toxicity at surface), 7.4.3.1 (Trace/metal toxicity on seabed - target dredge area trace metals are remobilized). No definitive reference has as yet been provided clearly articulating the justification for the application of the nominal depth of 200 m and the definitive criterion for classifying deep-sea mining. By application of this nominal criterion, the demersal hake and monk fisheries in Namibia which are conducted in 200-600 m water depth, would then also be classified as deep-sea trawling. Additionally, the recent oil and gas discoveries off Namibia earmarked for development would equally be classified as deep-sea mineral resource extraction. Deep sea minerals (polymetallic nodules, cobalt crusts and seabed massive sulphides) occur in deep sea environments which are located on the continental slope, continental rise and abyssal plain in water depths of 800 m to 6000 m typically in international waters. They do not occur on the continental shelf which typically lies within the Exclusive Economic Zone, which is where the Namibian marine placer deposits of phosphate are found and ML 170 is located. The continental shelf off Namibia is one of the widest continental shelves in the world (Bremner 1981) with the continental shelf break occurring over 100 km from the coast off ML 170

	at a depth of approximately 350-400 m at an average gradient of 0.16 degrees. The seabed on the continental shelf off Namibia at water depths of 200 to 600 m has been subjected to many years of extensive and repetitive bottom trawling operations and as such no longer represents a pristine seabed environment. This includes the deep-water fishery for orange roughy which focused on hard grounds and unlike in some other parts of the world e.g. New Zealand, these deep-water species are caught in relatively shallow water on the Namibian continental shelf. That fishery has been suspended as the resource has been depleted to an extent that it is no longer commercially viable and the spawning aggregations on which the fishery depended have declined i.e. recruitment failure primarily due to unsustainable fishing pressure.
3.5 Adherence to international marine mining standards / guidelines which Namibian has signed and ratified.	The proposed NMP Project involves the exploitation of a placer deposit containing phosphatic sands located on the continental shelf within the Exclusive Economic Zone ("EEZ") of Namibia in water depths of 190-250 m in the SP 1 area of ML 170. As proponent, NMP is required to comply the Laws of Namibia and any related international laws as ratified and managed by Namibia within Namibia's Exclusive Economic Zone (EEZ). The proposed project in ML 170 is not a "deep sea mining" project and Namibia does have current environmental, fishing and mining laws and regulations in place, which have served to govern the fishing and marine diamond mining operations undertaken withing the Namibian EEZ and Territorial waters and within its obligations under any relevant international laws and guidelines, since independence in 1990.

3.6 A realistic socio-economic assessment of marine phosphate mining. The August 2018 report by Stratecon on the Economic Assessment of the Development of a phosphate-based industry in Namibia overestimates the number of jobs to be created and falsely presents phosphate mining be seen as a solution to unemployment in Namibia. A socio-economic analysis of benefits gained from phosphate mining by the Sandpiper Project should concentrate on the activities proposed by the project, and not be based on a scenario which rests on assumptions over which the proponents of the Sandpiper Project have no control.	In the absence of any supporting evidence or literature, the statements contesting the information presented in the 2018 Stratecon report are noted as opinion. The 2018 Stratecon report assesses the potential socio-economic impacts of a phosphate based industry in Namibia. The study does not address the Sandpiper Project specifically nor has it been presented as representing the project. Stratecon (formally Economics Information Services) is a company specializing in economic impact assessments and applied economic modelling. Stratecon has performed economic feasibility assessments for several government departments throughout Southern Africa as well as large private corporations. The 2018 Stratecon report was prepared by accredited specialists and has been independently vetted by the Chamber of Mines Namibia. The Stratecon report is presented in Appendix L and notes as follows *"This research has been sponsored by NMP and covers a statistically developed hypothetical case study based on the development of an integrated fertiliser industry through the dredging of phosphate rock from the known resources along the Namibian Coast. Detractors may find motivation for inferring reporting bias. This is to be expected but there is no intent of bias from the authors. The authors hope that policy makers will recognise the potential importance of the available opportunity. Stratecon accepted this assignment on the clear condition that the research direction*

	and scope would be dictated by ethical considerations and not by the wishes of the sponsors. This was accepted by NMP. Stratecon has no financial interest in NMP, LLNP or phosphate in Namibia". As noted in Section 7.8 of the ESIA, the socio-economic impacts assessed in this document are related directly to the offshore marine operations component in ML 170. In this regard, reference can be made to the 2022 ESIA report, chapter 7 section 7.8.5.1 (Job creation for approximately 72-100 jobs (vessel and land based support operations) and Appendix H (JDN socio-economic supplementary study) and section 7.8.5.2 skills development. Consideration of the jobs related to the land component of the project have not been included in the assessment of the socioeconomic benefits of the marine component By far the greater part of the socioeconomic benefits related to jobs and employment reside in the land-based component of the project which is projected to generate up to 600 direct and indirect jobs during the construction and operational phase of the project. The overall socio-economic impacts of the Sandpiper Project will be assessed as part of the land-based component and the full scale of potential social and economic impacts will be defined and presented, incorporating the marine component of the project.
3.7 All too often international mining companies have made promises	The general statement is noted as an opinion. Further comment lies

to Government that further beneficiation of the minerals will be undertaken in the country, but in the end, this does not happen with Namibia (and Africa) ending up merely as suppliers of raw materials while the beneficiation of the ore, jobs and profits are retained in industrialised countries.	outside of the responsibilities of the Proponent in this instance. In regard to the Sandpiper Project and in country beneficiation, it is noted that the land-based component of the Sandpiper Project comprises beneficiation of the ore mined in ML 170 to produce a phosphate concentrate. The phosphate concentrate produced from the Sandpiper marine phosphate deposits has been assessed and classified as suitable for use as a Direct Application fertilizer as well as being suitable for production of a wider range of fertilizer products. As such a fully beneficiated product (Direct Application Fertiliser) will be produced in Namibia as a result of this project. The 2018 Stratecon Report considers the range of potential benefits that could accrue to Namibia based on the establishment of a fully integrated phosphate based industry in Namibia, based on further upstream beneficiation of the phosphate concentrate produced from marine phosphate mining.
3.8 The NMP Environmental Management Plan appears to be very self-regulating without clear reporting structures and without strict standards for non-compliance. International experiences have shown that self-regulation contains inherent conflict of interest.	The comments provided address matters of legislation and policy which lie outside of the authority of the Proponent in regard to this application. The comments are noted as opinion. Regulation of mining activities falls under authority of the Ministry of Mines and Energy, regulation of environmental matters falls under the authority of the Environmental Commissioner and the Minister of Environment, Forestry and Tourism. The proponent has no authority over regulation, only over management of its operations.

	The Environmental Management Act 2007 is designed to address these issues as noted including the requirements for drafting of an assessment and environmental management plan, and related statutory reporting of environmental monitoring results required for renewal of clearance certificates on a 3 yearly basis. Under Namibian law, the Proponent is required to follow the defined processes. The Chamber of Mines has previously addressed the allegation by CNFA that the mining industry is self-regulating and the laws of Namibia are inadequate for regulation of seabed mining. Regarding the adequacy of Namibian legislation , the Chamber of Mines, Namibia notes:" *CoM strongly rejects these insinuations as it implies that the Namibian Minerals (Exploration and Mining) Act 1992 ("Minerals Act 1992"), the Environmental Management Act (2007), and the Namibian Territorial Sea and Exclusive Economic Zone of Namibia Act 3 1990 are deficient in their legislative function and that seabed mining is currently being conducted illegally as a self-regulated industry, being without a proper legal regulatory framework. The truth is that these Acts are well constructed and gazetted with very stringent contractual obligations placed on the proponents* (CoM media statement 2021).

4 ACKNOWLEDGEMENTS

ECC would like to thank the I&APs and stakeholders for providing feedback during the ESIA phase of the ESIA process. We acknowledge and appreciate the time required to review these documents and ECC genuinely appreciate the input provided by I&APS. The valuable feedback received during the ESIA report phase of the ESIA process will ensure a robust ESIA is submitted to the relevant authorities for a record of decision to be made. ECC acknowledges that constructive feedback results in an improved ESIA and a project that is understood by the community and I&APs.

Through the ESIA process, the Proponent and ECC have endeavoured to provide a platform to hear and address all relevant comments put forward by I&APs.

ECC would like to thank all specialists for their input, key stakeholders, groups, associations, private individuals, and government representatives for the constructive and challenging feedback during this process.

Although the official public review period for the scoping report is over, comments will now be directed to the Environmental Commissioners office for a selected public review period determined by the DEA.

Lastly ECC would like to thank the Proponent for being considerate and accommodating to the input and feedback from the I&APS and the ESIA team. Thank you for taking on and including feedback from the I&APs, local experts, and our team.

APPENDIX A – ORIGINAL COMMENTS AND RESPONSES SUBMITTED

From: **Lisa Levin** <llevin@ucsd.edu>
Date: Mon, Sep 12, 2022 at 1:08 AM
Subject: New I&AP submission
To: <info@eccenvironmental.com>

The following I&AP submission has been made on the ECC website:

Project: ESIA for the proposed Sandpiper Marine Phosphate Project within ML 170, offshore, Namibia

Project Name

ESIA for the proposed Sandpiper Marine Phosphate Project within ML 170, offshore, Namibia

Name

Lisa Levin

Company / Organisation

Scripps Institution of Oceanography, University of California, San Diego

Nature of company or organisation

Academic Institution

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Map It

Declaration of Interest

Expertise in deep-sea benthos, deep seabed mining impacts and climate change. Co-lead of Deep Ocean Stewardship Initiative, a scientific network dedicated to bringing science to policy making. Research experience off Namibia.

Comments

Submitted by Lisa A. Levin, Scripps Institution of Oceanography, UC San Diego
Sept. 11, 2022

Comments on Addendum report ECC-133-377-REP-25-A

Addendum report Appendix C and Appendix E were reviewed.

General: Use of several terms and statements should be called into question, as they appear to be an attempt to deflect from the fundamental issues. Additionally – the assessment of impacts throughout the ESIA document are generally too conservative – where high significance (severe impact) is designated as medium, and moderate impact is designated as low significance.

The use of the term dredging is not appropriate for the mining operations proposed by Sandpiper, which will remove the upper 2.5 m (or even 3 m) of seafloor. Dredging is typically done to clean or remove unwanted sediments and debris. Note the removal of diamonds from marine sediments (e.g., by DeBeers) is called diamond mining, not diamond dredging. There is an extensive discussion of diamond mining by DeBeers in Appendix E. This is taking place in even shallower waters than the proposed phosphate mining as noted in Appendix E (which also refers to phosphate mining… not phosphate dredging).

Removal of the seabed to 2.5 m (or even 1.5 m) is a huge impact on all features that affect life on the seafloor (substrate type, grain size, water content, geochemistry of sediments and porewaters, water flow, pH, oxygen, suspended sediments etc.).

This statement appears in several places. The proposed operations are at 200m-225m water depth on the continental shelf and are not located in the deep sea. Proposed operations at 200-225 m ARE in the deep sea as defined by practicing scientists. Depths below 200 m experience changes in light, temperature, food supply and other factors that select for different animal attributes (taxonomic composition, morphologies, lifestyles and body sizes) than in shallow waters. (Bindoff et al. 2019; IPCC SCROCC Ch. 5). Other reference for the >200 m definition of the deep sea Mengerink et al. 2014 (Science 344: 696-698); Danovaro et al. 2020 (Nature Ecol. Evol. 4, 181-192), Levin et al. 2019 (Frontiers Mar. Sci. 6: 21) and hundreds of others

This statement is incorrect: "Deep Sea Mining is primarily mining of a specific group of deep-sea deposits (Cobalt Crusts, Polymetallic Nodules and Seabed massive Sulphides) which are found only at water depths of greater than 800-1000m on the Continental Rise and Abyssal plain in water depths of up to 6000m."

Mining of phosphorites when below 200 m is considered deep-seabed mining. Phosphorites have been considered for deep sea resource extraction alongside cobalt crusts, polymetallic nodules and massive sulfides. For example, see Levin et al. 2016 (Marine Policy74: 245-259; Defining "serious harm" to the marine environment in the context of deep seabed mining). In some places minerals such as FeMn crusts and phosphorites can co-occur in the deep sea – such as off southern California.

Repetition of Comments: Please note that repetition of comments (by submitters) from previous reviews likely means these issues remain inadequately addressed.

Time for Review: Previous review comments objected to the short period available for review. This same problem has arisen with the current review period. There are many pages to examine and too little time.

Tailings Release Location: Release of tailings 15 m below the surface is distant from the bottom and makes it likely that almost the entire water column (to 220 m) will experience tailings impacts (turbidity, heavy metal and radioactive enhancement, changes in light) and that the tailings will disburse further than if placed near the bottom.

Responses to Comments:
The addendum responses in most cases fail to address the comments, and largely refer to the ESIA documents and processes. For example - the proposed zone for phosphate mining is the exact area of the large adult HM biomass and poses further threats for our fishery. Response: The potential socio economic, sediment plume dispersion and fisheries impacts will be fully assessed as part of the ESIA process.

The query about microbial studies has gone unanswered. It is not only a plume issue.

Responses to queries that state the impacts have been assessed by specialists in their field internationally and by external peer reviewers are disingenuous. There were relatively few international specialists hired as official reviewers, some without deep-water expertise. Many of the external peer review comments from scientists around the world that have been provided since 2014 seem to be ignored.

Comments on Appendix E

3.2.1

The discussion of benthic faunal recovery potential in the SP-1 mine area draws heavily on analysis of faunal recovery from shallow water dredging. Shallow-water processes in high oxygen settings will proceed very differently than in the SP-1 deeper water, lower oxygen environment.

The projected significance of removing the benthic fauna and associated substrate over a maximum of 2.5-km2 and average of 1.7 km2 per annum for 20 y is given as medium. This cannot possibly be correct, based on the abundance of biota shown in images The authors of this section acknowledge that recovery will likely not occur in the lifetime of the mine. It reports that sediments will change from silty sand to silt, with altered species composition. An explanation is needed as to why this is a medium and not severe effect.

The text refers to Jones et al. 2017 -which analyzed faunal recovery from simulated polymetallic nodule mining in 11 studies. Appendix E states Almost all studies showed levels of recovery in faunal density and diversity, especially for meiofauna and mobile megafauna, often within one year. However, some of the investigated sites were to a degree still depauperate in most faunal groups assessed over >10-year timescales suggesting longer-term recovery periods from effects of mining across most taxonomic groups.

This is misleading as the key point made by Jones et al. 2017 is that " very few faunal groups return to baseline or control conditions after two decades" This quote was left out. So was the point that "sessile megafauna did not show any evidence of recovery". Also left out is the reference by Jones et al. 2017 to a study showing deep-sea meiofauna did not recover 26 years after disturbance. (Notably, meiofauna will not be monitored by NMP). It is also noted by Jones et al. that the assessed studies suffered from innaccurate location information – meaning it was unclear if the experimental disturbance sites were accurately resampled, and from undersampling of fauna. Jones et al. also concludes that " It is our view that insufficient information is currently available to generalise the observed biological effects to the longer terms, larger scales, and greater disturbance intensities (e.g., from sediment plumes) expected to result from full-scale mining activities. They point out that "Recolonisation of seafloor communities clearly is scale-dependent, such that recolonization of vast mined areas of seafloor impacted repeatedly by sediment plumes will require much greater time scales than recovery of the relatively small experimental disturbances reviewed here."

These points need to be considered in the analysis of the proposed NMP mining. Some discussion of cumulative impacts from mining SP-2 and SP-3 is also needed.

3.2.2

The altered topography and formation of anoxic areas is also given a medium significance rating. The text suggests, without real substantiation, that this is not considered likely – but where it occurs this is also of high significance.

3.2.3

The sampling for thiotrophic bacteria is inadequate. As pointed out in the text, the large, sulfur oxidizing bacteria can migrate vertically and may not be visible in ROV or AUV imagery.

3.2.5 The following statement may not be true:

"Furthermore, elevated nitrate concentrations at the base of the water column and in the sediment pore-water supports the contention that HS- flux is low as the two compounds cannot coexist" Please see recent papers on nanoaerobic respiration e.g., Berg et al. 2022 FEMS Microbiology Review and others.

3.3 Appendix E states that "High suspended sediment concentrations near the sea bed generated by the drag head and subsequent re-deposition of the material causes smothering effects on the benthos. This impact is very localized and short term, and effects will only be relevant along a narrow strip around the outer edge of the dredge site since any re-deposition inside the dredged area will have no impact as the animals are removed. Significance rating is low.

