

BASIC ASSESSMENT PROCESS FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 11C BY TRANS ATLANTIC DIAMONDS (PTY) LTD

Trans Atlantic Diamonds (Pty) Ltd
Office 1603 Portside
4 Bree Street
Cape Town, Western Cape, 8001



Appendix 1: EAP CVs and Qualifications

Anchor Environmental Consultants
8 Steenberg House, Silverwood Close, Tokai, South Africa
www.anchorenvironmental.co.za



CURRICULUM VITAE

CHERUSCHA SWART

DATE OF BIRTH: 3 November 1988

NATIONALITY: South African

ACADEMIC QUALIFICATIONS

- MSc (Cum Laude) Zoology, Stellenbosch University, 2015 – 2017
- BSc (Hons) Biodiversity and Ecology, Stellenbosch University, 2013
- BSc Biodiversity and Ecology, Stellenbosch University, 2010 – 2012

SCIENTIFIC REGISTRATIONS:

- EAPASA – Environmental Assessment Practitioner: Number 2021/3298
- SACNASP – Pr.Sci.Nat. Environmental Science: 155305
- IAIAsa – Member: Membership number 7398

OTHER TRAINING

- Environmental Impact Assessments Training Course, Cape Town, 2024 & 2025. Business Succes Solutions in association with Janice Tooley Attorneys. Accredited with SACNASP and EAPASA.
- Practical Implementation of Environmental Auditing and Monitoring Training Course, Cape Town, 2024. Business Success Solutions in association with Umhlaba Environmental Consulting. Accredited with SACNASP and EAPASA.
- Environmental Legal Compliance, Auditing and Monitoring Training Course, Cape Town, 2023. Business Succes Solutions in association with Janice Tooley Attorneys. Accredited with SACNASP and EAPASA.
- Environmental Impact Assessment Law Event Course, Cape Town, 2020. Business Succes Solutions in association with Janice Tooley Attorneys. Accredited with SACNASP.
- First Aid Level 1.

COUNTRY EXPERIENCE: South Africa

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Excellent)

POSTAL ADDRESS: 8 Steenberg House, Silverwood Close, Tokai 7945

PHONE: +27-21-701 3420

E-MAIL: cher@anchorenvironmental.co.za

EMPLOYMENT HISTORY:

2022–Present — Senior Consultant & Head Environmental Assessment Practitioner in Environmental Impact Assessment Department: Anchor Environmental
2019–2022 — Consultant and Environmental Assessment Practitioner: Anchor Environmental
2018 – 2019 — Junior Consultant and Taxonomist: Anchor Environmental
2014 – 2017 — Assistant Research Consultant: Stellenbosch University
2014 – 2015 — Research Intern: National Research Foundation

SUMMARY PROFILE

Cheruscha holds a Master of Science (MSc) in Zoology, as well as an Honours (BSc Hons) and Bachelor of Science (BSc) degree in Biodiversity and Ecology from Stellenbosch University. She is a Registered Environmental Assessment Practitioner (EAP) with 12 years of research and consulting experience. At Anchor Environmental Consultants, she serves as a Senior Consultant and Head Environmental Assessment Practitioner (EAP), leading multiple projects. Her expertise includes Environmental Impact Assessments (EIAs), applications for prospecting rights, management plan development, environmental compliance monitoring, baseline and monitoring surveys, and specialist impact assessments, all undertaken across marine, coastal, and terrestrial environments. In addition, she has specialist expertise in marine invertebrate taxonomy and rocky shore surveys. Her project portfolio spans a wide range of sectors, including land-based and offshore prospecting, offshore mining, agriculture, land- and sea-based aquaculture, solar desalination, residential and commercial developments, conservation surveys for protected areas, and long-term monitoring of bays and ports along the South African coast. Cheruscha is the author of three peer-reviewed scientific publications and numerous scientific reports, with additional projects and publications currently in preparation.

SELECT PROJECT EXPERIENCE

Period	Country	Clients	Project, Tasks
2026	South Africa	Greenvolts Pty (Ltd)	Terrestrial animal species compliance statement: A terrestrial animal species compliance statement was conducted for a solar PV development in Saldanha.
2026	South Africa	Trans Atlantic Diamonds	Environmental Assessment Practitioner Reapplication process: Basic Assessment Process and application for prospecting rights in the offshore sea concession area 11C, Western Cape
2026	South Africa	Denith Engineering (Pty) Ltd	Environmental Assessment Practitioner Applicability Checklist for the Proposed Crane Installation at the Royale Cape Yacht Club, Erf RE/10256, Cape Town
2025	South Africa	Gansbaai Marine (Pty) Ltd	Marine Field Scientist Marine Rocky Shore Survey to fulfil the requirements of Gansbaai Marine's Coastal Waters Discharge Permit, Western Cape.
2025	South Africa	Enviro-EAP	Independent Reviewer Peer review of the terrestrial animal species assessment for a proposed development in Riversdal, Western Cape
2025	South Africa	CK Rumboll & Partners	Terrestrial Biodiversity/ Animal Specialist; Principal Reviewer Terrestrial animal species compliance statement as part of an EIA for phase 2 of a low-cost housing development in Darling

Period	Country	Clients	Project, Tasks
2025	South Africa	Enviro-EAP	Independent Reviewer Peer review and amendments of terrestrial animal species assessment for the proposed development in Yzerfontein, Western Cape
2025	South Africa	Kovaks Investments 172 (Pty) Ltd	Terrestrial Biodiversity/ Animal Specialist; Principal Reviewer Terrestrial Biodiversity Assessment for the Proposed Residential Housing Development, near Rooipan Salt Pans, Yzerfontein, Western Cape.
2025	South Africa	Kovaks Investments 172 (Pty) Ltd	Terrestrial Biodiversity/ Animal Specialist; Principal Reviewer Terrestrial Animal Species Assessment for the Proposed Residential Housing Development, near Rooipan Salt Pans, Yzerfontein, Western Cape.
2025	South Africa	Enviro-EAP Pty (Ltd)	Independent Reviewer Peer review of the Animal Species Impact Assessment for the Mixed-Use Development, Yzerfontein, Western Cape.
2025	South Africa	Enviro-EAP Pty (Ltd)	Independent Reviewer Peer review of the Animal Species Impact Assessment for the Proposed Residential Development, St Helena Bay, Western Cape.
2025	South Africa	Enviro-EAP Pty (Ltd)	Independent Reviewer Peer review of the Animal Species Compliance Statement for the Proposed Citrusdal Housing Development, Citrusdal, Western Cape.
2025	South Africa	Enviro-EAP Pty (Ltd)	Independent Reviewer Peer review of the Animal Species Compliance Statement for a new dam, Clanwilliam District, Western Cape.
2025	South Africa	ATKV Sake (RF) Pty Ltd t/a ATKV Hartenbos	Terrestrial and Animal Specialist; Principal Reviewer Terrestrial Biodiversity, Plant and Animal Compliance Statement for the Proposed Dune Stabilisation at the ATKV, Hartenbos, Western Cape Province.
2025	South Africa	Overstrand Local Municipality	Specialist and Principal Reviewer Invasive Alien Plant Species Monitoring, Control and Eradication Plan for the Onrus Catchment, Western Cape Province.
2025	South Africa	Breede Valley Municipality (Western Cape)	Terrestrial and Animal Specialist; Principal Reviewer Animal Species Specialist Assessment for the Proposed Integrated Residential Development at Touwsrivier, Western Cape Province
2025	South Africa	Breede Valley Municipality	Terrestrial and Animal Specialist; Principal Reviewer