Multiple parts of this statement are incorrect. The suspended sediment plume will affect areas that are left within SP-1 as source populations (discussed in section 3.2.1 - leaving unmined patches of seabed adjacent to or within targeted areas, to aid the recovery of macrofaunal communities. Many new papers have emerged recently on effects of deep-seabed mining sediment plumes. The dredge head plume will affect the lower 10 m of water and up to several hundred meters away. Over the SP1 area and surrounding this is a large volume of impact.

3.4 Plume from hopper spillover

The statement that sediment plume behaviour put forward in the EIA was based on available data on regional currents and measured and modelled marine diamond mining discharge plumes in ~100 m water depth is concerning. Are the sediment properties, particularly grain size, in the diamond mining area similar? Seems unlikely. Current regimes will differ as well.

3.4 and 3.5 Significance impact of plumes and sediment deposition smothering are given as low. But these sections donot discuss the actual sublethal consequences of the suspended plume or deposited sediments or note the effects of multiple mining operations, should they occur. Strips of biota left unmined within SP-1 will be severely affected – the impacts will not be low! Since the claim is that this will not contribute to the nepheloid layer – please give the range of existing suspended sediment

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The Report states "According to the plume dispersion model, an area of 151 km2 outside of the dredge area will have a total re-deposition rate of >10 cm, which would well trigger the SSD HL50 of 54 mm. However, this is an accumulative prediction for dredging activity for the entire 20 years of dredging, while a single operational cycle is predicted to result in a 0.3 mm deposition, well below the HL5 (6.3 mm). Accordingly, no amendment to the significance rating is warranted. "

What is the duration of a single operational cycle? Have any long-term experiments (press vs pulse) been carried out on sedimentation effects? It is possible that 0.3 mm deposition (17 times a year – required to get 10 cm over 20 y) is harmful? Numerous sublethal effects such as clogging of feeding apparatus) are likely. Also epibenthic sessile taxa cannot escape even small burial (1 cm) as indicated by Smith et al. 2008 (..epifaunal suspension feeders, permanently attached to hard substrate could not escape burial of 1 cm depth). The suspension feeding tunicate Mogula appears to be exceptionally abundant in the area. Note the bias in Smith study towards molluscs (24/32 species were molluscs). What fraction of the Namibia benthos is molluscs? Also data in Smit et al. 2008 come from shallow water dredging studies, where the organisms may be far better adapted to periodic sediment disturbance.

3.6. Sound effects are given as low significance in the EIA and review comments indicate sound should be measured, but that "this can only be carried out once the dredger is actively operating onsite in ML170. What was learned from sound under diamond mining? Please see Williams et al. 2022 8 JULY 2022 • SCIENCE VOL 377 ISSUE 6602 p. 157. It is unclear how reference areas to examine effects of sound could be placed anywhere near the mining areas (and still be representative of the ecosystem). Vibration is also generated and can disrupt animal activities.

EIA and Environmental Monitoring Plan.

The benthic biological studies focus on macrofauna. There is no mention of meiofaunal sampling. Why? Meiofauna (nematodes, copepods) may be a major means of transferring energy from the seabed to the pelagic and demersal fisheries. There is limited focus on mobile epifauna and fish.

Note that sieving through a 0.5 mm mesh prior to preservation (as proposed) will retain many fewer animals than if preservation is done prior to sieving. Some fraction of macrofaunal juveniles will be lost.

On Mon, Sep 19, 2022 at 8:51 AM Angela Alchin <alchinangela@gmail.com> wrote:

Good day, with regard to the Marine Phosphate mining EIA,

I would like to know will Walvis Bay residents be made aware of the land-based component of this project?

For example:
3D mapping
another EIA of the land based part
will we be made aware of the areas where the toxic waste will be stored, and where the run-off of the plant will occur in the ocean?

Regards
Angela

From: **Thomas RATHENAM** <tirathenam@hotmail.com>
Date: Mon, Sep 19, 2022 at 10:25 AM
Subject: New I&AP submission
To: <info@eccenvironmental.com>

The following I&AP submission has been made on the ECC website:

Project: ESIA for the proposed Sandpiper Marine Phosphate Project within ML 170, offshore, Namibia

Project Name

ESIA for the proposed Sandpiper Marine Phosphate Project within ML 170, offshore, Namibia

Name

Thomas RATHENAM

Company / Organisation

X=tr Consultants

Nature of company or organisation

Consulting

Email Address

tirathenam@hotmail.com

Telephone No.

0811289880

Address

PO Box 23135
Windhoek 9000
Namibia
Map It

Declaration of Interest

As a concerned member of the public

Comments

An important part of the risk management plan is that it is entirely based on self policing. Is the company willing to commit sufficient funds to allow for I dependent periodic assessment and should adverse results come from these assessments to stop all mining activities until these adverse activities have been remedied?

From: **Marcia** <marcia.a.fargnoli@gmail.com>
Date: Mon, Sep 19, 2022 at 9:39 PM
Subject: Comments ECC-133-377 draft ESIA assessment report, EMP and appendices for Namibia Marine Phosphate (NMP), proposed Sandpiper Marine Phosphate Project within M170, offshore, Namibia
To: info ecc <info@ecconvironmental.com>

Dear Environmental Compliance Consultancy,

Thank you for the opportunity to comment on the draft ESIA assessment report, EMP and appendices for Namibia Marine Phosphate (NMP), proposed Sandpiper Marine Phosphate Project within M170.

I would like to first state that the commenting period for such a large amount of documents was rather short at 15 days. In any case, I have done my best to raise many of the issues I am concerned with. Please find my comments and questions below.

1. Please give details of how you ascertained the legal requirements of your project. Did you employ a legal expert? Can you provide details such as a short CV on this person?

2. Please can you explain how you came to the conclusion that the portions of the mining project that must take place on land should not be included in this EIA when they are part and parcel to the mining project and mining cannot take place with no place to put the recovered material.

3. Please can you explain why your Environmental Management Plan is so vague? There does not seem to be a very clear reporting structure. There also does not appear to be internal regulations/strict standards for noncompliance. The EMP is overtly self-regulating. How did you conclude that this Environmental Management Plan is sufficient to regulate your operations in a way that will be compliant with the Environmental Management Act.

4. Please can you give details of the minimum requirements (qualifications and experience) you will utilise in order to hire an Environmental Manager.

5. Please explain how you came to the conclusion that you will 'only' mine 34km2 out of your whole Mining Licence Area? What will legally bind you 'only' to mine in this 'mine plan area'? What control measures are in place that will prevent you from mining outside of this 34km2 'mine plan area'?

6. You suggest that you might mine in other areas of the Mining Licence area in the future, but the onsite studies have not been completed for the entire Mining Licence Area, so how can you claim that your scientific studies would be accurate for areas where you have not conducted studies?

7. The Zone of Influence is overly downplayed in the report. The Zone of Influence from the discharge plume is 513 km2 outside of the mining target area from only Zone 1. It needs to be made clearer up front that the impact extends far beyond the 34km2 'mine plan area.' What would the zone of influence be if you mined other areas in the MLA? Where would they extend? What if you mined the whole MLA?

8. Please explain why the footprint of your mining operation will extend beyond your Mining Licence Area by 11km2 for Zone 1 and why you think this is acceptable. How far would this footprint extend outside of the MLA if you mined the entire MLA (which is what you have a mining licence for that you seek Clearance for).

9. How do you plan to stay to the maximum of 3 metres into the sea floor? What systems do you have in place to prevent you from going deeper?

10. Please explain any other activities you will be conducting in the remainder of the Mining Licence Area?

11. Please explain why you have not included the full cumulative impacts of the full project including those revolving around mining waste and why you have separated these as if they do not form part of mining operations. These form a critical part of the mine and the project cannot go forward without these, so why are these not in this EIA? As part of the whole project EIA, all of the components (including those based on land) must be looked at to ascertain the cumulative impacts of the mine. Most of the components of the mining project are based on land and these will also have impacts on the marine environment that need to be addressed. If all components of the project are assessed together, it will be much clearer what the cumulative impacts will be.

12. Please explain what you mean by the statement "The dredger then travels to Walvis Bay to berth at an appropriate facility to discharge the phosphate ore ashore as cargo." Has an 'appropriate facility' been designated already to discharge the phosphate ore 'as cargo'? If so, where is this facility located in Walvis Bay? How will such a 'cargo' facility be regulated enough to handle 125,000t of slurry per campaign week?

13. Please explain why you believe it is acceptable or appropriate to dispose of tailings 15m below the ocean surface? Shouldn't the tailings be brought to shore and disposed of in a Tailings Dam on land? Why do you believe it is acceptable to dispose of the tailings into the ocean and not in a Tailings Dam?

14. Why have you not analysed the temperature of the tailings that you will release back into the ocean? Temperature has a very serious effect on marine life and how can you guarantee the temperature of the tailings will be exactly the same temperature of the receiving environment? This could potentially have a serious effect on the receiving environment and you have chosen not to even consider it as a potential issue and have failed to assess this.

15. Figures and maps relating to Walvis Bay and Figure 15 are too blurry to understand.

16. Why do you conclude that resident demersal fish, such as hake and monkfish, already have elevated levels of cadmium in their livers and this is the reason why unnatural disturbance will not increase the toxicity load? Certainly if they already have elevated levels of cadmium in their livers, adding more would not be a good thing.

17. Why do you conclude that unnatural disturbance and release of sediment through mining will not increase the level of heavy metals released by way of a plume. Disturbing up to 3 meters of the sea floor with a dredger is unnatural and as a result, the sea life will be exposed to an amount of sediment that has never been naturally released. Indeed this can result in bioaccumulation and this can negatively affect the whole food chain including fish, sharks, marine mammals, sea turtles, and birds, many of which are protected. Your report refers to arsenic, cadmium, chromium, copper and nickel as being the heavy metals that occur in the area. It has also been admitted that uranium and thorium and their associated radionuclides could be released. Why would this not be a serious concern for these to be released in the form of a plume caused by mining activity of 3 metres of the sea floor which is not natural? With regard to the radioactive elements, it seems you will only analyse this effect through the EMP only once mining operations are underway. That is way too late to make such an assessment. You must be sure before an environmental clearance can be given and before you are allowed to mine.

18. Why has the impact of sediment plumes and their possible toxicity not been assessed for the entire food web including marine mammals, turtles and seabirds?

19. Sediment plumes could affect echolocation and other forms of communication between species. This has not been discussed.

20. With regard to noise impacts, why did you choose only to conduct a literature based assessment and instead wait until the intended dredger is on site in order to assess the impacts only once mining starts? You have stated that "Noise levels from the dredging may also affect behaviour, but we have no firm conclusion on this impact which requires a specialist response." You have provided no specialist response with on the ground data. You must be sure before environmental clearance can be given and before you are allowed to mine. You will also not have a specialist response on the boat at all times. Why is it that you say that fish will not be displaced or affected by the noise but marine mammals will choose to avoid the area when you have not had a specialist response on this? How do deem this as not serious enough to study thoroughly in this EIA and only wait to explore this issue once already mining? Noise can have a serious impact on marine life and this has been proven before. Your study does not address this.

21. The studies on whales, turtles and seabirds is entirely lacking and consists only a very short desktop study. Many of these species are protected under Namibian and International law. Your report has admitted that Zone 1 is located in a critical area offshore for whales and dolphins, and that most, if not all species are expected to be found in the proximity of the mine site. The entire zone of influence of 513km2 could impact them and displace them and affect their feeding, but you have not completed an onsite impact assessment. You do not even know exactly what species occur in the MLA, and what they use the area for but you assume the impact is insignificant enough to not even study it. Your conclusion is that these species will not be affected once mining ceases, so it is a minor effect. The reality is that mining will occur for 20 years. This conclusion is seriously flawed especially with no on site studies having been conducted.

22. Why do you determine that with a 20 year life of mine that the project will have long term positive socio-economic impacts? How do you determine 20 years of a mine will offer a long term positive impact when essentially it will only last for 20 years? This is not a renewable resource and this is therefore cannot be a sustainable industry over the long term. Long term cannot be defined as 20 years. What will the impact of closure after 20 years be? In numerous towns across Namibia, there is a boom and bust result from mining. In the end, the Karas region was left much poorer because of mining. How do you assume it will be different in this case?

23. What employment opportunities for local communities do you refer to? Certainly marine mining is extremely specialised and requires higher educational skills and experience, so the main type of work offered will not go to those in society that experience the highest unemployment rate. How many of the jobs are permanent and how many of these jobs will go to unskilled unemployed people?

24. In your socio-economic sections, you clearly state that 600 Namibians will acquire direct and indirect jobs when both the marine and terrestrial components of the project can commence. It is confusing that throughout the rest of the report you refrain from analysing the terrestrial component of the project, but you have chosen to analyse it in this instance. Why is that? Since your report consistently focuses on how you choose to separate the impacts of the marine component from the land component, you need to be consistent and separate the 'positive' socio-economic impacts as well, otherwise the report is entirely inconsistent in weighing up the pros and cons of the project. Please can you break down the types of jobs and the types of skills and education that will be needed for the marine component only since that is what this report is supposed to be focussed on?

25. Why are you including positive socio-economic impacts for the land component of the project in the Marine EIA? If you are including positive impacts from the land, certainly negative impacts from the terrestrial EIA then also have to be included in this assessment, especially those which do directly negatively impact the marine environment arising from the terrestrial component of the project.

26. Why are you including positive socio-economic impacts for potential future industries, such as a fertiliser industry, that have not even been considered and have not undergone any environmental impact assessment? These have no place in the Marine EIA.

27. Why have you separated the socio impacts and the economic impacts into two separate impacts in the structure of the assessment chapter?

28. When looking at the breakdown of the structure of assessment, the marine assessment is taking only four of the assessment categories, where socio and economic take two, and cumulative one. Since this is a marine EIA, it seems odd that so much of the EIA is focussed on Socio and Economic issues on land.

29. Throughout the assessment on the marine environment impacts, potentially serious impacts, are down-played as low significance, especially when looking at the various tables of potential impacts. Why is this?

30. Why did adverse major impacts in 2012 and 2014 miraculously change to adverse low impacts in 2022, particularly with benthic biota, fishing operations and displacement of fish?

31. The maps are very blurry and unclear and it is hard to understand and see the details. Some of the maps do not have a clear key to make it understandable (for example it is not clear what the big red dot on some of the maps represents). The fish maps in the EIA only show the mining target areas, but they do not show the 513 km2 zone of influence outside of the mining target areas. The zone of influence must be clearly included and overlaid on these maps.

32. Why did you make some of the specialist studies available to certain members of the public for them to include in media reports prior to all IAAPs receiving them to review and analyse themselves?

33. Your report seems to deem that direct impacts on the fishing industry operations will be low because you suggest you will only mine in Zone 1 and this will impact direct fishing operations less (but not entirely). However this cannot be guaranteed to the fishing industry because you are seeking environmental clearance for the whole Mining Licence Area. If you are really 'only' going to mine the 34km2 area of Zone 1, then why not apply for a mining licence and environmental clearance only for that area? As long as you have a mining licence for the entire area of ML170 which you are seeking environmental clearance for, then you have to declare the impacts on the whole of ML170 and this includes the extensive impact on fishing rights throughout ML170.

34. In your report, you have determined that you could not provide data for cumulative impacts within your project because you do not have data to evaluate this. How can you determine the impact as being low across every category if you admittedly have no data to work from? How can you, with no available data on your intra-project cumulative impacts, conclude that your project "is unlikely to contribute significantly to cumulative impacts and therefore the contribution is marginal compared to overall activities within the Namibian EEZ." You do not have the data to back up this statement.

Thank you very much for taking the time to consider my concerns and questions.

Sincerely,
Marcia Fargnoli
The Earth Organisation Namibia

17 September 2022

To: Jessica Bezuidenhout
Environmental Compliance Consultancy (ECC)
PO Box 91193, Klein Windhoek, Namibia
Email: info@eccenvironmental.com

Dear Jessica

Re: ECC-133-377 **Public review,** comments, observations and input to the draft ESIA assessment report, EMP and appendices for Namibia Marine Phosphate (NMP), proposed Sandpiper Marine Phosphate Project within M170, offshore, Namibia

1. As the former Environmental Commissioner unequivocally stated, clearance may not be granted, before *both* the marine aspects *as well as* the land-based operations, on-shore processing facilities, waste components and so on have also been submitted, commented on, reviewed and accepted, as per legal requirements and guidelines. As such, the application for an environmental clearance for only part of the components of the project is premature and incomplete.

   The full cumulative impact is impossible to assess, or clear, without also taking account of the above-mentioned, integral land-based activities, in a holistic manner, document and assessment. Currently there is insufficient information on how the waste aspect of the proposed operations will be addressed, in its entirety, which is extremely alarming for Namibian citizens, and ecosystems at large.

2. The dangers of slime, waste and tailings has just been tragically and clearly portrayed in the very recent Jagersfontein debacle in our neighbouring country, South Africa: This mining catastrophe resulted in substantial, tragic loss of irreplaceable human life, millions of damages in destroyed homes and municipal infrastructure, to mention but a few; resulting in **multiple lawsuits**, by local government, **human rights watchdogs** and more.

   Contaminated water sources may well have been **irrevocably damaged**, providing huge concern as the area's summer rains are around the corner. These may have been destroyed forever, for generations to come. No water, no life. Loss of livelihoods and towns for generations to come, if not forever.

   Threats to underground water sources are by no means immaterial, and cannot simply be downplayed or ignored.

   Such damage may last into perpetuity.

3. In this context it would appear inconceivable to envisage the processing and dumping of tons of highly toxic material and slime in the proposed proximity to

Walvis Bay. The proponent acknowledges the presence of heavy metals, uranium and cadmium, among others, in the sediments concerned.

4. Disastrous examples of similar phosphate mining projects wreaking havoc in countries such as Nauru, Tonga and Mauritania, among others, may not be disregarded.

5. One of the many reasons this initial NMP EIA was overturned and rejected in 2012, the other reasons being inadequate science, inaccurate scope, and unsatisfactory public participation. Not much has changed since then, except for reams of overwhelming, volumous documentation having been dumped on the public for scrutiny two weeks ago.

6. **The classification of impacts has been immensely played down, under-estimated, throughout the process.**

   Surreptitiously this changed from '*adverse major impacts*' in the presently reported 2012 and 2014 processes to *'adverse low impacts'* in the current version. This appears utterly untenable, unjustifiable and inconsistent.

7. The gazetted moratorium instituted, defended and confirmed by the Namibian Government seems to have been disregarded throughout.

8. The appendixes are not provided in order, but in a very confusing, jumbled fashion.

9. The NMP Environmental Management Plan which is alleged to form part of the Verification Study advocates adaptively managing marine mining impacts, with NMP undertaking environmental monitoring and providing results to Government.

   From a procedural point of view this is entirely unacceptable, as **self-regulation by industry** has proven time and again to be ineffective and toothless, as it contains an inherent 'conflict of interest' element. Worldwide, it has become undeniable, how ineffective and flawed such an approach is. If it were not so, we would not be faced with the continuing sagas of mining disasters resulting in significant harm to human lives and the environment.

10. **In addition to the point above, adaptively managing marine mining environmental impacts does not work in an ocean ecosystem, because once the adaptive measures have been identified the harm has already been done.** Hence the **legally**

and constitutionally required *precautionary approach* requires cautionary measures and approaches to be adopted and enforced, as a guarantee BEFORE ANY environmental harm has been caused. This is also legally required in the **international** context, which has become extremely pertinent in the marine phosphate mining issue.

Namibia would do great harm to her reputation, as a **law-abiding constitutional democracy,** and **international** relations by allowing such to go ahead, at the cost of her widely acclaimed and lucrative fishing industry, which is based on a **renewable** resource, as well as the safety of Walvis Bay and coastal regions.

11. Namibian Marine Phosphates proposes mining in the area south of Walvis Bay where there is potential direct overlap with valuable juvenile fish that are specifically protected from fishing in that area, at 200 metre depth. Harm caused by mining and prospecting activities could be irreversible, once its impacts to Namibia's economically invaluable fishing grounds, stocks and nurseries has been detected and quantified. **It is undeniable, and needs to be acknowledged, that mitigating measures for certain kinds of harm are not possible nor effective.** Namibia's fishing industry is based on a renewable resource, directly provides 16800 persons with employment, many of them female. This is in addition to approximately 60 000 indirect jobs.

    According to Namibia's Statistic's Agency, Namibia exported N$ 7,03 billion in seafood exports in 2016.

12. The feasibility of phosphate markets has not been established. Even if these were economically proven, in this day and age it does not justify endangeringing the fishing industry and valuable fishing grounds for the sake of a **non-renewable** resource.

    It is commonly and widely, scientifically accepted, that all forms of mining do cause environmental harm, due to the very nature of mining activities. In addition to this, phosphate mining activities require highly industrialised equipment, being outsourced, and are, relatively speaking, not very labour intensive, vis a vis the alleged employment creation and provision of jobs for local Namibians.

    The present horse-mackerel fishing sector already contributes significantly to employment as well as food security in the SADC region: an existing, renewable industry, which does not result in the destruction of ecosystem habitats, nor pose direct threats to the health and safety of the environment and Namibian people, unlike the proposed phosphate mining activities, which could potentially destroy this fishery and cause significant harm to people and the environment.

The methodology, quantification and reflection of socio-economic benefits in the report is fundamentally flawed, highly overdramatized and manipulated, as it is based on including the land-based operations, which have yet to be assessed in their entirety.
Arguably the land-based operations of the project may well pose much higher direct dangers to members of the public than the marine component. In addition, the employment numbers have been radically overinflated by the proponent, and do not make sense in relation to NMP's proposed operations.

13. Legally, the EIA process is incomplete, as the on-land / coastal processing issues have not been sufficiently addressed, if at all, nor any transporting of ore and other materials.

14. The so-called 'verification programme report' does not appear to have any legal identity in law, unless there is a formal, Ministerial agreement regarding said report, in which case such contractual, Ministerial agreement should also be made available to public scrutiny.

15. Many concerns have been raised by internationally re-knowned scientists, lawyers, community activists and IAPs (Interested and Affected Parties). Most of these have been largely ignored and brushed over. <u>No mitigating measures have been listed for numerous concerns raised.</u>

16. The documents made available reveal a fragmented, non-collated and unconsolidated EIA. There is massive repetition of selected opinions of the mining company's appointed consultants and reviewers, which is extremely tedious to analyse and process.
In the so-called "verification report", not only are the different sections dealing with the various aspects of impacts not integrated; they are also divided into different volumes, adding to the repetition, lack of collation, and confusion regarding alleged planned activities.

17. The scientific methodology in many of the presented studies is faulty and lacking, so that interpretation of the results obtained is invalid and irrelevant to the alleged assessment of impacts. For example, assessing sediment toxicity in tanks is not satisfactorily comparable to the ever-variable nature of ocean currents and the marine environment. Simply put, it is not good science either. Many graphs, illustrations and tables are both outdated, unclear and confusing.

18. The logic employed in the interpretation of the impacts does not always make sense and is erroneous in many places; this was however not identified by the so-called '*independent*' reviewers, who are, in actual fact, appointed, commissioned and paid for by the proponent.

19. A common ploy has been adopted by the proponent, in punting the term *'dredging'* in all aspects, whereas, materially, the activities pursued and sought after relate to full-scale *mining* activities. Again, the link to the over-inflated, alleged socio-economic benefits has been entirely manipulated and misrepresented, as 'dredging' may not lead to the economic benefits claimed.

    In actual fact, the activities for which environmental clearance is being sought, including the marine area and **depth** concerned, are classified and commonly recognised as deep-sea mining.

Confederation of Namibian Fishing Associations

Chairman: Matti Amukwa Email: matti@empirefishing.com.na P O Box 2513 Walvis Bay
Secretary: Ron Wolters Tel: 081 646 4720 Email: secretary@nha.org.na

19 September 2022

To: Jessica Bezuidenhout

Environmental Compliance Consultancy (ECC)

PO Box 91193, Klein Windhoek, Namibia

Email: info@eccenvironmental.com

Dear Jessica

Re: Confederation of Namibian Fishing Associations submission on Namibian Marine Phosphates Environmental Social Impact Assessment (ESIA) Report for the proposed Sandpiper Marine Phosphate Project Within ML 170, Offshore Namibia. Project number: ECC-133-377-REP-03-C

Thank you for the opportunity to provide this submission.

As an interested and affected party (IAP), the Confederation of Namibian Fishing Associations (CNFA) represents the commercial fishing industry, and is concerned to ensure that the Namibian Marine Phosphates (NMP) proposed deep sea marine phosphates mining project does not negatively impact on the fishing industry, which is a major player in the Namibian economy, both in terms of GDP earnings, and jobs.

Time required for Interested and Affected Parties (IAPs) to review draft EIA submission

The NMP ESIA is of both national and international precedent setting importance in terms of deep-sea mining, so must be allowed to be reviewed properly as it has the potential to impact future generations of Namibians.

Including all annexures, the draft NMP ESIA amounts to thousands of pages. The annexures in particular are very technical scientific documents which require review by international scientists with the necessary technical expertise, as the average layman IAP is not capable of doing this. NMP in drafting its

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ESIA was very reliant on utilising technical scientists. IAPs should also be given the opportunity to call on international scientific experts to properly review the documents that form part of the draft ESIA.

Over three months ago, in early June, the CNFA asked if we could obtain the 2020 technical reports on plume modelling, sediment toxicity and noise impacts etc., that NMP had commissioned as far back as 2020, as responses to gaps in the original Environmental Impact Assessment (EIA). We requested these, so that we could circulate them to international experts with the necessary expertise to assess these documents. However, we were told that "the reports form part of the current assessment process, and will be circulated to all registered IAPs in due course, in accordance with the regulations".

A two-week period for review is way too short. International scientists with the necessary specialist expertise to review these documents are very busy people, and cannot be expected to do a proper review of these documents with a deadline of two weeks. To get a good response from IAPs, where international expert scientists can have proper input, requires at least a three-month period.

Assessment of impacts

A recurring theme through the Namibian Marine Phosphates ESIA, is that there will be little or no damage, suggesting no adverse impacts. This submission disagrees, and points to areas of real environment concern.

Separation of "at-sea mining" and "onshore processing" ESIAs

While it is understood that NMP argue that it is necessary for them to receive environmental clearance approval for the at-sea mining operation first, so that they have security to then go ahead with the on-shore processing ESIA, the CNFA is very concerned that separating them does not give a clear picture in terms of environmental impacts upon which the environmental clearance is approved or not.

In any normal mining ESIA environmental clearance approval process, the mining operation and how the mine waste is dealt with, is handled together. In the case of the NMP operation, mining and how the waste is dealt with is mostly separated into two ESIAs. This presents a problem in assessing the mining operation, as the at-sea ESIA does not assess the bulk of the mining waste, which is part of the onshore operation. As in the case of the Frank Sinatra song, Love and Marriage, you can't have one without the other, if one is to assess the mining operation in a holistic way, properly.

The CNFA does not accept this ESIA as being complete and ready for submission for clearance without all the on-shore processing land components included. They are all part and parcel of the actual mine, and all aspects will have cumulative effects that have to be taken into account before any clearance can potentially be given.

Separately undertaking EIAs for the at-sea mining component of the Namibian Marine Phosphate and the onshore processing creates assessment problems.

The onshore processing element of 5 million tonnes of unprocessed material which must be brought ashore annually for processing into around 3 million tonnes of raw marine phosphate rock will require huge amounts of water washing the sludge (potentially including heavy metals and radioactive material)

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off the marine phosphate. This water will have to go somewhere, which includes back into the Walvis Bay harbour "marine environment", where the aquaculture sector grows, in particular, oysters. Oysters are filter feeders, which means they are perfect indicators for pollution, as they suck up everything in the water. Since oysters are grown for human consumption, concentration of heavy metals into oysters, would make these oysters unviable as a commercial product.

Key Developmental Principles

Two principles of overriding importance must, at all times, be borne in mind:

Firstly: it must be ensured that the environment holding these resources is not subjected to irrevocable damage which could lead to economic and social disadvantage for Namibia at a later stage.

Secondly: new industrial endeavours should not be developed at the expense of existing economic activity providing a mainstay for the national economy and upon which the livelihood of regions and communities depend.

The Namibian fishing industry is currently worth Namibia $ 10 billion annually, of which the hake sector contributes 60%. The hake sector also currently directly employs 12,027 people. **With a total allowable catch (TAC) of over 150,000 tonnes annually, the hake fishery today is only at 50% of its potential maximum sustainable yield (MSY). The Namibian Ministry of Fisheries and Marine Resources (MFMR), have a policy to grow the hake fishery to MSY in a number of years, which will substantially increase economic benefits to Namibia. As detailed shortly in this submission, it is the shallow water hake, *Merluccius capensis*, through which growth will occur in the Namibian hake stock to reach MSY, as it breeds and lives its life in Namibia waters. Much of the life cycle of *M. capensis* occurs inside of 200 metres depth, where the bulk of the fish stock lives.** Marine phosphate mining must not be allowed to negatively impact the hake resource, or the monkfish resource, which is also found close to where NMP propose to mine. The deep-water hake, *Merluccius parodaxus*, spawns in South Africa, which Namibia has no control over.

In addition to fishing sectors, especially hake and monkfish mentioned in the EIA of 2012, the wetfish horse mackerel sector has developed since then, through the direction of the Namibian Government, as shown in National Development Plan 5. Wetfish horse mackerel vessels land chilled horse mackerel to onshore processing plants in Walvis Bay, for further processing. Because the vessels cannot stay at sea for lengthy periods which factory freezer vessels can, they are particularly limited to fishing closer to Walvis Bay. Should SP1 be mined as a site, this would significantly negatively impact the wetfish horse mackerel sector in particular, to the point of threatening the sector's economic viability:

1. The Wet Landed Horse Mackerel (HM) Association object to the position indicated for phosphate mining above 25.5 degrees approximately, as it infringes into crucially important fishing areas for the sub-sector.
2. **The Namibian HM resource is the largest fishing resource by specie in southern Africa / SADC and at a total allowable catch (TAC) of 330,000 tons in 2022, is critical for food security in SADC.**
3. **However, due to current regulations, the HM sector (fishing only permitted deeper than 200m to protect inshore fish breeding and juvenile grow-out areas) is squeezed into very limited**

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zones to catch the TAC which becomes more and more difficult due to water temperatures and movement of HM during winter conditions. The area north of 25.5 degrees is the only area where catchable shoals of HM are found during specific winter months for wet fish HM vessels, and hence the risk to allow phosphate mining at that position. This area is also known to be where the large adult HM concentrate, and if marine phosphate mining is allowed to go ahead, a bigger risk of heavy metal contamination on this part of the HM resource.

4. Considering that the proposed phosphate mining zone has also been squeezed in the southern part of the HM catching zone outside the 200m depth, this is unacceptable as it poses a direct threat to the HM sector which is known as the protein basket for the lower income in SADC countries.
5. Also considering that the proposed zone for phosphate mining is the exact area of the large adult HM biomass and poses further threats for the fishery.
6. Based on importance of food security as well as newly found job creation in the HM sector, the Wet Landed Horse Mackerel Association proposes that all fishing areas outside the 200m depth restriction, where HM fishing takes place, be exclusively zoned for HM to ensure the survival of this important sector. **The wet landed HM sector aligns 100% with the Namibian Blue Economy policy in terms of food security and job creation for Namibians, mining inside these limited fishing areas posing a huge risk.**
7. During winter months the HM resource moves closer to shore, which makes catching areas even more difficult.
8. The risks to Southern Africa's largest fishing resource, as well as the significant potential to grow employment in this sector, outweighs benefits from mining in the limited areas of HM fishing. Also, the Governments of fellow SADC countries have a vested interest in the wellbeing of the Namibian HM resource, due the importance of food security provided to the people of Southern Africa.

Impacts on breeding and juvenile fish stocks, the marine food chain in the water column including heavy metals, plume and potential noise impacts

The NMP proposed mine is right on the 200-metre depth restriction, which large commercial fishing vessels are not allowed to fish inside, to protect the inshore breeding grounds for fish, as well as grounds for juvenile fish to grow in a protected environment. The mining operation, both through dredging and releasing of fine sediments from the dredging vessel when loading the phosphate sludge, will impact the water column.

In the graphs below from the Ministry of Fisheries and Marine Resources hake stock assessment documents, **MC 21 and 22 in the top graph refers to *Merluccius capensis*, which remains in Namibian waters. This is the hake stock that is currently resulting in growth of the Namibian hake resource. You will note that the bulk of the fish is in the 100 – 200 metre depth restriction. And the second to largest quantity is in 200 – 300 metres. Namibian Marine Phosphates SP1 proposed mining site is just outside the area where the bulk of *Merluccius capensis* breed and grow. With currents impacting the mining sediment plume, as well as noise from the mining dredging operation, the Namibian Hake Association is very concerned about the potential impacts on the hake resource.**

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The lower graph, MP 21 and 22, refers to *Merluccius paradoxus*, which breeds in South Africa, and only comes to Namibia after reaching a certain size, going back to South Africa to breed off the West Coast Hondeklip Baai.