Period	Country	Clients	Project, Tasks
			Terrestrial Biodiversity Compliance Statement for the Proposed Integrated Residential Development at Touwsrivier, Western Cape Province
2025	South Africa	Breede Valley Municipality	Terrestrial and Animal Specialist; Principal Reviewer Site Sensitivity Verification (SSV) and Report for Terrestrial Biodiversity and Animal and Plant Species for the Proposed Integrated Residential Development at Touwsrivier, Western Cape Province
2025	South Africa	Private Client	Environmental Assessment Practitioner; Terrestrial and Animal Specialist Site Sensitivity Verification (SSV) and Report for the Proposed Solar-Power Desalination Plant Jacobsbaai & Saldanha Area, Western Cape.
2025	South Africa	V&A Waterfront	Environmental Assessment Practitioner; Project Manager Basic Assessment Process for a Mixed Use Development at the V&A Waterfront, Cape Town, Western Cape
2025	Namibia	Namwaste (Pty) Ltd	Animal Specialist Invertebrate Specialist Study for the Proposed Namwaste Management Facility, Arandis, Namibia
2025	South Africa	De Beers Marine (Pty) Ltd	External Environmental Auditor; Environmental Assessment Practitioner External Environmental Compliance Audit for prospecting right NC12189 PR in South African Sea Area 6C — Phase 2 Auditing the compliance of prospecting activities, during January 2022, with the conditions and management measures stipulated in the associated Environmental Authorisation and Environmental Management Programme.
2024	South Africa	De Beers Marine (Pty) Ltd	External Environmental Auditor External Environmental Compliance Audit for prospecting right NC12189 PR in South African Sea Area 6C — Phase 1 Auditing the compliance of prospecting activities, during the period 15 April 2021 to 31 December 2021, with the conditions and management measures stipulated in the associated Environmental Authorisation and Environmental Management Programme.
2024-2026	South Africa	Overstrand Local Municipality	Environmental Assessment Practitioner Estuarine Maintenance Management Plan (MMP) for the proposed dredging and future maintenance of the Onrus Estuary—Onrus Catchment to Coast (C2C) Programme

Period	Country	Clients	Project, Tasks
2024- 2026	South Africa	Sunwater East London	Environmental Assessment Practitioner; Project Manager Scoping & Environmental Impact Assessment (EIA) for the proposed Solar Powered Desalination Plant in the Port of East London for Transnet National Ports Authority
2024/ 2025	South Africa	Department of Forestry, Fisheries and the Environment: Oceans and Coasts	Project Manager; Stakeholder Engagement Specialist Development of management plans for the South-East Atlantic and South-West Indian Seamounts Marine Protected Areas
2024	South Africa	Prism Environmental Management Services on behalf of property owner	Marine, Terrestrial and Animal Specialist Coastal Impact Assessment for the Proposed Property Development on two Erven in Wilderness, Western Cape.
2024	South Africa	Port Nolloth Sea Farms Ranching (Pty) Ltd	Environmental Assessment Practitioner Amendment of the Environmental Authorisation for the Port Nolloth Sea Farms ranching abalone holding and processing facility, south of Kleinsee.
2023	South Africa	Gansbaai Marine (Pty) Ltd	Marine Field Scientist Marine Impact Assessment to fulfil the requirements of Gansbaai Marine's Coastal Waters Discharge Permit
2023	South Africa	St Helena Bay Water Quality Trust	Report Editor and Reviewer The State of St Helena Bay: annual environmental monitoring and reporting campaign
2019 – present (ongoing)	South Africa	Saldanha Bay Water Quality Forum Trust	Marine Field Scientist; Co-author; Report Editor The State of Saldanha Bay and Langebaan Lagoon: Annual Monitoring and reporting campaign
2023/24	South Africa	GIZ	Co-author; Environment Legislation Section Green infrastructure options for improved waterway and catchment management for the City of Cape Town.
2023	South Africa	Impact Water Solutions and GIZ	Co-author; Environment Assessment Practitioner GIZ Green Hydrogen Desalination ESIA Scoping Study to provide strategic information on the technoeconomic, legal, environmental, and social applicability of desalination plants as water source for green hydrogen projects in South Africa.
2023	South Africa	Doug Jeffrey Environmental Consultants	Marine and Coastal Specialist

Period	Country	Clients	Project, Tasks
			Marine Specialist Study for the Residential Development in Oude Kraal, Camps Bay: Site Sensitivity and Constraints Report
2023	South Africa	African Tuna	Specialist and Lead Author Feasibility study for the commercial harvesting of periwinkles and limpets on the west coast of South Africa
2023	Angola	SHELTER (on behalf of Eni Angola)	Specialist and Co-author Preparation of a Terrestrial and Coastal Biodiversity Action Plan (BAP) as part of the Angola Northern Gas Complex Onshore Plant Project
2022/2023	South Africa	Matzikama Kaolin	Environmental Assessment Practitioner; Project Manager; Stakeholder Engagement Specialist Scoping Assessment as part of an application for prospecting rights: Prospecting of kaolin in the Western Cape
2022/2023	South Africa	Xwena Kaolin	Environmental Assessment Practitioner; Project Manager; Stakeholder Engagement Specialist Scoping Assessment as part of an application for prospecting rights: Prospecting of kaolin and silica in the Western Cape
2022 – present (ongoing)	South Africa	I&J Danger Point	Environmental Assessment Practitioner; Stakeholder Engagement Specialist Abalone ranging right application & Risk Assessment
2022 – present (ongoing)	South Africa	Drylands Farms	Terrestrial and Animal Specialist; Environmental Assessment Practitioner Terrestrial Baseline Survey as part of prefeasibility for a proposed agricultural development on a mine in the Northern Cape of South Africa
2018 – present (ongoing)	South Africa	De Beers Marine Namibia	Taxonomist; Environmental Scientist; Co-author De Beers Marine Namibia Environmental Monitoring Programme in the Atlantic 1 Mining License Area: Annual Benthic Sampling Campaign
2021/2022	South Africa	SANEK Liquidators	Environmental Site Officer (ESO) Stonehurst mountain Estate Phase 4 Development — Compliance Monitoring
2021/2022	South Africa	SRK Consulting	Marine Specialist Marine Impact Assessment for the increase in manganese handling capacity at the Multi-Purpose Terminal, Port of Saldanha, Saldanha Bay, South Africa
2021/2022	South Africa	Trans Atlantic Diamonds	Environmental Assessment Practitioner Basic Assessment Process and application for prospecting rights in an offshore sea concession 10B in the Northern Cape