DWG/HK/2022/doc06

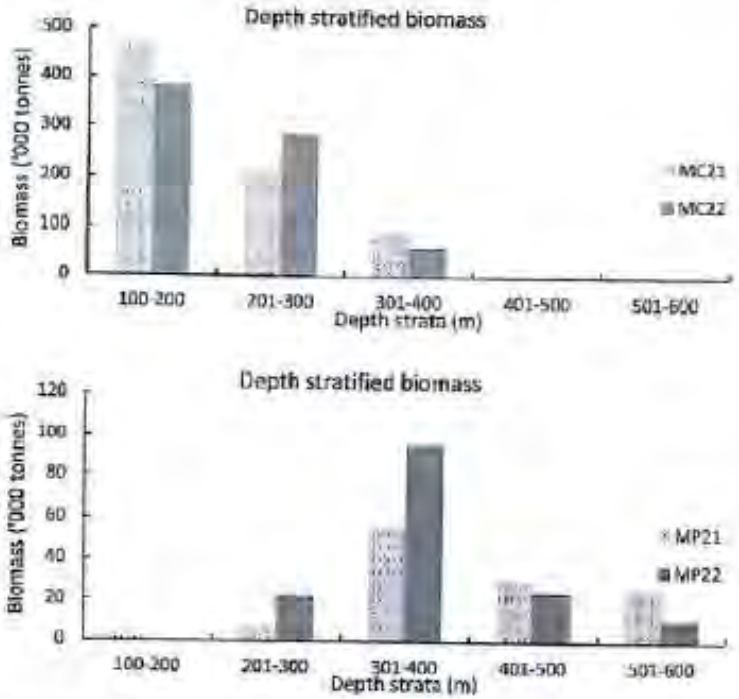

Figure 5 Depth-stratified biomass distributions for the two species of hake: M. capensis (top) and M. paradoxus (bottom) from the2021 and 2022 (bottom) swept-area surveys

Proportion wise, *M. capensis* dominates the two shallower depth zones (100- 300 m) while *M. paradoxus* dominates from 401 to deeper, with normally no *M. capensis* deeper than 500 m. The two species occur almost on an equal basis in the intermediate depths of 301-400 m.

Source: NatMIRC 2022 Hake Demersal Working Group

Heavy metals such as cadmium, as well as radioactive material such as uranium, have been found in the sediments of the ML170 area, and their pollution impacts need to be well understood, as well as impacts of fine particles in the plumes.

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The mining operation will release these metals because of the deep disturbance of the sediments. The N17 area in ML 170, from an international research cruise, has the highest levels of arsenic and cadmium of all 22 sites examined (Orani et. al., 2018.) Mercury is also measured in this report. Should these heavy metal levels increase above world food safety standards in Namibian fish marketed to international markets, the Namibian fishery could potentially be closed down overnight, until heavy metal levels dropped below the international food safety standard.

Page 95 of the draft ESIA report states that "the sediments of the Namibian continental shelf are characterised by elevated cadmium concentrations. It is suspected that residential demersal fish such as hake and monkfish, would have elevated cadmium concentrations in their livers. Therefore, dredging operations would not have an effect on these species". There needs to be data to support this assumption. The fish swim in the water column, where at this stage the sediment containing the heavy metals remains mostly undisturbed. **If the mining operation digs up the sea bottom, releasing heavy metals into the water column and consequently the food chain, the likelihood that heavy metal levels in fish will increase is potentially significant. NMP proposes to sample after the ESIA is approved, but this is a high risk to the fishing industry, and one that internationally would be unlikely to be accepted.**

While the ESIA studies on the **water column plume** downplay impacts, if 5 million tonnes of phosphate sludge are mined annually, NMP have stated that around 10% or **500,000 tonnes, will be released by the dredging vessel as fine tailings about 15 metres below the surface. With around 200 metres to the sea bottom, these tailings will impact the environment through water turbidity, change in light levels in the water, and heavy metal and radioactive material being released into the water column. As a consequence, these tailings will be disbursed much more than if they were placed near the bottom.**

Another concern is potential algal blooms resulting from exposing the rock phosphate on the ocean floor, and the mining operations sediment plume, fertilising the sea. NMP state that 1.7 square kilometres of seabed will be dredged every year from their SP1 site. This area will become cumulatively bigger every year. An algal bloom will deplete the seawater of oxygen. Separately, but also of real concern, Namibia as it expands its economy on the coast, will need to rely on investing in more freshwater desalination plants. Any increase in concentrations of algae in seawater could pose a threat to the effective operation of a desalination plant.

With reference to Appendix E on the water column, sediments, and benthos specialist study, benthic faunal recovery in the SP1 mining area, draws on analysis of faunal recovery of shallow water dredging with high oxygen levels – very different to the SP1 deeper water with lower oxygen environment.

Work by Jones et. al. 2017, relating to faunal recovery was quoted in Annexure E as suggesting levels of recovery often in 1 year, with some sites being over 10 years. The projected significance of removing the benthic fauna is given as medium. However, an explanation is requested as to why this is not severe? What was not quoted in the study was that Jones stated that "very few faunal groups return to baseline or control conditions after two decades". Jones et. al. concluded that "It is our view that insufficient information is currently available to generalise the observed biological effects to the longer terms, larger scales, and greater disturbance intensities (e.g., from sediment plumes) expected to result from full-scale mining activities. Recolonisation of seafloor communities clearly is scale-dependent, such that recolonization of vast mined areas of seafloor impacted repeatedly by sediment

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plumes will require much greater time scales than recovery of the relatively small experimental disturbances reviewed here". A consequence of this is that any strips of seabed left unmined in SP1 to help facilitate fauna recovery, will be severely affected by the plume.

The sediment plume model in Annexure I relies on a limited 3-month deployment of an instrument at one location to measure currents. There is also no data presented by NMP on natural sediment movements, suspension and nepheloid layers. These will be magnified by redeposition from the mining plume, as lighter muds settle later onto the seabed surface. As a consequence, turbid plumes can remain active during shelf break dissipation events, storms, and other long period activity.

Deposition of sediments in adjacent areas is a major concern for deep ocean mining. Mining deposits will be more susceptible to erosion and continued travel. Every effort should be made to discover available turbulence and sediment data to incorporate into the current models.

This also brings into question what impacts will there be on nearby fish breeding and nursery grounds, as well as cumulative impacts if mining is expanded into SP2 and SP3 areas.

Previous questions about the lack of microbial studies have also not been answered, as plumes are not the only issue.

Noise disturbance of the marine environment is also a major concern to the fishing industry. Large fish can swim away, but how will this impact and potentially disrupt their breeding cycle, given that they currently breed inshore of the proposed mine site? And juvenile fish, which are particularly vulnerable to changing environmental conditions, are not able to swim away. Different fish also respond to different sound frequencies.

Sound effects are given a low significance in the ESIA, and review comments indicate sound measurements can only be carried out once the dredger is actively operating onsite on ML170. This response by NMP does not give the fishing industry any sense of security or peace of mind.

Williams et. al., 2022, from a study by scientists from Oceans Initiative, the national Institute of Advanced Industrial Science and Technology in Japan, the Curtin University in Australia, and the University of Hawaii, found that **noise from one mine alone could travel approximately 500 kilometres in gentle weather conditions, creating a "cylinder of sound" from the surface to the seabed, with cumulative impacts likely in places where multiple mines operate**. It is also noted that although mining companies are already testing smaller-scale prototypes of deep-sea mining systems, they have yet to share their data on underwater noise pollution. So, **the Science article had to use noise levels from better-studied industrial activities, including "coastal dredgers".**

It's also noted the Science study joins a growing body of research where a number of countries, experts, corporations and environmental organisations are calling for a halt to any seabed mining, until science and management can be put in place that ensure that mining will not cause harm to the marine environment. The study "highlights how much remains unknown about mining's potential impacts, not just on the deep ocean, but throughout the water column" (University of Hawaii at Manoa, July 7, 2022).

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Deep-sea Mining Definition and the need for clarification on the term "dredging" with regards the NMP operation

NMP say that dredging for marine phosphate is on the continental shelf, and a shallow water operation.

Mining of phosphorites when below 200m is considered deep-sea mining. Phosphorites have been considered for deep sea resource extraction along with cobalt crusts, polymetallic nodules and massive sulphides (Levin et.al., 2016).

From an international definitions' perspective, all mining deeper than 200 metres is considered as deep-sea mining, and due to the Namibian 200 metre depth contour protecting fish breeding and nursery zones inside this depth, NMP will be mining in waters deeper than 200 metres. Due to the Benguela Current being very nutrient rich, visibility and the ability for sunlight to penetrate the water below the surface reduces quickly with depth. In other words, the Namibian marine environmental ecosystem becomes deep quickly, also impacting water temperature, food supply, as well as animal taxonomic composition, morphologies, lifestyles and body sizes (Bindoff et.al., 2019).

Also, the use of the term dredging by NMP deflects from the reality that this is a full-scale mining operation. Dredging is usually undertaken to remove unwanted sediment in harbours etc. The operational standards used to manage a harbour dredging operation, are quite different to the significant implications of mining marine phosphate. **In the case of NMP, it will be removing the top 2.5 - 3m of the seabed, which will have a significant effect, impacting substrate type, grain size, water content, geochemistry of sediments and porewaters, water flow, pH, oxygen, and suspended sediments amongst others.**

Meeting international marine mining standards / guidelines versus Namibia's local standards

Namibia is signatory to international agreements such as the United Nations Law of the Sea agreement (UNCLOS), which covers both international waters, and waters within national jurisdiction, following the precautionary principle.

On page 34 in Table 3 with reference to the Territorial Sea and Exclusive Economic Zone Act no. 3 of 1990, the draft ESIA states that **Namibian legislation regulates the activities of proposed exploration and mining projects that fall within these areas and "not" international guidelines or standards.**

Then, with reference to UNCLOS on page 44, this "provides an international legal framework to govern the seas and oceans of the world. Namibia as the designated State is required to administer exploitation, protection and preservation of the marine environment and natural resources on the Namibian Continental Shelf and Exclusive Economic Zone by enforcing the State's specific regulatory requirements for preventing pollution and damage to marine resources".

NMP then reinforce this on page 124 of the draft ESIA by stating that "The proposed Sandpiper Project is located on the Namibian continental shelf in water depths of less than 300m and which is deemed national jurisdiction falling within the Namibian Exclusive Economic Zone (EEZ) which extends to 200 nautical miles (370.4 km) offshore. This is consistent with the definitions and provisions of the Territorial Sea and Exclusive Economic Zone of Namibia Act, Act 3 of 1990, whereby international laws are not applicable, and Proponents are required to comply with the required Namibian regulations.

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Namibia has signed and ratified UNCLOS, and has therefore agreed to be bound by these international laws, both inside and outside its EEZ.

At the International Seabed Authority Conference in Jamaica during July and August 2022, Senator Johnson Smith, with reference to the Montego Bay Convention (UNCLOS), stated that it serves as best practice for the governance of global commons, noting that it is one of the first, and few instances in which the "Interests of humanity have been elevated above State sovereignty and national interests and codified in international law" (Smith, A. August 2, 2022).

The International Seabed Authority (ISA) has set out a Mining Code comprising a comprehensive set of rules, regulations and procedures issued by ISA to regulate prospecting, exploration and exploitation of marine minerals in the international seabed "Area". All rules, regulations and procedures are issued within the general legal framework established by UNCLOS, in particular its Part XI on the Area, and its 1994 Agreement relating to the implementation of Part XI of UNCLOS.

Given that Namibia has obligations under UNCLOS, proper deep-sea mining regulations need to be drawn up, including applicable international law.

Namibian Marine Phosphate appear to want to avoid being accountable to international deep-sea mining environmental standards. Why is that?

Socio-economic assessment of marine phosphate mining

The August 2018 report by Stratecon on the Economic Assessment of the Development of a Phosphate-Based Industry in Namibia, Appendix L, is based on assumptions which need to be challenged.

The Stratecon Report sets out to analyse the economic benefits that could accrue to Namibia from opening the country to an incipient phosphate industry. Stratecon recognises that a complete industry is not set up overnight, it is a process which evolves over time, yet in this study it was assumed to commence mining in 2012 and culminating in an integrated fertilizer industry by 2016.

If one considers that Namibia Marine Phosphates, on whose request the Stratecon Report was conducted, in its Terrestrial Scoping Report for the Sandpiper project published in 2012, clearly sets out that it will require three years to ramp up its production to reach its target output of three million tons of final product annually, then one must question how realistic it is to assume that Namibia will have an integrated phosphate industry within four years.

The Stratecon Report states that: *"The industry would expand in discreet steps as cost and market information becomes more certain within the Namibian context. First there would be the need for dredging and basic beneficiation. Firms would need to establish plants and secure markets for these products.*

This could be followed by additional beneficiation, which would also need additional expenditure on factories and securing of markets and then there is, finally, the option to expand into advanced levels of beneficiation."

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NMP in its Sandpiper Scoping Report 2012 states clearly that: *"intention is to mine these deposits using proven deep-water dredging techniques. The material will be transferred to shore at Walvis Bay, where minimal beneficiation is required to separate the phosphate sands from other marine sediments. The processed product is exportable in a particulate form as "phosphate rock" concentrate, which is sufficiently reactive that it can be applied directly to the soil to assist the plants to grow."*

It is apparent that the benefit of the Namibian phosphate deposits is that the mined material can, with a minimum of beneficiation, be turned into a product for which there is a big demand.

While the Sandpiper Project makes no commitment to further beneficiation other than producing rock-phosphate for fertilizer, the Stratecon Study paints a picture of a fully developed phosphate industry. Phosphate and macro-economic indicators show an increasing GVA from "further beneficiated products" for the period 2012-2016. Where does this increase come from? Have other operators appear out of the blue?

Let us now take a look at some of the other benefits quoted in the Stratecon Report:

- Dredging

Dredging of the phosphate deposits occurs at a depth of around 200 meters. Dredging at that depth is a highly sophisticated operation requiring specialists in this field. The amount of trailing suction dredgers capable of working in this depth is limited to a very small number of specialist companies mainly from Belgium and Holland. These vessels will need to be chartered at a fee to be paid in US Dollars, which will require large amounts of foreign reserves.

- Productivity gains in subsistence agriculture would have been boosted from 2010

With the project starting in 2012 we fail to see how productivity could have increased since 2010?

Fertilizers including phosphate are available in Namibia and if subsistence farmers have not made use of them in the past, why would they now apply them once Namibia has phosphate mining?

To claim responsibility for potentially doubtful gains in subsistence farming is far-fetched and not plausible!

- The data by Stratecon would like us to believe that phosphate mining will create 5,309 jobs in in the first year of operation rising to 18,900 in year four.

Sandpiper, in their Scoping Report 2012, put their fulltime employee requirements as first year 54, rising to 86 in year two with a final figure of 135 to produce 3,000,000 tons of rock phosphate! While there is talk of another 400 or so people, this is understood to just be in the construction phase.

If we employ the Social Accounting Matrix as used by Namibian economists, then one new job will create 3.8 jobs in other industries, which means that phosphate mining will add to another 513 jobs in other sectors. New jobs and induced jobs by phosphate mining will amount to 648 people!

We are at this stage dealing with one potential mining operation, but even if two or three additional mines were to start up, the labour requirements would be in line of those of Sandpiper, and nowhere near what is quoted in the Stratecon Study.

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Phosphate mining is a highly industrialised operation where machinery plays a bigger role than people. Further beneficiation of the rock phosphate is an industrial/chemical process which requires a small amount of highly qualified operators and technicians to manage the process.

The Stratecon Study, for obvious reasons, gives an overrated labour requirement to make phosphate mining be seen as the solution to the unemployment in the country, which is a false picture!

A socio-economic analysis of benefits gained from phosphate mining by the Sandpiper Project should concentrate on the activities proposed by the project, and not be based on a possible scenario which might arise from mining. The potential scenario is based on an assumption of factors over which the proponents of the Sandpiper Project have no control.

All too often international mining companies have made promises to Government that further beneficiation of the minerals will be undertaken in the country, but in the end, Africa always ends as raw material supplier and the beneficiation of the ore, jobs and profits are generated in the Northern hemisphere or the Far East!

The Jan De Nul N.V. socio economic specialist study on the assessment of dredging works, Appendix H, provided information on the JDN-scope which consists of a dredging vessel mining phosphate sand, a land-based buffer pond, an associated workshop, and a JDN Project Operations Support Office in **Walvis Bay, Namibia**.

Paragraph 2.1.4 of the report states that: **In the current project set-up, no infrastructure investments within the JDN scope are foreseen.**

As dredging provides raw material faster than processing can work it away, the dredger will be discharging its load into buffer storage from which the processing plant then will draw its raw material as required. It is planned to utilize the dredger for three months in the first year, six months in year two and, once the plant is fully operational, for nine months of the year. The dredger required will be chartered by Sandpiper from Jan de Nul for the required period, after which it departs to other dredging projects around the world.

In the current project set-up, no local shareholders within the JDN scope are foreseen (paragraph 2.1.5) and, therefore, no profits retained and distributed to local shareholders and no taxes paid. Charter fees will be payable by Sandpiper in US Dollars, as is customary in the dredging industry.

Deep-water dredging is a highly specialised sector of the dredging industry, and JDN will be providing the vessel with an established, fully qualified crew, more so as the vessel will not be spending the entire year working in Namibia.

Being a Belgian company, crew on board are recruited under European Union standards and mostly drawn from Europe. On completing their tour on board, the crew members are flown home to spend their rest period with their families.

Support services of the local industry will be limited to providing provisions and crew transfers.

The vessels are registered under a European Union flag and will obtain international bunker fuel which is duty-free, therefore, no taxes for the Namibian Government.

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Dredging supplies are highly specialised and not readily available in Walvis Bay, so it can be expected that the JDN head office will be shipping what is required out of Belgium.

The impact of the dredging operations for phosphate will have a limited direct impact on the Namibian economy, but will require substantial funds to acquire foreign currency to pay the charter fees in US Dollars.

NMP Environmental Management Plan

This appears to be very self-regulating, which raises concerns in terms of accountability from the perspective of regulating your operations. Is there a clear reporting structure including necessary regulations, and are there strict standards for non-compliance?

Self-regulation contains inherent conflict of interest. Dr. Bjorn Serigstadt of the Institute of Marine Resources in Bergen, Norway, stated that when oil and gas was first discovered in Norway, industry undertook self-regulation. It was quickly realised, however, by the Norwegian Government, that the Government needed to organise independent environmental monitoring, and not the commercial industry, to endure accountability.

Also, adaptively managing marine mining environmental impacts is very risky, because problems do not surface immediately in an ocean environment, but once they do, turning around the impacts of the harm done can take many years, if it is even possible to do so, as it may have caused an ecosystem regime shift.

Review of Appendix N in the ESIA downloads (although not listed in the draft ESIA) – 2014 NMP Verification Study

This is a key document forming baseline information for the ESIA of well over 1,000 pages of scientific reports, which should be listed in the ESIA contents pages, and currently is not, although it has been supplied as one of the download documents for ESIA assessment.

The following are a compilation of comments from international expert scientists, who over a short period of time, did their best to review the Verification Study.

1. Overall **Assessment Summary Tables** that assess significance of impacts have down weighted the majority of impacts. In some cases, this is because they compare the scale of one mining site to the entire Namibian coastline. This is not right. The impact should be assessed for the mining site and impact area.

The Verification Study defines impact as being "high" if ecosystem functions cease. **There is a need to undertake a proper assessment of environmental sensitivity to impacts.**

Where there are shown to be impacts of any significance in the Verification Study, no mitigation measures are offered. In other words, if the environmental clearance goes through based on the current Assessment Table grading's, Namibia Marine Phosphates (NMP) will not be accountable for any marine environment damage, unless it can be shown that the mining is causing irrevocable harm.

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All environmental impacts should consider those in the entire Mining License Area (MLA), not just SP-1 where they intend to start mining, as there is no guarantee that future mining will not expand to other areas of the MLA. On page 20 of the 2022 draft ESIA, NMP state that other sites SP2 and SP3 also contain phosphate resources, and may be considered at a later stage.

2. With regards **benthic biota**, the Verification Study states, "the removal of the upper 1 to 2.5 metres (possibly up to 3 metres) of sediment by dredging will result in the loss of the benthic biota associated with the sediment. The exposed sediments are likely to be different to the original superficial deposits, and sediment refill rates at this depth are likely to be very slow. Colonising assemblages are likely to differ to those present prior to the dredging activity".

This means **complete loss of benthic biota and regime shift likely / certain.**

Epibenthos are shown in the Verification Study to include large numbers of structure forming individuals - ascidians, sea pens and sponges. These provide nursery grounds and refuge for demersal and benthic fishes and fish larvae. They are also considered vulnerable marine ecosystems (VMEs) and in international waters have a protected status. Given the absence of knowledge about the location of early life stages of Monkfish and Goby, which occur in this area, it seems that the potentially highly significant role of the epibenthic invertebrates with regards to fish and biodiversity should be examined.

There really needs to be remotely operated underwater vehicle (ROV) surveys to visualize these ecosystem engineer species, and appropriate sampling (e.g., to see if fish larvae are living among sea pen tentacles, and juveniles in sponges). The high incidence of monk juveniles in the Verification Study sample trawls, suggest there can be a key relationship. It would be important to consider a thorough ROV benthic survey with an eye to creating protected habitats that help sustain the fisheries.

Low biodiversity of benthos does not mean low ecological significance. It is stated in Specialist Report Appendix 1 c of the Verification Study that "the available information indicated a benthic environment of generally sandy conditions in which benthic species diversity was generally low. This suggests that it is unlikely that the benthic habitat in the dredged area has a particularly key role in ecosystem processes".

Low biodiversity does not mean low ecological significance. Low oxygen areas are highly productive and that productivity (among few species) sustains key fisheries and other services. There is also a wealth of epifauna being ignored with potential high ecological significance.

The dominant species *Diopatra monroi*– a big polychaete that accounts for 54% of biomass is stated to be a direct developer with complete development inside its tube. This means it will not recover after mining (no planktonic larvae stage). It is likely to be a key trophic support species that is gone from the system for a long time. Its importance as fish food, sediment stabilization or other attributes should be investigated and addressed.

All this indicates the need for a "precautionary approach".

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3. Where is the discussion of impacts on **mesopelagic fishes?**

The Verification Study states, "Little is known about the potential effects of marine dredging (in particular the potential impacts of sediment plumes) on scattering layers that include *inter alia* mesopelagic fish species, gobies, plankton and zooplankton. Thus, it is recommended that future monitoring surveys should attempt to track the scattering layer patterns and trends in order to infer the relative abundance and distribution of these species. This could be achieved using industrial or scientific echo sounders." - page 698.

The turbidity and contaminants in the bottom plume and in the overflow sediment filled waters returned at the surface by the dredger, are sure to affect mesopelagic fishes. Namibia, like all other high productivity areas must have a wealth of myctophids, bristle mouths, (and krill), that serve as forage fish for other species in the ecosystem (including commercial fish species).

4. The different report sections contain many **contradictions** - about sediment texture (sandy vs silty vs mud), about heterogeneity (homogeneous vs environmental gradients), about metal contaminants.

Some call the sediments sandy when in fact they have high silt content. The meiofauna study says *it is likely, in this case, that the significant correlation between the sediment metals and the nematode community structures is* ***coincidental (due to the metals' associations with the fine sediments)*** *rather than causal.* The epifauna section says about sponges *that the brown coloration appears to have arisen from mud staining.*

Some areas refer to homogeneity of setting and fauna across the area. The meiofauna study refers to considerable heterogeneity. It says: *This reveals a nematode community distribution pattern that is consistent with the* ***presence of an environmental gradient.*** *The closely-related Cluster D, E and F meiofaunal assemblages were present at sites located on the eastern side of the verification survey area. Amongst these, the Cluster F communities were confined to the five sampling stations that extended along the eastern side of the grid. The remaining nematode assemblages, i.e., those belonging to Clusters A, B and C, were identified at sites located in the western half of the survey area (Figure D4).*

5. **Water Column and Sediments.**

"The currents and circulation information in the Verification Study was primarily taken from regional scale circulation modelling and other published sources. There is uncertainty on the applicability of this to the proposed mining area" - (page 340).

This is unacceptable. The Verification Study should have done current, tide and eddy assessments over at least 365 days at the site and at the depths needed.

"Local oceanographic processes were assessed during a 90-day deployment of a fixed mooring fitted with an upward looking ADCP, two Aquadopp current metres as well as a RBR CTD fitted with turbidity and dissolved oxygen sensors (Figure 3). The 90-day period was selected, in part, to detect effects of

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internal tides with a ~14 day (lunar) periodicity shown by Monteiro *et al.* (2005) to be important features controlling fine sediment distributions on the central Namibian continental shelf. The 90-day period would be able to capture 5-6 of these events, should they be detectable at the measurement site." So, **the Verification Study only measured 90 days.** It is unclear whether this was on the sea floor (193 metres).

And worse:

- "Similarly, important features of the water column were generalised from regional and possibly outdated information; this needs to be focused on the mining area."
- "Sediment characteristics vary zonally and longitudinally on the Namibian continental shelf, extrapolation from measurements to the north and south of the proposed mining area may not be sufficiently reliable leading to uncertainty ..."

With regards a sediment plume, in the Verification Study it is stated there were "a few key assumptions, these being:

- that the flows in the CSIR (2006) study were accurately simulated and that these flows are representative of those prevailing at the deeper 200 m to 225 m ML 170 sites;
- the physical properties (grain size distributions, flocculated or unflocculated settling rates, etc.) of the material that was dredged was similar to that which will be dredged at the NMP operations site;
- the quantities being discharged (particularly the fines component) by the NMP dredging operations will be less than that assessed in the CSIR (2006) study. The fact that the overall sediment discharge rates for the CSIR (2006) study were approximately 4 times those anticipated for the NMP dredging suggest that this will remain true even if there is a significantly increased fines component in the NMP dredging discharges;
- the assumed initial plume behaviours in the CSIR (2006) study were correct and correctly accounted for in the modelling undertaken as part of that study;
- that these initial plume behaviours reported in the CSIR (2006) study are also applicable for the assessment of the proposed NMP dredging discharges"

These are big assumptions. Without accurate current/tide/eddy measurements, and knowing (not guessing or assuming) the fines (resulting from mining), and the plume, you know very little.

6. **Sediment Plumes. The EU MIDAS Consortium (www.eu-midas.net) in their study on Managing Impacts of Deep-Sea Resource Exploitation, stated that: "There is a risk that the mining process will release metal ions into the water column, either in the benthic plume created by mining vehicles or, following dewatering on the surface vessel, in a mid-water plume. Such plumes can potentially travel hundreds of kilometres, carrying potential toxicants with them. Mid-water plumes may impact photosynthetic microalgae or animals within the water column".**

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The **sediment plumes** associated with mining, are now recognized in the Verification Study to be 2 to 5 times larger than previously thought. On what basis do they come to 2 to 5 times larger? **The plume will clog and damage the filter feeding epibenthos (ascidians, sea pens, sponges) in a broad area surrounding the direct mining footprint. With continuous mining it will not dissipate quickly. If these epibenthos have a nursery function, their widespread loss could be very detrimental to fish stocks. The same is true for surface feeding macrofauna (annelids, molluscs, crustaceans). Hydrogen sulphide may also be toxic to these organisms.**

The Verification Study states "*Sediment plumes are not expected to significantly affect recruitment as the area of dredging operations will be small and plumes should disperse quickly within a short distance from the dredging operations*". There is no sound evidence for this. Continuous mining with regular turnarounds will maintain a continuous plume.

The sediment will result in a 'soup' in which no larvae can settle. No knowing for how long. Extensive modelling is needed to show how far the plume will go.

In both the Trans-Tasman Ironsands and Chatham Rock Phosphate resource applications off New Zealand, the plume modelling was a major issue.

Table 1.1.3. refers to mitigation, releasing sediments 10-15 metres below the dredging vessel hull as discharge point. Why is that mitigation? It is still going into the water, still going to spread out. There is no evidence that this is below the thermocline, or anything which might help a little.

No ship operations can be expected to offer zero threat of pollution and alien species – there is always some. **Overflow water from phosphorite slurry reintroduced to surface waters is sure to have some nutrients but this is listed as none.**

The Verification Study states: "In summary, the two key metrics of relevance in terms of plume dynamics are the extent of the plume and the persistence (or duration) of the plume. The duration of the plume potentially has implications for biogeochemical transformation processes that may result in ecological impacts (e.g., oxygen demand and/or toxicity in the upper water column)." This is exactly why the plume needs to be understood properly now, ahead of any decision on whether to mine or not. In the draft ESIA 2022 document, Appendix I on plume dynamics and dispersion, more research is required to properly understand the plume.

7. **Hypoxia.** "However, dissolved oxygen concentrations were, in many instances, significantly depressed towards the sea-bed. The natural periodic development of hypoxic conditions is well-documented in Namibian coastal waters" – p 639.

So, with regards Table 1.1.10, what will adding a load of sediment and bacteria into these already low oxygen waters do? It is likely to use up all available oxygen, driving the system completely anoxic. An important factoid: each gram of sediment contains about 7 to 9 billion bacteria, most of whom are aerobes - they are very efficient at sucking the oxygen from the water. Especially when released from their anoxic world. What most people don't realize is that when you get just a few millimetres into the sediment there is no oxygen. Which is why animals make burrows and tubes to the surface. As a

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result, all the bacteria in those sediments are in a dormant state, and when oxygen becomes present, they start up the metabolic machinery and so use the oxygen that is available.

Mining/plumes/disturbance can only make hypoxia a lot worse, and exposing bacteria when mining the sediments will use up whatever limited oxygen is there.

8. The potential for release of **sulphide** and contaminants into the water column by mining is a major concern for many components of the ecosystem. Loss of sulphide oxidizing bacteria will contribute. **Hydrogen sulphide is an indicator of no oxygen, which is in turn an indicator of lots of dangerous compounds in the sediments, including heavy metals. We know that NMP's proposed mining site is not in shallow waters where the hydrogen sulphide eruptions are obvious, but there is still the risk of hydrogen sulphide conditions.**

The claim in the Verification Study that there is no sulphide, and no bacteria that use sulphide is almost certainly not correct as sampling and detection methods were not appropriate and the large amount of organic matter buried to 2-3 metres of dredged sea bottom sediment almost certainly generates sulphide (some small sulphide oxidizing bacteria were reported).

The fact that NMP did not detect any acid volatile sulphur (AVS) is definitely not proof that there was no free hydrogen sulphide present in the pore water. With frozen core samples which NMP scientists were using, is that even if there were low amounts of AVS initially present in situ, they may have been oxidized during core storage if the cores were not stored anoxically under nitrogen or argon.

It has been said that the method NMP scientists used for detecting hydrogen sulphide will not work at all. Dissolved sulphide really needs to be measured on fresh core material as soon as possible after coring, in the best case by means of rhizomes and immediate fixing of the liquid sample with zinc. AVS cannot be a proxy for H2S. Measuring redox potential is also impossible in a frozen sample. One needs dissolved ions for that, and alterations after sampling and during freezing/thawing will seriously affect the redox potential.

On the outer shelf there is probably plenty of Fe in the solid phase. The problem with AVS is not that there might not be Fe there, but that in most marine environments, AVS rapidly converts to pyrite, which you will not measure with an AVS treatment. You would need to do the Cr-II reduction to get at the total reduced inorganic S pool. The likely concentrations of pyrite S would be in the order of 100 umol S/g dry sediment. Pyrite oxidation (e.g., if the sediments are stirred up even in minimal amounts of oxygen) leads to acid generation and further enhancement of pyrite oxidation. **In other words, acid mine reactions; loss of oxygen in the water.**

Potentially there is free Hydrogen Sulphite up to a few hundred uM, and maybe a substantial pool of reduced pyrite sulphur (1 umol/g of reduced sulphur in the solid phase is roughly equivalent to 1 mmol S/L in the solution phase).

Hydrogen Sulphide is almost certainly present in mined sediments to 2 or 3 metres (despite claims based on inappropriate sampling methods). There are multiple lines of evidence for this. **The sediment report refers to sulphide scavenging heavy metals. Thus, introduction at the seabed and into the water**

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column remains a major concern despite claims of 'low' significance. The same is true for toxic trace metals.

The removal of sulphur oxidizing mats should be assessing the removal of sulphur oxidizing bacteria, which may be distributed throughout the sediment column. The survey has not adequately demonstrated the absence of these bacteria. ROV visual surveys are needed. Similarly, appropriate sampling and analysis techniques are needed. If they are there, the significance of the removal is high.