Period	Country	Clients	Project, Tasks
			Basic Assessment Process and application for prospecting rights in an offshore sea concession 7C in the Northern Cape Basic Assessment Process and application for prospecting rights in the offshore sea concession area 14C, Western Cape Basic Assessment Process and application for prospecting rights in the offshore sea concession area 11C, Western Cape Basic Assessment Process and application for prospecting rights in the inshore sea concession area 14A, Western Cape
2021	South Africa	Nomalungelo Faku	Specialist and Lead Author Feasibility study for a pearl farm in the greater Nelson Mandela metropolitan area
2021	South Africa	Cliff Path Action Group	Marine Specialist Marine Environmental Impact Assessment for the Proposed Pedestrian Path to Connect the two Parts of the Hermanus Cliff Path via Poole's Bay
2018 – 2021	South Africa	Mhlathuze Water	Lab Technician and Scientist Mhlathuze Water Environmental Monitoring Programme for the Richards Bay Offshore Outfalls Region
2019/2020	South Africa	Planet Capital and Cape Nordic Corporation	Environmental Assessment Practitioner Support; Stakeholder Engagement Specialist Basic Assessment Process for the Proposed Land-based Aquaculture Facility near Elands Bay on the West Coast of South Africa
2020	South Africa	Planet Capital and Cape Nordic Corporation	Animal Specialist; Field Scientist Proposed Land-based Aquaculture Facility near Elands Bay – Bat Specialist Impact Survey and Assessment
2020	South Africa	CSIR Coastal Systems Research Group	Taxonomist CSIR Coastal Systems Research Group: Identification of benthic invertebrate macrofauna.
2020	South Africa	Department of Environmental Affairs and Development Planning	Field Scientist; Stakeholder Engagement Specialist Berg Estuary Valuation Study: Value of The Berg Estuary and Importance of Management Interventions
2019	South Africa	Department of Agriculture, Forestry & Fisheries	Environmental Assessment Practitioner Support; Stakeholder Engagement Specialist Basic Assessment Process for the Proposed Sea-Based Aquaculture Development Zone in Algoa Bay, Eastern Cape

Period	Country	Clients	Project, Tasks
2019	South Africa	Doring Bay Abalone	Co-Author Draft Environmental & Risk Assessment for an Application for a Right to Engage in an Abalone Ranching Pilot Project
2019	South Africa	Mozal Alumium Smelter	Taxonomist; Co-Author Estuarine Specialist Report for the Mozal Matola River Pipeline, Mozambique: Estuarine Impact Assessment

PUBLICATION RECORD

SWART C AND ROBINSON TB (2019) Horizon scanning for alien predatory crabs: insights from South Africa. *African Journal of Marine Science* 41(2): 125 – 135, DOI: 10.2989/1814232X.2019.1588782

SWART C, VISSER V AND ROBINSON TB (2018) Patterns and traits associated with invasions by predatory marine crabs. *NeoBiota* 39: 79 – 102. <https://doi.org/10.3897/neobiota.39.22002>

ROBINSON TB AND **SWART C** (2015) Distribution and impact of the alien anemone *Sagartia ornata* in the West Coast National Park. *Koedoe* 57 (1): DOI: 10.4102/koedoe.v57i1.1246

SEDICK S, CLARK B, GIHWALA K, **SWART C** (In prep.) The description of a new species of *Nereis* (Annelida, Nereididae) from the shallow waters of southern Namibia.

GIHWALA K, BICCARD A, CLARK B, **SWART C**, MAKHOSONKE A, STEFFANI N, ROOS L (In prep.). Anthropogenic disturbance and subsequent recovery of benthic habitats and associated macrofaunal communities in southern Africa.]

THESIS

SWART C (2017) An assessment of invasive predatory marine crabs and the threat they pose along the South African coastline. MSc Thesis, Stellenbosch University, 154 pp.

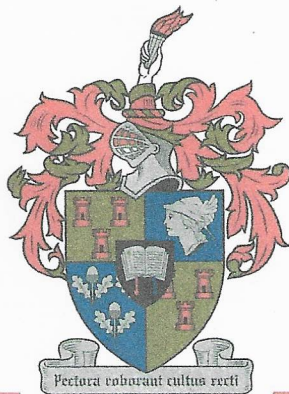
CONFERENCES

2014 Poster Presentation: “Distribution and impact of the alien anemone *Sagartia ornata* in the West Coast National Park”. South African Marine Science Symposium, Stellenbosch University, Stellenbosch, 15 – 18 July 2014

2015 Poster Presentation: National Research Foundation Research Day, Feb 2014; Second Prize

2017 Oral Presentation: “Horizon scanning for intertidal predatory crab invaders: South Africa as a case study”. South African Marine Science Symposium, Nelson Mandela University, Port Elizabeth, 4 – 7 July 2017

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Certified a true copy of the original

[Signature] 18-07-24

Janine van Graan
Commissioner of Oaths
Professional Accountant (SA)
SAIPA Membership No. 7380
Minter House, 1 Otto Close
Westlake. 7945

UNIVERSITY OF STELLENBOSCH

This is to certify that

CHERUSCHA SWART

*had complied with all the conditions prescribed
in the Act, Statute and Rules of the University,
and the degree*

MASTER OF SCIENCE
(MSc)
cum laude
(Zoology)

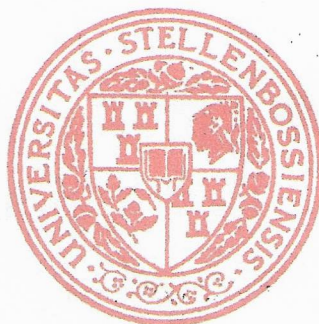
*with all the rights and privileges pertaining thereto was awarded
at a congregation of the University in December 2017.*

[Signature]

RECTOR AND VICE-CHANCELLOR

[Signature]

DEAN



[Signature]

REGISTRAR
1 December 2017

**Environmental Assessment
Practitioners Association
of South Africa**



Registration No. 2021/3298

Herewith certifies that

CHERUSCHA SWART

is registered as an

Environmental Assessment Practitioner

**Registered in accordance with the prescribed criteria of Regulation 15. (1)
of the Section 24H Registration Authority Regulations
(Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the
National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).**

Effective: 01 April 2026

Expires: 31 March 2027

Chairperson

Registrar



SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Cheruscha Swart

Registration Number: 155305

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science (Professional Natural Scientist)
Zoological Science (Professional Natural Scientist)

Effective **9 February 2023**

Expires **31 March 2027**



President of Council

Chief Executive Officer



CURRICULUM VITAE

STEVE COLIN SEPTEMBER

DATE OF BIRTH: 20 January 2000

NATIONALITY: South African

ACADEMIC QUALIFICATIONS:

MCom Public and Development Management, 2024, University of Stellenbosch

BCom (Hons) Public and Development Management, 2022, University of Stellenbosch

BA Development and Environmental Studies, 2021, University of Stellenbosch

COUNTRY EXPERIENCE: South Africa

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Excellent)

POSTAL ADDRESS: 8 Steenberg House, Silverwood Close, Tokai 7945

PHONE: +27-21-7013420

E-MAIL: steve@anchorenvironmental.co.za

EMPLOYMENT HISTORY:

2025-current: Consultant: Consultant (Anchor Environmental Consultants)

2023-2025: Junior Environmental Manager (Guillaume Nel Environmental Consultants)

2023-2023: Graduate Intern (Stellenbosch Municipality)

2022-2022: Student Intern (Stellenbosch Municipality)

SUMMARY PROFILE

Steve has a MCom and BCom. Hons. degrees in Public and Development Management and a BA Development and Environmental Studies degree from the University of Stellenbosch. He is a Consultant for Environmental Management at Anchor Environmental and a professionally registered Candidate Environmental Assessment Practitioner (EAPASA: 2023/7868), as well as a Full Member at the International Association of Impact Assessment South Africa (IAIASa) (Full Member: 8136). He is an environmental manager with spatial planning, public administration, public management and public participation experience on local government level within the Western Cape of South Africa. Furthermore, he has a geographic information systems background in the local government sphere, as well as required for the National Environmental Management Act (NEMA). As an Environmental Consultant, his responsibilities include the conducting of environmental impact assessments, water use license applications, heritage applications, and specialist reports.