The microbial ecosystem in the sediment is primarily responsible for the phosphorite in the first place, and **we don't fully understand the controls in this process.**

9. Fisheries biomass in SP-1 and the MLA.

The extrapolation of catch rates from outside the area into it based on stratification by depth and area is an accepted technique. Average % of total biomass are presented in the summary, yet variance in catch rates can be high (and especially so for the non-target species). Stratification of the trawl survey will be directed mainly at the key commercial species, and the 95% confidence intervals presented in Table 1 look tight, but will likely be poor for less commercial or bycatch species. Survey design (and survey sampling gear) would also likely be structured around adult fish, not juveniles. Hence care is needed in talking generally about species populations.

The report makes it clear that the expectation is that there is movement within the stock boundaries for a number of species. Hence an all-data compilation will not pick up seasonal variability in how fish use the area.

A general point that comes up in the Summary section (p vii) is that the consultant scientists seem to be looking for "unique" situations in the area. With fish that is not the point, it is how different species use the area at different times, and at different life history stages. Plus, the nature and extent of secondary effects (sediment plume etc) is potentially much broader than just the SP-1 area, so comments about "negligible" seem unjustified (p. v).

With regards **assessment of fisheries biomass and stock assessment,** as mentioned above, Table 1 includes variance estimates for monk and hake. But no other species. Perhaps that was all that was asked for, one would have expected more than just 2 species.

It is noted on p.7 that recruitment will be driven by many factors, and will vary. That is quite correct, but without knowing the major drivers of some of the variability, it is hard to draw conclusions about whether or not disturbance in the mining area will be important. **Juvenile hake are shallower and to the south, but obviously migrate within the general area. Hence the secondary plume effects need to be considered, as do seasonal differences in distribution of fish relative to mining. The general conclusion that recruitment is unlikely to be affected in a major way is reasonable, but as the authors concede at the bottom of p.7, the possible impact of dredging goes beyond knowing simply biomass.**

A critical element of understanding **recruitment** is the seasonality of sampling. Irrespective of trying to establish temporal changes on annual time scales, sampling of adult fish and evaluating gonad development needs to be structured to ensure peak spawning times are determined. It also needs to be analysed on an appropriately small spatial scale to pick up "pockets" of fish that spawn several times

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throughout the year. Serial rather than synchronous spawning is more difficult to detect and monitor from combined historical data.

The review seems to have done a good job at picking up the main data on spawning. It is interesting to note that migration occurs for several species, and early life history stages (eggs, larvae, juveniles) can be significant in the MLA. A key aspect of understanding recruitment of fish stocks will be monitoring larval stages where pelagic mortality from both natural predation, lack of food, or effects from sedimentation plumes could be high.

Depending on the type of gear used in trawl surveys, they may be poor at retaining small-sized fish, and hence juveniles can be underestimated.

Figure 5 shows high variability in the total catch, with D11 standing out. So, one can expect reasonably high cvs. Yet these are not given. One wants to see where D11 was on Figure 6. Unfortunately, the binning of catch weights doesn't enable that - it would have been much more useful to have had a free-form graduated circle size without presenting 1360 kg as the same size as 11800 kg. Graduating the larger catches is often more useful than fine divisions of small catches.

Table 4. Gear selectivity is worrying with regards relative catch rates. One would have expected more than 14 species, so does the retained list tell us anything about gear performance. The report notes the fish species diversity was less than the compiled list in the original EIA. Gear effects come up again with the length frequencies. The left-hand limb will be constrained by the relative catchability of small fish as well as gear retention issues. So, one can't say if small monkfish were largely absent from the survey area, or there but not caught. It highlights that specific small-fish gear is needed to address recruitment-juvenile distribution and abundance. The verification survey can't say much about this.

This one-off survey was carried out in June, yet peak spawning for hake is mid-July to September. So how does one interpret a figure like Fig17. Clearly stages 3 and 4 are close to, and actually, spawning. But can an active fish (stage 2) in June spawn later in the year (say, September). Peak spawning would also coincide with peak aggregation density, so simply from an objective of evaluating the mining area for an objective to evaluate the importance of the area for spawning (of hake anyway), the survey should have been longer.

The significance of **impact** on recruitment of key commercial demersal/benthic species **cannot be low if all of their habitat and food is being removed, and if the locations of early life stages are not known (as for monkfish).**

The Verification Report states *"Recruitment of monkfish is likely to be negatively affected but the extent of this impact could not be assessed"*. This is a major result.

Missing – where are the benthic fish data for non-commercial species?

The Verification Study states *"No other major impacts on fish recruitment were identified"*.

Where are the goby egg laying and nursery grounds? Where are the monkfish nursery grounds? Do they use the biological structure and refuge provided by the invertebrate epifauna (sea pens, sponges) as in other regions?

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The finding of 7% of *L. vomerimus*recruits and 2% of biomass in the MLA is significant and of concern – giving that the mining impacts will spread well beyond this area via benthic plume and contaminants. If there are monkfish recruits and juveniles further inshore of the MLA, there is also a concern.

The heavy occurrence of goby, goby larvae and juvenile monkfish (45% of catch?) within the MLA, as indicated by the spawning summary, is of major concern. These are critical forage species for others (and seed for the monk fishery) so their complete loss (as is inevitable) from the mining sites is of HIGH significance.

Two approaches were considered when it came to assessing fisheries biomass and stock assessment:

Approach 1: To use observations from within the region of interest itself to directly estimate densities in the SP-1 dredging site and surrounding MLA.

Approach 2: To estimate biomass in appropriate strata in a larger area surrounding the region of interest, and to infer densities inside the MLA by appropriate weighting of strata in proportion to the areas represented by those strata.

Later in the report, they say they preferred approach 2 (no reason given, although if asked, one would assume they will say that the estimates of approach 1 had greater variance. All results are based on approach 2. However, Table 6.a) in the Verification Study shows that the hake estimates for Merlucius capensis biomass (and recruit numbers) is much higher for approach 1 than approach 2 (e.g. 15 410 biomass recruits vs 3 869). That is, for approach 1 their % of recruits in MLA would be roughly 4.5%, not 1.6%. This is of concern to the hake sector.

Other benthic fish species (west coast sole, kingklip, etc.) should be surveyed in the study area – at least by ROV.

10. **There is no discussion of the loss of natural ecological services and functions provided by the ecosystem** (e.g., what are these), although they are mentioned as a concern. Some of those functions include refugia, nursery grounds, and trophic support for fishes, habitat that promotes biodiversity and genetic diversity, Hydrogen Sulphide uptake and sequestration preventing release into the water, uptake of methane and sequestration of carbon, stabilization of sediment and prevention of turbidity, remineralization and nutrient cycling.

As a reviewer in the Verification Study says, "whereas the impacts of fishing mortality, as simulated in the model, cease as soon as fishing is stopped, the impacts of dredging have a longer-lasting impact because of habitat destruction."

Potentially this could mean that dredging could lead to a longer-term reduction in the maximum population size (carrying capacity) of a species strongly dependent on the benthic environment. In contrast, fishing mortality alone leads only to a reduction in the population size at the time.

11. **Sampling of the Seabed. Sampling done with a Day grab - neither Van Veen or Day are preferable as they have a bow wave that blows away the small organisms from the surface– normally a box core**

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or multicorer would be used, or possibly tube cores via ROV (which can accommodate the shelly surface).

Regarding sampling for Thiobacteria: absence of evidence is not evidence of absence. There are a lot of these bacteria, but if the Verification Study did not detect them, they were using inadequate techniques. With a grab you cannot sample for these bacteria at all.

One has trouble getting a good feel for the nature of the trawl. The text says a 45m vertical opening-for a bottom trawl?? Or is that 4.5m? The ground gear is simple polypropylene with no bobbins as far as one can see. So bottom contact could be good, if a bit jerky. But the mesh size in the bellies is large, so wouldn't retain small fish.

The gear detail is important, especially how similar it is to the Ministry of Fisheries and Marine Resources NATMIRC trawl used in their surveys. Simple footropes can be effective if the seafloor is uniform and soft, but less effective if there are firmer areas where the gear can bounce. The fact the cod-end has a liner doesn't mean much given the larger fore-meshes. So, what herding versus escapement goes on could be variable between nets of a different design. It limits comparability with surveys outside the area covered. It also has its own selectivity parameters, for different types of fauna, so the biodiversity obtained, size of the fish and invertebrates, and catch rates are all "relative" to the gear used. One suspects this trawl is good for adult fish, less so for small fish, and not good for general benthic invertebrates.

The authors (p.48) acknowledge that the species complexity reflects the availability of species typically caught in demersal fisheries. So, they are very correct in saying it is a subset, but potentially very incorrect in thinking it is an "indicator". The selectivity issues are limiting, and no one should argue that a single gear type is acceptable to monitor fish and benthic invertebrates.

On p.50 the Verification Study asserts in the second paragraph that the trawl survey was a suitable platform for a monitoring programme. Based on the observations above, this is not the case.

Why not a fine-mesh trawl, or an epibenthic sled which would be far superior? The "one size fits all" approach is flawed, and one would not like to see this survey retained as a "baseline" for future monitoring. It is "relative" to itself over time, and that is fine if you know what it is sampling well, and what it is not. So, comments about the area being "impoverished" (p.39) cannot be substantiated without much more evaluation work done.

It is concerning that sponges are almost written off as being "simple, primitive, and somewhat characterless". But they should be well described, there are good poriferan taxonomists, and when one species occurred on 20 out of 24 stations, it should be identified. Sponges can be very important ecosystem elements. But they will not be well retained by such trawl gear.

Sampling undertaken with fisheries trawl gear, tends to be very selective - it is designed to catch large commercial fish, so comparisons with other sorts of trawl gear or combining lots of different surveys, can be misleading, and to use it for benthic epifauna is highly questionable. Especially with limited mobility, destructive trawling to monitor benthic invertebrate abundance is flawed. Towed camera surveys would be a much better way to establish what is there, where, and how much.

The main point is, one needs to treat a one-off verification survey, with a particular type of trawl gear, with caution, and results are relative, not absolute.

A further key criticism of their 'verification' fieldwork is that they only did short cruises/deployments in winter (June/July/August). So, in those cases no seasonal variability is accounted for. They assume that their winter sample is representative of all seasons. If they revisited this area in Feb/Mar/April, would they find the same state of oxygen/sulphide in the sediments/water? The waters are likely to be better oxygenated during winter than in late summer. A full annual cycle of data is needed.

12. **Toxicology and heavy metals.**

The Verification Study states "Surficial and subsurface sediments supported relatively high concentrations of the heavy metals' arsenic, cadmium, chromium, copper and nickel. The bioavailability of these heavy metals was investigated by elutriation tests and negligible proportions entered the dissolved phase. The low release of the metals into the dissolved phase indicates that although their natural concentrations exceeded the sediment quality guidelines for the region, they do not represent a toxicity risk either *in situ* or following physical disturbance. This supports the assessment of toxicity risks in the EIA."

This is pure guesswork: there is no analysis on the effects of the mining and associated processes on toxicity – what metals will be released and in what quantities. All this does is look at existing sediments. What we need to know is what metals will be released by the mining, in what quantities and what is the susceptibility of the organisms to them.

The MIDAS Consortium argue that it will be necessary to assess the toxicity of individual mineral deposits independently to identify the potential toxic risk during mining. However, from a toxicological perspective, it may not be necessary to characterise the individual toxicity of each metal ion within each mineral deposit. It may only be necessary to determine – under controlled, ecologically relevant conditions – the bulk lethal toxicity of that ore deposit for a number of different biological proxy organisms in relevant physical phases (e.g., in solution/aqueous, as particulates, or adsorbed onto the surface of particulates). A similar approach could be adopted to determine the bulk lethal toxicity of any return waters from surface dewatering before any discharge into the ocean takes place.

Metals released during mining will occur in different physical states. Metals may enter solution/aqueous phase and be taken up across the gills, body wall and digestive tracts of exposed animals. Alternatively, metals may adsorb onto sediment particles or flocculates and be ingested; this may be particularly the case for metals released during dewatering of the ore slurry.

Lethal toxicity is conventionally assessed in terms of the '96-hour LC50': a measure that identifies the concentration of toxicant that kills 50% of the exposed organisms during a 96-hour period. However, 96-hour LC50 limits only indicate acute impacts. Mining within a licence block will continue for years to decades, and organisms will be subject to chronic metal exposures that might be orders of magnitude lower than the lethal dose and at a considerable distance from the mined site.

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The MIDAS project recommends that the bulk toxicity of each prospective resource should be established in advance, and at different times during the biological season cycle, for a suite of organisms relevant to the region surrounding the area of immediate impact. Such an approach should also be adopted to assess the potential toxicity of discharge waters from any dewatering of the ore slurry. This assessment could be conducted before an exploitation contract is granted (e.g., as part of an Environmental Impact Assessment). It makes sense that the NMP Verification Study should have done the above.

If heavy metal concentrations increase in Namibian seafood above World Health Organisation standards, the Namibian fishing industry could be closed down.

High concentrations of the heavy metals, uranium (approx. 52mg/kg) and cadmium (approx. 20mg/kg) in the sediments of ML170 (sampling station N17), have been documented in the scientific report: Anna Maria Orani et.al., 2018. Baseline study on trace and rare earth metals in marine sediments collected along the Namibian coast. Marine Pollution Bulletin 131 (2018) 386-395.

These results need to be assessed both in terms of possible impacts on the marine food chain (requiring plume modelling and tracing of contaminants through the food chain). Also, large amounts of sediment waste will build up near the NMP marine phosphate processing plant proposed to be established a little inland of Walvis Bay, with the possibility of leakage into the water table as well as back into Walvis Bay Harbour, and wind-blown dust impacting the Walvis Bay population.

There is good consensus globally, that marine-origin phosphates have a higher radioactivity content than igneous phosphates. I am not aware of Namibian Marine Phosphate making public any results showing the radioactive levels of phosphates in ML170. Much of the US Florida phosphate wastes from fertilizer production exceeded permissible radioactivity levels, and have had to be stored in specially restricted areas in the USA.

Togo is one country that has allowed on-land phosphate mining, without enforcing safety regulations. The result has been that waste produced from the phosphate mining has flowed into the sea, causing serious problems of contaminated seafood to coastal communities.

Conclusion

Both the at-sea mining ESIA and onshore processing ESIA should be assessed as a holistic whole because one primarily addresses mining and the other handles what to do with the waste, before a decision is taken on whether or not to grant an environmental clearance.

The Verification Study of 2014, together with the more recently commissioned reports of 2020 onwards on the sediment plume, sediment toxicity, noise impacts etc., are very technical documents. Rather than just being appended as part of the draft ESIA, they need to be properly reviewed by a panel of genuinely independent scientists with necessary specialist expertise, who are not financed by industry sectors, so that the interests of Namibia are properly catered for. Currently the mining impacts are significantly downplayed, relying on the Benguela Ecosystem to dilute them.

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Around 2016-18, other submissions on the NMP Verification Study were received by the Ministry of Environment, Forestry and Tourism, from interested and affected parties, including Government, and these should be incorporated in the ESIA.

Given the potential ecosystem impacts of marine phosphate mining, that there are additional mining companies queuing up to do so, as well as the cumulative impacts of expanding marine diamond mining, it is also essential that a Strategic Environmental Assessment and a proper baseline study of critical environmental indicators occurs. These studies must take place before any decision is made on whether to proceed with marine phosphate mining or not.

The Ministry of Fisheries and Marine Resources has the best capacity to be the lead agency in this. And with this there is also the need to develop proper deep- sea mining regulations that meet international standards, and independent monitoring to ensure proper compliance.

The radioactivity and heavy metal levels of the sediments in ML170 need clearer definition as well, given their serious implications.

Civil Society should be kept informed along the way. This way the process will be transparent, and should include independent international expertise to help support a good end decision.

Thank you very much for the opportunity to provide input in this review process of the NMP ESIA.

Yours sincerely

Matti T. Amukwa
CHAIRPERSON
Confederation of Namibian Fishing Associations

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To whom it may concern

Re: Comments on Namibia Marine Phosphates Environmental Verification Study

Namibia's marine environment is driven by the cold Benguela Current and localized upwellings which bring nutrient-rich water from the depth to the surface. Namibia is known for its abundant fish population with one of the world richest fisheries. One of the four main sectors in order of contribution to national Gross Domestic Product is the fishing industry. No wonder that Namibia is particularly dependent on the fishing industry and relies on good and healthy catches.

Such treasures must be protected under all possible circumstances and not sacrificed recklessly. This requires a scientific understanding resulting in a document that has been studied to the minutest detail.