TECHNICAL SKILLS: QGIS, Python, HTML Web designing

MEMBERSHIP OF PROFESSIONAL BODIES/ORGANISATIONS:

- Candidate Environmental Assessment Practitioner, the Environmental Assessment Practitioner Association of South Africa (Registration Number: 2023/7868) (2023-)

- Full Member, International Association of Impact Assessment South Africa (Registration Number: 8136) (2025-)

SELECT PROJECT EXPERIENCE

Period	Country	Clients	Project, Tasks
2025-	South Africa	Trans Atlantic Diamonds (Pty) Ltd	Candidate Environmental Assessment Practitioner Basic Assessment and Prospecting Right Application for the Concession Area 11C, West Coast, Western Cape
2026	South Africa	Fynbos Eiendomme (Pty) Ltd	Candidate Environmental Assessment Practitioner Review of the Basic Assessment Report for the Proposed Upgrading of the Herold's Bay Sewage Pump Station 1 and associated Rising Main and the Development of Pump Station 4 and new Associated Infrastructure
2026	South Africa	Denith Engineering (Pty) Ltd	Candidate Environmental Assessment Practitioner Applicability Checklist for the Proposed Crane Installation at the Royale Cape Yacht Club, Erf RE/10256, Cape Town
2025-	South Africa	V&A Waterfront (Pty) Ltd	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Mixed-Use Development on Project Parcels O and P and a1 &a2 on Erven 158570 RE, 149294 RE, 177854 and 179076 Breakwater Precinct, V&A Waterfront, Cape Town
2025	South Africa	City of Cape Town Municipality	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Phase 1 Water Pipeline in Hout Bay, Cape Town, Western Cape
2025	South Africa	City of Cape Town Municipality	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Water Pipeline Installation in Simon's Town, Cape Town, Western Cape
2025	South Africa	Croydon Gardens Development (Pty) Ltd	Candidate Environmental Assessment Practitioner Section 24G Process for the Alleged Illegal Infilling of Building Material, Garden Waste and Inert Waste within a wetland/watercourse, the illegal construction of a dam, and the proposed residential development on Remainder 8 and 10 of Farm 654, Somerset West, Western Cape
2025	South Africa	Combined Developers (Pty) Ltd	Candidate Environmental Assessment Practitioner Section 24G Process for the alleged illegal clearance of vegetation and infilling of potential sensitive habitat and the proposed residential development on the remaining extent of Portion 1 of Farm 849, Paarl, Western Cape
2024-2025	South Africa	Rabie Property Developers	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Mixed-Use Development and the redevelopment of the Durbanville Racecourse, Durbanville. Western Cape

Period	Country	Clients	Project, Tasks
2024-2025	South Africa	Brandwacht Property Development (Pty) Ltd	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Residential Development on the Remaining Extent of Farm Brandwacht No. 1049, Stellenbosch, Western Cape
2024-2025	South Africa	Overstrand Municipality	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed 11kV Underground Electrical Cable Development, Hermanus, Western Cape
2024-2025	South Africa	Legaro Property Development	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Drakenzicht 3 Mixed-Use Development on Portion 5 of Portion 3 of Farm 845, Paarl, Western Cape
2024-2025	South Africa	Drakenstein Municipality	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Secondary Bulk Sewer Pipeline, Paarl, Western Cape
2024	South Africa	Nitida Boutique Hotel	Candidate Environmental Assessment Practitioner Part 2 Amendment for the Proposed Nitida Wine Farm Boutique Hotel Development, Durbanville, Western Cape
2024	South Africa	Subrolox (Pty) Ltd	Candidate Environmental Assessment Practitioner Part 1 Amendment (Transfer of Ownership) for the Approved Pontac Park Light Industrial Development on Portion 10 of Farm van Wyks River No. 787, Paarl, Western Cape
2024	South Africa	Arun Holding (Pty) Ltd	Candidate Environmental Assessment Practitioner Part 1 Amendment (Timeframe Extension) for the Approved Light Industrial Park on Erf 15712, Wellington, Western Cape
2024	South Africa	Nitida Boutique Hotel	Candidate Environmental Assessment Practitioner Part 1 Amendment (Timeframe Extension) for the Approved Nitida Boutique Hotel Development, Durbanville, Western Cape
2024	South Africa	Bello Campo (Pty) Ltd	Candidate Environmental Assessment Practitioner Part 1 Amendment (Layout Amendments) for the Approved Residential Development on Erf 8892, Paarl, Western Cape
2024	South Africa	City of Cape Town Municipality	Candidate Environmental Assessment Practitioner Applicability Checklist for the proposed rehabilitation of Cape Flats 1 and 2 Bulk Sewers, Cape Town, Western Cape
2023-2024	South Africa	City of Cape Town Municipality	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Upgrading of the Rietvlei Pump Station, Kuils River, Western Cape
2023-2024	South Africa	City of Cape Town Municipality	Candidate Environmental Assessment Practitioner Basic Assessment Process for the Proposed Upgrading of the Raapenberg Pump Station and construction of screening facilities and sand traps, Cape Town, Western Cape

THESES

September. S.C. 2025. An Exploratory study on Public Participation of Rural Communities in the IDP Public Participation process: Case Study of Elsenburg. MCom Thesis, University of Stellenbosch, 200 pp.

**Environmental Assessment
Practitioners Association
of South Africa**



Registration No. 2023/7868

Herewith certifies that
STEVE COLIN SEPTEMBER
is registered as an
Candidate Environmental Assessment Practitioner

**Registered in accordance with the prescribed criteria of Regulation 15. (1)
of the Section 24H Registration Authority Regulations
(Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the
National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).**

Effective: 01 April 2026

Expires: 31 March 2027

Chairperson

Registrar



CURRICULUM VITAE

MICHAEL PHILIP ANTHONY ARMITAGE

DATE OF BIRTH: 9 September 1996

NATIONALITY: South African

ACADEMIC QUALIFICATIONS

MSc (Distinction) Environmental and Geographical Science, 2022, University of Cape Town

BSc (Hons) (First Class Pass) Environmental and Geographical Science, 2018, University of Cape Town

BSc Environmental and Geographical Science and Archaeology, 2017, University of Cape Town

OTHER TRAINING

Environmental Impact Assessments Training Course, Cape Town, 2024. Business Success Solutions In association with Janice Tooley Attorneys. SACNASP and EAPASA accredited.

Practical Implementation of Environmental Auditing and Monitoring Training Course, Cape Town, 2024. Business Success Solutions in association with Umhlaba Environmental Consulting. SACNASP and EAPASA accredited.

PCSWMM and EPA SWMM5 Modelling Short Course, 2019. Computational Hydraulics International (CHI).

First Aid Level 1

Scientific Registrations

EAPASA: Candidate EAP, Registration Number: 2024/7978

IAIAsa: Full Member, Registration Number: 7619

COUNTRY EXPERIENCE: South Africa, People's Republic of China

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Basic)

POSTAL ADDRESS: 8 Steenberg House, Silverwood Close, Tokai 7945

PHONE: +27-21-701 3420 **E-MAIL:** michael@anchorenvironmental.co.za

EMPLOYMENT HISTORY: 2022-Present: Environmental Consultant: Marine Ecosystems and Resources (Anchor Environmental Consultants)

2021: Research Assistant (South African National Biodiversity Institute and Breede-Gouritz Catchment Management Agency)

2015: Mathematics and Physical Science Tutor (Mastermaths)

SUMMARY PROFILE

Michael holds MSc and BSc (Hons) degrees in Environmental and Geographical Science (EGS) and a BSc in EGS and Archaeology, all from the University of Cape Town (UCT). His MSc entailed a detailed field and laboratory study, and comparative analysis, of trace metal contamination in the Knysna Estuary (RSA) and the Yangtze Estuary (PRC). He's passionate about Integrated Environmental Management (IEM) and Integrated Water Resource Management (IWRM), and is particularly interested in the management of ecosystems and water resources within coastal transitional environments. He is invested in pursuing integrated, "nature-based" solutions to problems traditionally solved with grey infrastructure design choices. Michael thrives on unpacking the complexities of dynamic systems and using this knowledge to optimise integrated management strategies. Prior to working at Anchor, he analysed water quality data on behalf of the Breede-Gouritz Catchment Management Agency (BGCMA) and the South African National Biodiversity Agency (SANBI). Within Anchor Environmental Consultants, he principally works as an Environmental Assessment Practitioner (EAP), undertaking Environmental Impact Assessments (EIAs) in marine, coastal, estuarine, and terrestrial environments. He also works as an estuarine management specialist and specialist scientist, having authored several estuarine management plans (EMPs), maintenance management plans (MMPs), and many estuarine specialist impact assessments. He's further authored several socio-economic impact assessments, and has wide-ranging GIS mapping expertise.