Earthlife Namibia strongly condemns the plan of off-shore phosphate mining. Mining activities, especially dredging, will undoubtedly disturb the delicate biological balance of marine life, which will most certainly lead to unpredictable consequences. Unpredictable also because no comparable activity has happened anywhere in the world.
Be that as it may, what is foreseeable is considerable loss for the profitable fishing industry and the loss of many work places. Through responsible utilisation the fishing industry will be sustainable and bring significant revenue and nutrition in the long term, while the income from phosphate mining will only be for a limited period of time and only a few people will benefit from it., not the entire nation and its people

The Verification Study is a particularly technical document with a lot of information. Earthlife Namibia does not have the capacity to evaluate the technical issues. The short time frame given

for comments does not allow the study to be intensively reviewed by an independent team of experts.
In this submission, Earthlife will therefore address only some aspects of concern that apparently did not receive sufficient attention in the Verification Study.

- **Benguela Current**
  The Benguela Current is one of the world's cold-water systems and is characterized by strong coastal upwelling and high level of plankton production. No other feature dominates Namibia's coastal environment as much as the Benguela Current.
  Even small changes in temperature can have disastrous consequences for marine life and the entire eco-system.
  Earthlife feels that the impact of dredging and increased traffic of vessels on the Benguela Current has not been tackled according to its importance.

- **Plankton**
  The possible impact of the dredging activities on phytoplankton and zooplankton have not been measured in depth.
  Phytoplankton are a source of food for microscopic faunae, called zooplankton, which in turn provide food for higher levels of invertebrates and vertebrates ranging from crabs and lobsters to shrimps, fish and sharks widely distributed in pelagic waters. The continual massive production of phytoplankton in Benguela waters does not only provide high-volume food webs but also consumes a significant amount of atmospheric carbon dioxide.

  In the Verification Study it is stated: *Overall, although the waters off central Namibia are productive and support large communities of plankton, the proposed dredging site does not occur within any identifiably important area for phytoplankton, zooplankton or ichthyoplankton growth and development.*

  This statement appears very nebulous. Can this be verified throughout all seasons? And under increasing climate change conditions? How can you determine the area of influence without taking all involved parameters into account?

- **Noise**
  Verification Study: *A literature-based assessment of the potential impacts of sound from dredging vessels on a variety of species showed that sound levels in all cases are well below those known to cause damage to marine life.*

  Some marine species are known to be extremely sensitive to extraneous sounds, in some cases to the extent of losing their orientation and or lose the ability of hearing. The dredging vessels will cause continuous noise. This will certainly have an impact on the general condition of marine life. The negative impact on the general condition of marine life has been greatly neglected and should be viewed more seriously.

- **Toxic influence of heavy metals**
  Phosphates are used in the fertilizer industry. Their processing and extraction can have harmful environmental consequences as they contain heavy metals such as uranium, cadmium, lead, arsenic, and other heavy metals which are all toxic if consumed in certain quantities.

  Verification Study: Heavy metal concentrations in both surficial and subsurface sediments reflect relatively high concentrations of arsenic, cadmium, chromium, copper and nickel. High concentrations of cadmium and nickel were predicted in the EIA. The low release of the metals into the dissolved phase indicates that although their natural concentrations exceeded the sediment quality guidelines for the region, they do not represent a toxicity risk in this phase either in situ or following physical disturbance. The bioavailability of these heavy metals in the dissolved phase was investigated by elutriation tests and negligible proportions were released.

  The study acknowledges that relatively high concentrations of heavy metals are released through the activities. Yet, the consequences are severely ignored. The flippancy with which the study addresses this important issue is alarming. It is decided that the toxic metals are excreted through the defecation and thus regarded as harmless to marine life.

  The ingestion of toxic heavy metals over a long period of time leads to absorption in different organs and throughout the whole body in different concentrations and with different health effects.

  Finally, the contaminated fish end up on the plates of the consumers, thus having a negative effect on the health of the people.
  Can NMP justify this in clear conscience?
  It is most important that the heavy metals will be extracted from the raw material before the phosphate is processed into fertilizer in order to prevent soil contamination. The heavy metals would otherwise be taken up by the plants and in the meat of animals, all ending up on the consumer's plate which eventually creates an unhealthy community.
  The impact of sediment plumes and heavy metals for the entire food web has not been assessed.

- **Accumulative influences**
  The subsequent processing of the mined phosphate raw material has to be carried out on land and will have further negative effects, both on land and on marine life, but also on the people who work with the uranium-containing material. How will the workers be protected?
  A lot of toxic waste will be produced, which will have to be disposed of properly. These problems have not been addressed in the study.

- **Holistically approach**
  There is another issue of concern.
  The increasing impacts of climate change must be accounted for. The ocean is getting warmer, the water is getting more acidic, the conditions for marine life are getting worse.
  Furthermore, the construction of desalination plants in Luederitz and Walvis Bay is on the agenda. Negative environmental impact from the release of concentrated brine is to be expected. Furthermore, a technical problem could arise when marine phosphate mining triggers algae blooms, which could clog up the desalination plant.
  Pollution through mining activities - offshore and onshore - contribute to contamination and need to be considered in the wider context.
  The overall scenario with all factors involved must be approached holistically to avoid accumulation of pollution and negative impacts on our environment as much as possible.
  ALARA – As Low as Reasonably Achievable – is a guiding principle for safety for the environment and its people and should be strictly adhered to.

The above submission reflects only some of Earthlife Namibia's views on the proposed phosphate project. It is expected that the points addressed will be acknowledged and considered.
It can only be reiterated that Earthlife Namibia opposes the project due to the expected risks on the fishing industry and the environment, both off-shore and on-shore.

Bertchen Kohrs
Chair of Earthlife Namibia

SUBMISSION OF COMMENTS ON THE draft ESIA assessment report, EMP and appendices for Namibia Marine Phosphate (NMP), proposed Sandpiper Marine Phosphate Project within M170, offshore, Namibia

Bronwen Currie
20 September 2022

1. Kindly provide a copy of the official registration for the ESIA from the proponent with MEFT:
2. If the proponent insists that the ESIA is a dredging operation in SP1 this must be clearly stated on the official application and registration WITH THE OFFICIAL AUTHORITY. To date stakeholders have been informed that the ESIA is for a mining licence in MINING licenced area 170. Likewise if any special conditions and allowances have been officially granted to the proponent in this regard, registered stakeholders must be provided with the official documents outlining this allowance Ref:

"The operation proposed by NMP is a standard dredging operation that has been managed and monitored already on many occasions through government agencies reporting to MEFT for developments such as NamPort harbour expansion. As far as monitoring and mitigation the Namibian government has put in place adequate and proper legislation. In relation to the proposed project, the environmental monitoring, mitigation and management actions are captured in the environmental management plan (EMP) which must be approved by the Environmental Commissioner. "

3. There are multiple un-answered stakeholder comments and multiple wrong responses by the EAP.

For example
EAP responses : Sediment plumes from excavating sediment to a depth of 2.5 metres at the intensity of over-track removal taking place 3 times a week in the soft sediment is totally different and incomparable to fish trawls fishing over the area at the intensity of perhaps once a year over the same area (fishing over one location not more than several hours per year) . The EAP is misleading public stakeholders and IAPs by trying to compare sediment plumes with trawl plumes: they are incomparable in both intensity and impact. The maximum penetration of trawl gear into sediment is never more than 30 cm for monk trawls and not more than 20 cm for hake trawls, if that. The chief concern of the plumes generated from mining is the dispersal of sediments that lie more than 1 metre deep below the seabed: the character and heavy metal content is presently safely buried and controlled by microbial processes in the undisturbed sediment at those depths and poses no danger to sealife . However if excavated during mining, dispersal into the pelagic water via plumes, the substances (gases, particles, uranium and heavy metal complexes) are dangerous. It is totally erroneous to attempt to confuse or compare trawl "plumes" to mining plumes.

4. Toxicity testing

The impacts of the finest plume particles from deep cores (1-3 m deep sediment) when injested by filter feeding organisms in the food web in the pelagic waters of the mining licence area HAS NOT BEEN CORRECTLY TESTED. This is a critical aspect of plume toxicity so

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to make the statement in the "new"2020 toxicity testing report is unacceptable, that "*To address the issue of assessing toxicity in the deeper sediment profile, provision is made in the EMPR for a new set of baseline reference samples to be collected following award of the Environmental Clearance Certificate (ECC) !!!! and prior to commencement of mining, given the*
findings of the EIA Verification Study. This material will be subjected to toxicity testing across the
planned mining depth (sediment surface to the clay footwall) to add to the sediment toxicity analyses reported on here etc.)

5. The many unanswered valid stakeholder comments are either ignored or transferred into the monitoring plan for the future. This is unacceptable: in seabed mining many impacts are unavoidably harmful and can only be assessed as serious: requiring both proper scientific investigation and proper assessment BEFORE any mining is allowed.
6. The "new "2020 + reports add nothing to the "old"reports 2012 – 2014: Therefore in the same style of NMP resubmitting all their previous information in a new ESIA please attend to comments previously submitted.

7. With regard to the 2014 EIA studies, missing are:
   1. a realistic study of the cumulative impacts for the mining activity over the 20- year licence period
   2. an in-depth socio-economic study, that will potentially direct the intensity of the dredge-mining activity (referred to in appendix D6)
   3. impacts from transport of sediment and land-processing, as per definition of mining in the Mineral Act (1992). Mining as a whole is subject to an EIA; not only the excavation ("digging") stage. A study of transport of mother-ore, unloading, and processing of mined material is missing: these are known to have considerable impacts of concern in any mining activity.

   All 3 missing studies should be included in assessment of environmental impacts, to be considered by interested and affected parties, which of course include the public. The scale of excavation in ML 170 to reach production goals will affect the intensity of all impacts.

   The Environmental Management Plan (revised) is not commented on because the EIA upon which the management plan is based, has no credible scientific base. Monitoring according to wrongly identified and assessed impacts, wrongly identified monitoring needs, and continued faulty sampling, would allow impacts to worsen, and would mislead future monitoring efforts. Before a management plan is proposed the impacts of the mining activity must be properly assessed.

   Impacts in the deep ocean are notoriously difficult to recognize within a short period after an activity begins (in this case mining), even with sophisticated and intensive monitoring. Damage to the ocean is even more difficult, often impossible, to reverse. That apart, a capacitated national authority to regulate deep sea mining would be needed to oversee and inspect monitoring. Without the necessary legal framework or infrastructure and trained national personnel operating independently of the mining companies, an EMP is of no value and ineffective.

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Some in situ investigations were carried out by NMP on the small portion SP1 of the Mining Licence area 170, and are reported in parts of section C of the otherwise bulky "Verification Programme report", submitted to the Ministry of Environment and Tourism in 2014. Only sections of major scientific concern regarding these assessments are selected below for comment.

2. SUMMARY The Summary Impact Assessment tables (Section B) importantly appear to present the proponent's final impact assessments as presented to the environmental authority. These assessments are challenged on scientific grounds, due misinterpretation or lack of targeted and proper scientific investigation. Ignorance of correct scientific methodology and analytical techniques is inexcusable for some of the studies carried out (reported in section C). The effort to justify the failed 2012 EIA is scientifically not convincing. Some key issues of concern for impact assessment of seabed mining are still missing: primarily plume modeling which will dictate the intensity of most other impacts. Sediment suspended in the water can cause multiple direct or indirect biological impacts associated with mining, and detailed plume studies are an essential pre-requisite for any marine mining impact assessment. Impact assessments rely on targeted data, which is lacking. Experimental work on the impacts is totally lacking. Contradictions in the report between findings of studies on the different aspects (section C) detract further from the credibility of the assessments.

Of greater relevance to the wider, non-scientific Namibian community, is that mitigation for the proposed mining activity is assessed in both the 2012 and 2014 reports mostly as "not necessary" or - in most cases – "not possible" for the listed impacts. It is true than many aspects of seabed mining are not possible to mitigate, which is dangerous to the environment.

However difficulty to mitigate mining harm does not mean that there is not danger of serious harm. The general public is aware that any mining activity anywhere (terrestrial or marine) damages the environment. Mining damage in the ocean, due to the liquid 3-4-dimensional environment that is interconnected by ocean currents, cannot be confined to a small excavation "mine" site pit on the seabed. Unlike land mining, the activity cannot be contained only to the seabed, nor fenced nor walled-in to confine impacts to the seabed excavation site. Because impacts are spread around and dispersed by the seawater does not mean they are any less severe: they are simply carried much further from the excavation site. Impacts are far more difficult to measure and assess in the marine environment than on land. There are long time lapses (decades) between the time of impact, until the result of that impact shows up in monitoring, therefore immediate adaptive management is theoretical only and practically impossible to be effective in the ocean.
For the same reason it is absolutely essential to know the condition of the receiving marine environment, and the sensitivities of ecosystems to mining-related impacts. By having such knowledge before mining is allowed, makes it possible, at a minimum, to recognize mining impacts when they eventually appear.

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Namibia does not yet have pre-mining baselines, nor reliable knowledge of how the marine environment would respond to mining of phosphates, and the reports submitted by NMP fail to supply this knowledge. For that reason caution must be applied to a venture that is presently risky in its benefits, and unknown in its impacts.

3. COMMENTS to the 2014 EIA reports (the so-called Verification Programme Reports of Namibian Marine Phosphate) as advertised post-submission to MET Volume 1: Section 1 fails to refer to any legal documents or official agreements that permitted a second report, a "Verification Programme Report" to be submitted without re-registration or public consultation, 2 years after the first (failed) EIA report. The "high" confidence level expressed regarding assessments from the previously submitted 2012 EIA is challenged on scientific grounds. The Impact Assessment Tables structured and compiled by the proponent are found in Volume 1, Section B, headed "Impact Assessment Verification" and appear to be key to decision making. It is difficult to reconcile the subjective assessments presented (section B) with much of the new scientific study presented (section C), which is padded with much theoretical and desktop information. For ease of reference, the comments submitted below refer to the interpretation of the scientific studies in Section C, that were used to feed into these assessment tables in section B.

COMMENT: Impact Assessment Criteria Table 1.0 require explanation The Impact Assessment Criteria listed in Vol.1, Table 1.0 are questioned:
• Whilst of primary important to impact assessment, there is no evidence of the listed "environmental functions" being used or applied to the assessments.

There is no identification of which marine "environmental functions" (is this supposed to be equivalent to "ecosystem functions"?) are used in the assessments. Please explain where and how this criterion has been applied to the assessment tables, especially as the opinion provided in section C3.3 where "Ecosystem Assessment" fails to elaborate on which ecosystem functions are being assessed, and why, in the mining area.

• It is contended that the grading for a "serious effect" is abused (see rather Levin et al. 2016 regarding the term "Serious harm" for marine mining). According to Table 1.0 a serious effect is recognized only when: "Environmental functions and processes are altered to such an extent that they permanently cease". Clearly this is a ridiculously impossible criterion in the context of other criteria of either regional or national marine waters for impacts in the ocean: to consider impacts serious only if environmental functions (which are not defined) in the Benguela upwelling shelf off Namibia or the "Namibian ecosystem" or as quoted in places the report "the northern Benguela shelf and southern slope environments as a whole".
By applying unrealistic and impossible criteria, the assessment is openly biased to play down serious impacts.

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• Nowhere is the scoring system shown, therefore it is difficult to understand how the criteria were scored to arrive at the puzzling final assessments: scoring transparency would be helpful to pinpoint queries and comments.

4 COMMENT: **CONTRADICTIONS** in assessments are noted between the different tables presented, and in the scientific information provided in the different studies. This does not inspire confidence in either the science nor in the assessments. A few of the many examples are:
◦ the duration of the mining plume is estimated at 1-3 days for Table 1.1 but for 20 years for Table 1.2?
◦ hydrogen sulphide is recorded as either absent or present, important or not important in the (same) sediment (tables 1.1, 1.2 and 1.3)?
◦ the same currents either disperse or confine the sediment plume (table 1.1 to table 1.3 and C3, C2.2)?
◦ Elevated heavy metals from the sediment are high but available or not (in the same sediment) (table 1.1, C2.4)?
◦ sediment is described as both high in silt /low in silt content (table 1.3, meiofaunal study)?
◦ benthic habitats are described as both homogeneous (Table 1.3, C2.6) or heterogeneous (C2.4)?
◦ etc. with continued contradictions throughout the report.