Michael is registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA) as a Candidate Environmental Assessment Practitioner (EAP), Registration no. 2024/7978, and is a Full member of the International Association for Impact Assessments South Africa (IAIAsa), Registration no. 7619.

SELECT PROJECT EXPERIENCE

Period	Country	Clients	Project, Tasks
2025-Ongoing	South Africa	African Marine Solutions (AMSOL)	Environmental Management Specialist Development of an Environmental Management Plan (EMP) for the offshore ship-to-ship bunkering activities in Algoa Bay.
2025	South Africa	Saldanha Bay Water Quality Trust	Sediment Quality Specialist and Chapter Author 2025 State of Saldanha Bay (SOB) Annual Environmental Monitoring Report.
2025	South Africa	Netelek	Environmental Assessment Practitioner Screening study for a proposed Solar-Power Desalination Plant, Ammonium Production Plant, and Associated Infrastructure, Jacobsbaai & Saldanha Area, Western Cape.

Period	Country	Clients	Project, Tasks
2024- Ongoing	South Africa	Overstrand Local Municipality and United National Environmental Programme (UNEP)	Estuarine Specialist and Environmental Assessment Practitioner Onrus Catchment to Coast (C2C) Programme: Preparing Estuarine Ecological Health Assessment (EHA) and Maintenance Management Plan (MMP) Reports for the proposed dredging and future maintenance of the Onrus Estuary; Acquiring approval to rehabilitate the Main Onrus palmiet peat wetland under the Department of Agriculture's Landcare EMPr; Conducting a Water Use License (WULA) Application for both the dredging and rehabilitation work. Future works will include the compilation of additional MMPs, an EIA process, and an additional WULA for catchment rehabilitation further upstream.
2024- 2025	South Africa	Mossel Bay Local Municipality and Southern Estuarine Rehabilitation Action Group (SERAG)	Estuarine Specialist and Environmental Assessment Practitioner Preparing a Maintenance Management Plan (MMP) for the Groot Brak Estuary.
2024- Ongoing	South Africa	V&A Waterfront	Environmental Assessment Practitioner Basic Assessment Process for a Mixed-Use Development within the Breakwater Precinct of the, V&A Waterfront, Cape Town.
2024- Ongoing	South Africa	National Sea Rescue Institute (NSRI)	Environmental Assessment Practitioner Environmental Impact Assessment (EIA) for the Proposed Upgrades the NSRI Bakoven Rescue Base.
2024- Ongoing	South Africa	Sunwater East London	Environmental Assessment Practitioner and Estuarine Specialist Scoping and Environmental Impact Assessment (S&EIA) for Transnet Ports Authority (TNPAs) Proposed Solar Powered Desalination Plant in the Port of East London.
2024- Ongoing	South Africa	The City of Cape Town (CCT) and Infinity Environmental	Field Scientist Marine microplastics and water quality sampling.
2024	South Africa	Port Nolloth Sea Farms Ranching (Pty) Ltd	Environmental Assessment Practitioner Off Road Vehicle Driving Permit and Vessel Launching Permit Applications for the PNSF Abalone Ranching Concession Area (Ongoing).
2024	South Africa	ECA Consulting	Field Scientist Updated Marine Specialist Study and Dumping at Sea Permit Application for the Berth 100A Application in the Port of Ngqura.
2024	South Africa	Department of Forestry, Fisheries and the Environment (DFFE)	Stakeholder Engagement Support Development of management plans for the South-East Atlantic and South-West Indian Seamounts Marine Protected Areas (Ongoing).
2024	South Africa	Port Nolloth Sea Farms Ranching (Pty) Ltd	Environmental Scientist and GIS Specialist Amendment of the Environmental Authorisation for the Port Nolloth Sea Farms ranching abalone holding and processing facility, south of Kleinsee (Ongoing).

Period	Country	Clients	Project, Tasks
2024	South Africa	Infinity Environmental for the City of Cape Town	Estuarine and Ichthyofaunal Specialist (Lead Author) and GIS Specialist Estuarine and Ichthyofaunal Specialist Impact Assessment for the Proposed Fish Ladder Construction and Alterations of Existing Weir and Bridge Infrastructure in the Zeekoevlei Estuary.
2023	South Africa	Infinity Environmental for the City of Cape Town (CCT)	Estuarine Specialist and Lead Author Estuarine Specialist Impact Assessment for the Proposed Dredging of the Milnerton Lagoon by the City of Cape Town. (Ongoing).
2023-2024	South Africa	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) for the City of Cape Town	GIS and Environmental Governance Specialist Green infrastructure options for improved waterway and catchment management for the City of Cape Town. <u>Contributions included:</u> conducting extensive spatial mapping of key socio-economic metrics—and contributing to the interpretation of these results. Was also the lead contributor on the Governance and Regulatory Framework Report pertaining to Cape Town’s waterways (and associated green spaces)—which linked closely with the Socio-Economic report, and dealt in depth with topics such as land zoning, local legislative context, etc.
2023-2024	South Africa	Dube Tradeport Corporation	Estuarine Specialist Estuarine Specialist Impact Assessment for the proposed Development of a Logistics Hub in Portion A of the Old Durban International Airport.
2023-2024	South Africa	Dube Tradeport Corporation	Estuarine Specialist and Lead Author Estuarine Specialist Impact Assessment for the Proposed Automotive Supply Park Sewer Line Passing through the aManzimtoti Estuary.
2023	South Africa	St. Helena Bay Water Quality Trust	Sediment and GIS Specialist and Sediment Chapter Lead Author The State of St Helena Bay: ongoing semi-annual ecological monitoring of St Helena Bay and the lower Berg Estuary.
2023	South Africa	Saldanha Bay Water Quality Forum Trust	Sediment and GIS Specialist and Sediment Chapter Lead Author The State of Saldanha Bay and Langebaan Lagoon; ongoing annual ecological monitoring of Saldanha Bay and Langebaan Lagoon.
2023	South Africa	Enviroworks	Estuarine Specialist and Lead Author Estuarine and Coastal Impact Assessment for the Proposed SANParks Developments in the West Coast National Park, Langebaan.
2023	South Africa	Guillaume Nel Environmental Consultants	Estuarine Specialist and Lead Author Estuarine Specialist Assessment for the proposed upgrade of the TR77/1 (R27), Velddrif.
2023	South Africa	Doug Jeffery Environmental Consultants	GIS Specialist Marine Specialist Study for the Residential Development in Oudekraal, Camps Bay: Site sensitivity and Constraints Report.

Period	Country	Clients	Project, Tasks
2023	South Africa	Impact Water Solutions (IWS) for Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Environmental Scientist and GIS Specialist (Lead Author) Green Hydrogen Desalination Study Task 7: Environmental and Social Impact Assessment (ESIA) scoping Report. The report formed the basis for the guideline document for Green Hydrogen developments in South Africa.
2023	South Africa	WSP Group Africa (Pty) Ltd	Marine Ecologist Total Energies Block 11b/12b Environmental and Social Impact Assessment (ESIA): Marine Ecology Impact Study.
2023	South Africa	Infinity Environmental for the City of Cape Town	Estuarine Ecologist Remediation Plan for the Milnerton Lagoon: Ecological Risks and Benefits associated with the Proposed Remediation Options.
2023	South Africa	Sharples Environmental Services	Estuarine and GIS Specialist (Lead Author) Assessment of the Impacts of Building a Residential House in the Knysna Estuary, Garden Route Municipality, Western Cape.
2022-2023	South Africa	Infinity Environmental for the City of Cape Town	Estuarine Specialist and Co-Lead Author Situation Assessment and Estuarine Management Plan Reports for the Zandvlei Estuary.
2022-2023	South Africa	Lukhozi Consulting Engineers	Estuarine Specialist (Lead Author) Mouth Management Plan for the Zandvlei Estuary.
2022	South Africa	Nemai Consulting	Estuarine Ecologist and Field Scientist Ecological Water Requirements (EWR) Update and Estuarine Impact Assessment for the uMzimkhulu Estuary, Kwa Zulu Natal.
2022	South Africa	KSEMS Environmental Consulting	Estuarine Specialist and Lead Author Assessment of Impacts of Proposed Upgrade of the N2 Section 25 between the Isipingo Interchange and Umlaas Canal, and Construction of a New Drainage Canal, in the Ethekwini Municipality, Kwazulu-Natal.
2022	South Africa	Matzikama Kaolin	Environmental Scientist and GIS Specialist Scoping & Environmental Impact Assessment and Application for Prospecting Rights for Kaolin Prospecting in the Western Cape: Preparation of EIA Scoping Report.
2022	South Africa	Xwena Kaolin	Environmental Scientist and GIS Specialist Scoping Report for Prospecting Rights for Kaolin and Silica Prospecting in the Western Cape: Preparation of EIA Scoping Report.
2022	South Africa	Trans Atlantic Diamonds	Co Author of Marine & Fisheries and Socio-Economic Specialist Reports and Contributor to Basic Assessment (BAR) Report. Basic Assessment Process and Application for Prospecting Rights in Offshore Sea Concession 10B in the Northern Cape.
2022	South Africa	Trans Atlantic Diamonds	Co Author of Marine & Fisheries and Socio-Economic Specialist Reports and Contributor to Basic Assessment (BAR) Report. Basic Assessment Process and Application for Prospecting Rights in Offshore Sea Concession 7C in the Northern Cape.

Period	Country	Clients	Project, Tasks
2022	South Africa	Infinity Environmental for the City of Cape Town	Estuarine Specialist and Lead Author Zandvlei Dredge Assessment: Current Ecological Status Report
2022	South Africa	Lukhozi Consulting Engineers for the City of Cape Town	Estuarine Specialist and Lead Author Zandvlei Estuary: Ecological Context and Recommendations.

THESES

Armitage M.P.A. 2022. An Assessment of the Heavy Metal Concentrations in Surface Sediments from the Knysna Estuary. MSc Thesis, The University of Cape Town, 172 pp.

Armitage M.P.A. 2018. A Current Analysis of the Heavy Metal Load in the Ashmead Channel (Knysna Lagoon) Sediments. BSc (Hons) Thesis, University of Cape Town, 39 pp.

CONFERENCES

- 2021** Joint Society of South African Geographers-Southern African Association of Geomorphologists Conference (Presentation)
- 2021** International Association for Impact Assessment South Africa: Re-Thinking IEM (Integrated Environmental Management) in Pursuit of the Sustainable Development Goals (Attendee)
- 2021** National Research Fund-National Natural Sciences Foundation of China Collaborative Research Closing Symposium with academics from East China Normal University (Presentation)
- 2019** National Research Fund-National Natural Sciences Foundation of China Collaborative Research Symposium hosted in Shanghai with academics from East China Normal University and the University of Cape Town (Presentation)
- 2019** Pollution State of the Knysna Estuary Symposium with members of the Knysna Municipality, Town Council, and stakeholders (Presentation)
- 2018** National Research Fund-National Natural Sciences Foundation of China Collaborative Research Symposium hosted in Shanghai with academics from East China Normal University and the University of Cape Town (Presentation)
- 2018** International Urban Biodiversity & Food Security conference, held in Cape Town (Volunteer & Attendee)

EAPASA

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Environmental Assessment Practitioners Association of South Africa

Advancing environmental assessment practice in South Africa



Email: registrar@eapasa.org / Website: www.eapasa.org

Mr Michael Armitage
6 Kelvin Road
Bergvliet
Cape Town
7945

Sent by email to: michael.armitage@alumni.uct.ac.za

Dear Mr Armitage

Candidate Environmental Assessment Practitioner: Number 2024/7978

Michael Philip Anthony Armitage : South African ID 9609095225081

The Environmental Assessment Practitioners Association of South Africa (EAPASA) herewith certifies that Michael Philip Anthony Armitage is a Candidate Environmental Assessment Practitioner (EAP) in accordance with the prescribed criteria of Regulation 15.(2) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Your registration is duly authorised by EAPASA as the single Registration Authority for EAPs in South Africa (appointed as per Regulation No. 104, Gazette No. 41434 of 8 February 2018, in terms of section 24H(3)(a) of the NEMA). Your status as a Candidate EAP is displayed in the 'EAP Register' - please find your name and contact email address at

<https://registration.eapasa.org/registered-practitioners>

As part of your Continuing Professional Development, you are encouraged to be part of the EAPASA Mentorship Programme. Your review during the upgrade to Registered EAP will be contingent on you having met the requirements of EAPASA's Mentorship Programme.

As a Candidate EAP you are required to uphold the EAPASA Code of Ethical Conduct and Practice in your professional endeavours, towards the goal of quality assurance in environmental assessment practice.

Please accept my congratulations on your registration.

Best regards

Dr Patrick Sithole
Registrar
Date: 04 July 2024

Board Members: Ms Snowy Makhudu (Chairperson), Dr Khangwelo Desmond Musetsho (Vice-Chairperson),
Mr Zama Dlamini, Ms Jacqui Hex, Ms Minnette Le Roux, Ms Thato Moeeng,
Ms Jennifer Molwantwa, Mr Phumudzo Nethwodzi, Mr Danie Neumann,
Mr Khathutshelo Tshipala, Ms Letlhogonolo Tungamirai
Registrar: Dr Patrick Sithole
NPO Reg. No. 122-986

BASIC ASSESSMENT PROCESS FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 11C BY TRANS ATLANTIC DIAMONDS (PTY) LTD

Trans Atlantic Diamonds (Pty) Ltd
Office 1603 Portside
4 Bree Street
Cape Town, Western Cape, 8001



Appendix 1: Specialist CVs and Qualifications

Anchor Environmental Consultants
8 Steenberg House, Silverwood Close, Tokai, South Africa
www.anchorenvironmental.co.za





CURRICULUM VITAE

ADAM REES – MARINE ECOLOGIST

Citizenship: British | SA Critical Skills Visa (Aquatic Scientist & Environmental Scientist)