COMMENTS: Table 1.1 "Water Column and Sediments" related to section C studies
COMMENT to Table 1.1 Across all sections 1.1.3 to 1.1.11: The mining frequency of a 3-day turnaround cycle for a 20-year period (see NMP 2012) does not fit the impact duration descriptor given as "very short-, short, or medium-term". The sediment plumes and turbidity will be continual in the seawater at/near the excavation site; and additionally at the coast if waste from land-processing is returned to the sea (as yet not predicted; EIA for land-processing is missing). The duration accordingly should be listed as "long term" over the lifetime of the proposed mining activity. A turbid plume will be generated every 3 days during mining activities so to indicate plume dispersal as "short-term" because the plume might be dispersed in 1-2 days (only to re-commence with the next cycle of excavation after 3 days) is nonsense. As described in the report C3: "Four 4 km-long lanes will be dredged over a period of approximately 16 hours, this being the time required to fill the vessel's hopper, after which it will leave the site for a period of approximately 20 hours to discharge the dredged sediments, and then return to start dredging again." Dispersal of the plume according to current prediction and table 1.3 will be wide and not confined to the mine site. There is no evidence presented that the sediment plume will be confined to the dredge area (as claimed), because the currents there are considerable and the plume size is assessed to be 2-5 times larger than originally assessed in the 2012 EIA. There is no information or evidence supplied regarding vertical mixing for plume distribution and movement of the plume through the water column, so it must be assumed that the plume will affect the whole water column and all the animals there. This will influence the impacts in Tables 1.2. and 1.3. Clearly there is no reliable prediction about the size or spread or seasonal variability of sediment plumes. Plume modeling is a basic and very important pre-requisite for all marine

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mining related impacts because it contributes to and affects all other impacts, but modeling of plumes has not been done by NMP: missing. With plume dimensions reassessed as being "2-5 times larger than expected" and bottom current velocities being "higher" than first assessed it is clear that assessed impacts related to plumes cannot be 5 reliable. As quoted in the report "In summary, the two key metrics of relevance in terms of plume dynamics are the extent of the plume and the persistence (or duration) of the plume. The duration of the plume potentially has implications for biogeochemical transformation processes that may result in ecological impacts (e.g. oxygen demand and/or toxicity in the upper water column". Without, it is not possible to assess the impacts in the manner presented in this report.
Across all sections in the table 1.1.3 to 1.1.11, and the last row headed "Reasons" there is misrepresentation of results obtained. Faulty logic and misinterpretation are used to provide the impact assessment. Significance of impact is HIGH unless otherwise proven.

COMMENT to Table 1.1: 1.1.3, 1.1.7, 1.1.8. The header-term chosen "heavy-metal toxicity" should include all impacts from heavy metals and rare earth metals. The danger of suspended heavy metals or rare earth metals suspended on particles in the sediment cloud/plume, is that they will slowly (over many i.e. 20 years, with the continual plume that will be generated) be taken into the food web to build up in the flesh of the animals, including fish. A sediment plume will be generated both in bottom waters during excavation, and from overflow from the dredger vessel, (and from later processing); to likely affect the whole water column from top to bottom, because there is no barrier between surface and bottom waters, and there is active biological benthic-pelagic coupling between the benthic animals and those higher up in the water. (as an example, In the mining area juvenile hake, horse mackerel and juvenile monk all feed largely on the gobies that live and breed near the bottom).
The statement in study C2.7 is nonsense, that : " the proposed mining area off central Namibia is not within any important spawning or nursery grounds, particularly for the commercially important species." The mining licence does fall within an important nursery and recruitment area for hake, and is heavily populated by gobies that are the major food eaten by juvenile hake and other fish species such as monk.
Furthermore, as stated in the study there is evidence from the acoustic scattering layers within the mining licence area that there is a large zooplankton community that migrates vertically, that could be impacted in various ways, by the mining plume.
The mesopelagic fish have not been investigated. Some arguments used in the studies throughout section C for dismissing the mining area as "unique" or not having "unique" species are avoiding and missing the real and critically important ecosystem importance (environmental function) of this area which may well be unique in the northern Benguela. There is no scientific evidence presented in the report, neither record of any experimental work, to show that suspended sediment particles will not have heavy metals and other compounds ionically bound to them, which could introduce dangerous levels into the marine food web. It is known that heavy metals and radionuclide concentrations are especially high in the mining area,

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associated with the phosphate deposits (section C, repeatedly). This could seriously affect the food quality of harvested sealife. The so-called elutriation experiments presented in the study in section C are pathetic and useless: to filter the seawater for a few hours then look for dissolved heavy metals is invalid indication of uptake of heavy metals by filter feeding animals . The "reason" given in the tables is a total misrepresentation of the danger of uptake of heavy metals into the food chain: neither understandable nor acceptable: to quote: "Dredge area >20 mg/l suspended sediment concentration. Plume disperses 1 to 2 days'?. Effects are not usually immediately "toxic" (in that they cause death), but they can cause many other problems including decreased growth, deformities, disease and decreased breeding. If the flesh of marine animals (e.g. marketable fish, oysters,) slowly build-up heavy metal concentrations in their bodies, this would spell disaster for the export of these Namibian products, because of very strict food safety limits on the amount of heavy metals allowed. Hake and monk and forage animals move around in ML 170 continually; and oysters are cultured near to where processing 6 of the mined sediments is proposed. The impacts from dispersal of plume particles will likely be considerable. With a mining licence of 20 years, the reasoning given to assess the possible impact as low is totally unsubstantiated by any sampling or experimental work. This aspect is not covered at all in the impact assessment and is one of the most important probable impacts from the mining activity. A serious omission is that no experimental work has been has been carried out. No mitigation is possible because the high metal concentration that is presently safely buried in the sediments is a natural characteristic of these undisturbed sediments, with e.g high concentrations of Uranium and Cadmium in the Mining Licence area. This is a serious situation, risking a slow but continual transfer of contaminants from suspended sediment. The assessment by the proponent of low impact is scientifically not acceptable. Until proven otherwise, predicted negative impacts should be assessed as HIGH.

COMMENT to Table 1.1: 1.1.4, 1.1.5, 1.1.8, 1.1.9, 1.1.10 and 1.1.11: Invalid scientific basis for the assessment. The danger of liberating hydrogen sulphide (H2S) when excavating sediments to the proposed >2.5 m sediment depth, is that H2S and other toxic anaerobic substances in the deep sediments will suddenly be exposed to the overlying water, and be present in the plume, where they will strip the water of oxygen, and supply the water column with some toxic substances. The issue is not present natural flux from the surface sediments. The expected impacts are mainly to the lower and middle water column rather than at the surface where of course H2S has had time to oxidize; so again the listed indicator description of "toxicity" for impact in the assessment tables is inappropriate and shows ignorance regarding the relevance of H2S as an indicator of anaerobic products. The focus is liberation of H2S when deep sediments are excavated. The scientific reasoning and studies to investigate H2S avoid the issue and are scientifically unacceptable:

- wrong processing of the sediment cores (frozen and not stored anaerobically therefore analyses are invalid)
- no analysis of H2S but instead an invalid proxy used
- no standard sediment profiles of gravity cores to show properties of interest in deep sediment i.e. missing data

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• no investigation of the sediments for the presence of dangerous anaerobic products in deep sediments
• invalid measurement of redox potential: frozen core used – scientifically invalid
There are multiple scientific publications in primary scientific literature in the last decade that outline correct methodology for sampling biogeochemical parameters in sediments on the Namibian shelf. Likewise published profiles showing H2S in the Namibian sediments in sediment depths of 1+m over the shelf and on the slope. It is therefore inexcusable that correct processing and methodology on the sediment cores sampled was not followed by the appointed NMP consultants for the 2014 study (NMP 2014). By not storing, processing or analyzing the sediment cores correctly, the results presented are meaningless and scientifically invalid. Until proper analyses are carried out, the potential impact should be assessed as HIGH.

Note contradictions in section C3 for surface sediments: ""Smaller forms including Thiobacillus spp....were present; however, indicating that although the concentration was estimated to be low (hydrogen) sulphide was present in the sediments." Hydrogen sulphide is mentioned to precipitate metals in the sediments. Repeated contradictions in findings. 1.1.6 Pore water nutrient concentrations are known to be high on the Namibian shelf sediments and therefore will inject considerable nutrients into the water when excavated. It is 7 not valid to argue that the amount of pore water is low and therefore little impact. There is considerable sediment excavation (at least to 2.5m depth according to NMP 2012) so the total amount of pore-water is similarly considerable irrespective of porosity. There is no evidence presented to show that the increase nutrient load released from loaded dredged material will not lead to increased phytoplankton blooms. Faulty reasoning used in this argument; assessment flawed and therefore no confidence in assessment.

COMMENTS: C 2.4. Studies on Meiofauna It is agreed that " meiofaunal assemblages will provide a robust means of assessing and tracking any changes in the seabed habitats that are associated with the proposed dredging operations and enable these to be placed into context with any changes in background conditions. Similarly, the same approach will enable recovery of mined areas to be documented."

COMMENTS: Table 1.2 "Fish Mammals and Seabirds" COMMENT: Table 1.2.1: considering the effect of turbidity from sediment plumes - on fishing activity, ecologically important species, recruitment of key commercial species, biodiversity, and seabirds and mammals – the duration is estimated as long-term to permanent. Comparing to all comments made regarding sediment plume for Table 1:1. Impacts should be assessed as HIGH.

COMMENT: Table 1.2.3 The site is within a key recruitment area for hake and gobies as discussed for table 1.1. Impacts should be assessed as HIGH with mitigation strategies provided.

COMMENT: Table 1.2.5 The EIA is very deficient on noise impacts to marine mammals which are known to abound in the mining area. Missing are estimates of noise from the proposed dredger-hopper activity and estimates of effects/impacts of

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noise on at least some of the species. COMMENTS: Table 1.3 "Macrofauna" COMMENT 1:3.1 It is well known that the substrate (texture, grain size, organic matter etc.) is important to softsediment fauna. The deep sediments are markedly different from the surface sediments in the targeted mine area. For that reason leaving a bottom layer of sediment will likely result in a completely different community, with likely different ecosystem functions. It is questioned whether this is a valid mitigating effort or simply a consequence of mining that is being used as a mitigating factor. COMMENT 1.3.6, 1.3.7 Even the short period of current measurement showed variability in direction, with higher velocities than predicted near the seabed, implying considerable turbulence at the seafloor. So dispersal of sediment will not necessarily be confined to mine site.

COMMENT 1.3.4 Sulphide-oxidizing bacteria. No proof of the absence of the large sulphide oxidizing bacteria Beggiatoacea was presented. Wrong sampling and the wrong analytical technique was used for detection (see Salman et al., 2011 for correct methodology) so these bacteria of course could not and were not detected. Absence of evidence is no evidence of absence. Thus using wrong sampling and wrong analytical technique the results are useless and there is zero confidence in the assessment. Until proven otherwise it is 8 assumed that hydrogen sulphide is available in surface sediments and confined there by sulphide-oxidizing bacteria. This is important for oxygen dynamics. Relevant is the admission that hydrogen sulphide was present even in the surface sediment, to quote: "Smaller forms including Thiobacillus spp. with relatively lower growth yields were present; however, indicating that although the concentration was estimated to be low (hydrogen) sulphide was present in the sediments." The presence of sulphide is also supposed in the discussion of heavy metal precipitation by sulphide.

COMMENT 1.3.6. To quote "re-suspended sediment should disperse only over short distances." Although bottom current speeds found up to 3 times greater than originally predicted?

COMMENT Table 1.3.9: Assessment not acceptable due to faulty sampling and analysis. If anaerobic products are released into the hypoxic bottom water this can only make the situation worse for animals already living in a low oxygen environment. No information given of tolerances to oxygen depletion or "tipping points" of animals living at the bottom with regard to reduced oxygen. Worthless assessment, requiring proper investigation

COMMENTS Table: 1.4 Please explained why jellyfish were required for environmental impact assessment whilst meiofauna (Specialist study included in section C) are an excellent indicator of sediment change, were left out from impact assessment?

COMMENT: Missing assessment table: There are no impact assessments for Meiofauna (section C) as this is of the few good baseline studies presented that would be useful for showing changes over relatively short time period and a worthwhile and sensitive indicator of benthic faunal change

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COMMENT: Missing assessment tables: There is noticeably no "Cumulative Impacts from mining" table. This is an essential part of the impact assessment

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ECONOMIC & SOCIAL JUSTICE TRUST

20 September 2022

To: Jessica Bezuidenhout

Environmental Compliance Consultancy (ECC)

PO Box 91193, Klein Windhoek, Namibia

Email: info@eccenvironmental.com

Dear Ms Bezuidenhout

Re: Submission on Namibian Marine Phosphates Environmental Social Impact Assessment (ESIA) Report for the proposed Sandpiper Marine Phosphate Project Within ML 170, Offshore Namibia. Project number: ECC-133-377-REP-03-C

As an interested party, the Economic and Social Justice Trust (ESJT) is concerned to ensure that the Namibian Marine Phosphates (NMP) proposed deep sea marine phosphates mining project does not negatively impact on the marine ecosystem and the fishing industry, which is a major player in the Namibian economy, both in terms of GDP earnings, and jobs.

The NMP ESIA is of both national and international precedent setting importance in terms of deep-sea mining, so must be allowed to be reviewed properly as it has the potential to impact future generations of Namibians.

Including all annexures, the draft NMP ESIA amounts to thousands of pages. The annexures in particular are very technical scientific documents which require review by international scientists with the necessary technical expertise, as the average layman IAP is not capable of doing this. NMP in drafting its ESIA was very reliant on utilising technical scientists. IAPs should also be given the opportunity to call on international scientific experts to properly review the documents that form part of the draft ESIA.

We wish to point out that a two-week period for review is way too short for a proposal of this nature. International scientists with the necessary specialist expertise to review these documents would be required to conduct a proper review of these documents and a reasonable minimum period to do so would be 3-4 months.

P.O. Box 96179, Windhoek, Namibia Email: esjtrust1@gmail.com Tel: +264-811243438 (chairperson)

Trustees: Rinaani Musutua, Michael Gaweseb, Herbert Jauch, John Nakuta and Doufi Namalambo

We have taken note of the concerns raised by the Confederation of Namibian Fishing Associations (CNFA) and agree that these concerns need to be addressed in detail. These include:

The separation of "at-sea mining" and "onshore processing" because the mining operation and how the waste is dealt with should be considered together in the environmental clearance approval process. It is essential that the environment holding these resources is not subjected to irrevocable damage which could lead to economic and social disadvantage for Namibia at a later stage.

Also, new industrial endeavours should not be developed at the expense of existing economic activities on which the national economy and especially the livelihood of regions and communities depend.

The impacts on breeding and juvenile fish stocks, the marine food chain in the water column including heavy metals, plume and potential noise impacts. A growing body of research points to the need for a halt to any seabed mining, until science and management can be put in place that ensure that mining will not cause harm to the marine environment. A recent study warned that "much remains unknown about mining's potential impacts, not just on the deep ocean, but throughout the water column"[i].

A clear definition of deep-sea mining and of the term "dredging" with regards the NMP operation. Based on international definitions, all mining deeper than 200 metres is considered as deep-sea mining. Also, the use of the term dredging by NMP deflects from the reality that this is a full-scale mining operation. NMP, it will be removing the top 2.5 - 3m of the seabed, which will have a significant effect, impacting substrate type, grain size, water content, geochemistry of sediments and porewaters, water flow, pH, oxygen, and suspended sediments amongst others.

Adherence to international marine mining standards / guidelines which Namibian has signed and ratified.

A realistic socio-economic assessment of marine phosphate mining. The August 2018 report by Stratecon on the Economic Assessment of the Development of a phosphate-based industry in Namibia overestimates the number of jobs to be created and falsely presents phosphate mining be seen as a solution to unemployment in Namibia. A socio-economic analysis of benefits gained from phosphate mining by the Sandpiper Project should concentrate on the activities proposed by the project, and not be based on a scenario which rests on assumptions over which the proponents of the Sandpiper Project have no control.

All too often international mining companies have made promises to Government that further beneficiation of the minerals will be undertaken in the country, but in the end, this does not happen with Namibia (and Africa) ending up merely as suppliers of raw materials while the beneficiation of the ore, jobs and profits are retained in industrialised countries.

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The NMP Environmental Management Plan appears to be very self-regulating without clear reporting structures and without strict standards for non-compliance. International experiences have shown that self-regulation contains inherent conflict of interest.

We trust that these and other concerns will be addressed and thank you for the opportunity.

Kind regards

Herbert Jauch

(Chairperson)

[i] University of Hawaii at Manoa, July 7, 2022. New research finds deep-sea mining noise pollution will stretch hundreds of miles. ScienceDaily. https://www.sciencedaily.com/releases/2022/07/220707142140.htm#:~:text=2-,New%20research%20finds%20deep%2Dsea%20mining%20noise,will%20stretch%20hundreds%20of%20miles&text=Summary%3A,the%20largest%20habitat%20on%20Earth

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