Language: English

ACADEMIC QUALIFICATIONS:

PhD Marine Science (NQF 10), University of Plymouth

BSc (Hons) Marine Biology & Coastal Ecology (NQF 8), University of Plymouth

COUNTRY EXPERIENCE: UK, Europe and North Atlantic, Southern to West Africa and South Atlantic, Indian Ocean, Saudi Arabia and the Gulf

POSTAL ADDRESS: 8 Steenberg House, Silverwood Close, Tokai, Cape Town, South Africa 7945

PHONE: +27631286941

E-MAIL: adam@anchorenvironmental.co.za

DOB: 11/05/1991

EXPERIENCE

POSITION

Feb 2022- present

Senior Marine Consultant | Anchor Environmental Consultants (Pty) Ltd, South Africa

Feb 2022- present

Visiting Researcher | University of Plymouth, UK

2020-2023

Research Project Consultant (Marine Ecology) | Blue Marine Foundation, London, UK

2018-2022

Postdoctoral Researcher (Marine Ecology) | University of Plymouth, UK

2018-2020

UK Project Coordinator | Blue Marine Foundation, London, UK

2017 (Feb-March)

Field Research Assistant | Wildlife Conservation Society, Gabon &, GEOMAR

Helmholtz Centre for Ocean Research, Kiel.

2013 (May-Oct)

Research Assistant | University of Plymouth, UK

Adam is a marine ecologist and fisheries expert specializing in sustainable ocean management, with over a decade of experience supporting conservation and fisheries governance initiatives across Europe, Africa, and the Indian Ocean. His work increasingly contributes to regional and global ocean initiatives, including marine spatial planning, biodiversity conservation, and fisheries management in offshore and transboundary contexts relevant to Areas Beyond National Jurisdiction (ABNJ). Adam has extensive experience working in coastal, offshore, and deep-sea ecosystems, with expertise spanning benthic ecology, fisheries management, marine protected area design and monitoring, and ecosystem-based management approaches applicable from national waters to high seas contexts. He possesses strong technical expertise in ecological survey design, community-level data analysis (R, Python, Primer and PERMANOVA+), GIS analytics (ArcGIS, QGIS), ecological impact assessments, and marine spatial planning, supported by extensive field experience including offshore surveys, underwater video, eDNA, fisheries observations, acoustic monitoring, and environmental sampling. Adam combines scientific and consulting experience to support evidence-based policy and management, having authored multiple peer-reviewed publications, over 50 technical reports, and a book chapter informing marine conservation and sustainable ocean governance internationally. He has managed fisheries and marine ecology projects for governments, NGOs, and private-sector clients, including work supporting large-scale ocean planning and conservation initiatives. Adam is also passionate about science communication, using media, infographics, and conservation photography to translate complex marine science into accessible knowledge that supports policy development and public engagement in global ocean stewardship. He is a SACNASP registered Professional Natural Scientist in Aquatic Science and Environmental Science (Registration Number: 141530), a Visiting Researcher at the University of Plymouth, and a member of the Royal Society of South Africa.

PEER-REVIEWED PUBLICATIONS

- Hutchings K., **Rees A.**, Pulfrich A., Clark B. (2025). Effects of diamond mining on sandy beaches in southern Namibia – the use of *Tylos granulatus* (Isopoda: Oniscidea) as an indicator species. *African Journal of Marine Science*, 47(3), 281–294. <https://doi.org/10.2989/1814232X.2025.2562031>
- Stamp T., Pittman S.J., Holmes L., **Rees A.**, Ciotti B.J., Thatcher H., Davies P., Hall A., Wells G., Olczak A., Sheehan E.V. (2024) Restorative function of offshore longline mussel farms with ecological benefits for commercial crustacean species. *Science of the Total Environment*. Vol. 951, Issue. 174987, <https://doi.org/10.1016/j.scitotenv.2024.174987>.
- Renn C., Rees S., **Rees A.**, Davies B.F.R., Cartwright A.Y., Fanshawe S., Attrill M.J., Holmes L.A., Sheehan E.V. 2024 Lessons from Lyme Bay (UK) to inform policy, management, and monitoring of Marine Protected Areas. *ICES Journal of Marine Science*. Vol. 0, Issue 0, 1–17
- Hickman J., Richards J., **Rees A.**, Sheehan E. V. 2023. Shipwrecks act as de facto Marine Protected Areas in areas of heavy fishing pressure. *Marine Ecology*. 00, e12782. <https://doi.org/10.1111/maec.12782>
- da Silva C, Samaai T, Kerwath S, Adams LA, Watson KM, Bernard AT, van der Heever GM, Angel A, Schoombie S, Frainer G, Franken M-L, **Rees A.**, Paterson A 2023. Leaping into the future: Current application and future direction of computer vision and artificial intelligence in marine sciences in South Africa. *Research Ideas and Outcomes*. 9: e112231. <https://doi.org/10.3897/rio.9.e112231>
- Easton BAA, Scott K, Richards J, **Rees A.** 2023. Catch per Unit Effort of Decapod Species, *C. pagurus* and *H. gammarus*, from a Voluntary Marine Reserve. *Fishes*. 2023; 8(8):390. <https://doi.org/10.3390/fishes8080390>

- **Rees, A.**, Sheehan, E.V., Attrill, M.J. 2021. Optimal fishing effort benefits fisheries and conservation. *Scientific Reports* **11**, 3784 <https://doi.org/10.1038/s41598-021-82847-4>
- Davies, B.F.R., Holmes, L.A., Rees A., Attrill, M.J., Cartwright, A., Sheehan, E.V. 2021. Ecosystem Approach to Fisheries Management Works – how switching from mobile to static fishing gear improves populations of fished and non-fished species inside a Marine Protected Area. *Journal of Applied Ecology* <https://doi.org/10.1111/1365-2664.13986>
- Sheehan, E.V., Holmes, L.A., Davies, B.F.R., Cartwright, A., **Rees A.**, Attrill, M.J. 2021. Rewilding of Protected Areas Enhances Resilience of Marine Ecosystems to Extreme Climatic Events. *Frontiers in Marine Science* <https://doi.org/10.3389/fmars.2021.671427>
- Rees, S. E., Ashley, M., Evans, L., Mangi, S., Sheehan, E. V., Mullier, T., **Rees, A.**, Attrill, M. J. 2020. An evaluation of the social and economic impact of a Marine Protected Area on commercial fisheries *Fisheries Research* **235**, 105819-105819 <https://doi.org/10.1016/j.fishres.2020.105819>
- Davies, B.F.R., Attrill, M.J., Holmes, L., **Rees, A.**, Witt, M.J., Sheehan, E.V. 2019. Acoustic Complexity Index to assess Benthic Biodiversity of a Partially Protected Area in the Southwest of the UK. *Ecological Indicators*. DOI: 10.1016/j.ecolind.2019.106019
- Sheehan, E.V. **Rees, A.**, Bridger, D., Hall-Spencer, J.M. 2017. Strandings of NE Atlantic gorgonians. *Biological Conservation*. DOI: 10.1016/j.biocon.2017.03.020

BOOK CHAPTERS

- Morgan, A., Sheehan, E., **Rees, A.**, Cartwright, A. 2020 Towards a Marine Socio-Ecology of Learning in the South West of England. In Joel B. Pontius, Michael P. Mueller, David A. Greenwood (eds). Hunting, Foraging, and Fishing for Food as Place-based Learning DOI:[10.1007/978-3-030-42814-3](https://doi.org/10.1007/978-3-030-42814-3)

OTHER RELEVANT TRAINING & SKILLS:

Formal training: STCW Safety at Sea
GIS advanced methods
PERMANOVA and PRIMER 7
First Aid (general and outdoor)

SELECT PROJECT EXPERIENCE:

Period	Country	Client	Project/tasks
2026	Ghana	SLR/ Helios	Environmental Carrying Capacity Due Diligence assessment for Nile Tilapia aquaculture farming, Lake Volta, Ghana
2026	South Africa	ACER Africa	3 x Fisheries Screening and Impact Assessments for proposed subsea telecommunication installations within South Africa's EEZ.
2026	South Africa	SLR	Independent scientific reviewer of marine baseline reports conducted for green ammonia development in Egypt.
2025-2026	South Africa	Eskom	Marine Ecology and Avifauna specialist studies to support Environmental and Social Impact Assessment of two potential nuclear power plants in South Africa
2025-2026	South Africa	Department of Forestry, Fisheries and the Environment (DFFE), WILDTRUST	Development of Management Plan for the Namaqua Fossil Forest offshore Marine Protected Area, of South Africa.
2025-2026	Democratic Republic of Congo	DP World	Environmental monitoring of turtle nesting beaches (2025-2026 nesting season) within the Banana Seaport region, Democratic Republic of Congo
2025	Liberia	Conservation International	Development of technical guidance and implementation documentation for the development of Marine Spatial Planning in Liberia
2025	South Africa	Port Owen Marina Authority (POMA)	Assessment of invertebrate and fish fauna in the Berg Estuary channel and recommendations for disposal of dredge water
2025	South Africa	CES - Environmental and Social Advisory Services	Estuarine specialist studies, inclusion avifauna impact assessment and Delft3D hydrodynamic modelling for the development of a Liquefied Natural Gas Import Terminal at the Port of Richards Bay, Kwazulu-Natal.
2025	Namibia	De Beers Marine Namibia	De Beers Marine Namibia Environmental

			Monitoring of offshore diamond mining in the Atlantic 1 Mining License Area
2025	Mozambique	Kenmare/Acer Africa	Long-term water quality, coral reef, reef fish, turtle and fisheries monitoring programme at Caldeira and Njovo Islands, Mozambique
2025	South Africa	CES	Marine Specialist Study and Impact Assessment for proposed marine seawater gully intake locations within Namaqualand.
2025	South Africa	SLR Consulting (Africa)	Block 11b/12b Environmental and Social Impact Assessment (ESIA): Marine Ecology Impact Assessment Specialist Study update
2025	South Africa	SANParks	State of Knowledge reports for the Addo Elephant Park and Robben Island Marine Protected Areas.
2025	South Africa	CSIR	Strategic Environmental Assessment for a green hydrogen and port development in the Northern Cape. Desktop review, mapping, reporting, environmental sensitivity analyses.
2025	South Africa	Infinity Environmental	Marine Specialist Study and Impact Assessment for the Granger Bay revetment, Port of Cape Town, Western Cape.
2025	South Africa	Lambert's Bay Foods (Pty) Ltd	Environmental and effluent monitoring, audit and dispersion modelling in fulfilment of the awarded Coastal Water Discharge Permit
2025	South Africa	Enviroworks	Marine Specialist Study and Impact Assessment lead for the development of two gas-to-power plants in the Coega IDZ, Eastern Cape.
2025	South Africa	Pisces Environmental Services	Strategic Environmental Assessment and Sensitivity Analysis for the marine and coastal environment, Boegoebaai in support of a proposed green hydrogen port facility development.
2025	South Africa	WNEL	Marine and Estuarine impact assessment for a campsite development in Kleinsee, Northern Cape.
2025	Mozambique	ACER Africa	Assessment of changes to local fishing effort using survey and remotely sensed data to determine the socio-ecological changes and indirect environmental impacts of the Kenmare Moma mine, northern Mozambique.
2022, 2023, 2024, 2025	South Africa	Saldanha Bay Water Quality Trust	The State of Saldanha Bay and Langebaan Lagoon; ongoing annual ecological monitoring of Saldanha Bay and Langebaan Lagoon. Water quality analysis and reporting.
2025	South Africa	ImveloBlue	Development and implementation of an offshore Tuna (Albacore) Pole and Line fisheries observer program within South Africa.
2024	South Africa	WSP Group Africa (Pty) Ltd	Environmental screening (marine ecology and fisheries) of PetroSA offshore assets in Block 9 and 11a
2024	Namibia	De Beers Marine Namibia	De Beers Marine Namibia Environmental Monitoring Programme in the Atlantic 1 Mining License Area: 2023 Benthic Sampling Campaign. Chapter author: 'SkiMonkey' benthic tow camera benthic assessment of offshore diamond mining activities on benthic habitats. Survey design, image and statistical analyses, writing of report chapter.
2024	South Africa	GenesisHexicon	Shallow marine benthic ecological assessment and field survey for an offshore floating wind farm to be installed offshore of Richards Bay, KZN.
2024	South Africa	WWF	Development of an endangered, threatened and protection management plan for several wild capture and mariculture fisheries to undergo Marine Stewardship Council assessment. Stakeholder engagement and management plan writing lead.
2024	South Africa	CES	Field survey lead and marine/estuarine impact assessment within the Richards Bay estuary for a floating regasification unit and LNG terminal construction.

2024	South Africa	Department of Forestry, Fisheries and the Environment	Development of Management Plans for the Southeast Atlantic and Southwest Indian Seamounts offshore Marine Protected Areas of South Africa.
2024	South Africa	The Nature Conservancy, SANparks	Marine invertebrate (diver data) and marine resource use data analysis (expert interviews, aerial survey data) within the Table Mountain National Park Marine Protected Area. Data analysis, GIS spatial analysis and mapping, reporting.
2023	Saudi Arabia	NEOM	Marine conservation spatial planning through Marxan, for the NEOM (Saudi Arabia) marine and coastal region to support regionwide conservation planning efforts. Marine lead on conception, analysis, presentations and reporting, and led the creation of a final marine conservation plan for NEOM.
2023-2024	Mozambique	ERM - Environmental Resources Management for DP World	Marine/estuarine specialist study and field survey for an Environmental and Social Impact Assessment (ESIA) application for proposed expansion of the Maputo container terminal in the Port of Maputo, Mozambique.
2023	South Africa	WILDOCEANS	National assessment of the demersal inshore trawl. Socio-economic and legal assessment, resource exploitation assessment and spatial analysis to assess impacts of inshore trawl fishery on other coastal fisheries and legal and policy options available to reduce conflict and impacts.
2023	South Africa	Port Own Marina Authority (POMA)	Assessment of invertebrate and fish fauna in the Berg Estuary channel and recommendations for disposal of dredge water
2023	Guinea	Dynamic Mining/ SLR Consulting	Environmental assessment for a bauxite export facility in the prefecture of Boke, Republic of Guinea
2022-2023	South Africa	Lucky Star Limited, Pioneer Fishing (WC) (Pty) Ltd	Dumping at Sea Permit application: marine environmental constraints analysis, site selection and impact statement.
2022	South Africa	Triplo4	Proposed gas-to-power Powership Project at the ports of Ngqura, Saldanha and Richards Bay. Updates to marine ecology and fisheries Specialist Studies to support EIA
2022	South Africa	WSP Group Africa (Pty) Ltd	Marine ecological Screening Analysis for proposed green hydrogen project, Boegoebaai, northern cape
2022	South Africa	SLR Consulting	Constraints Analysis for a proposed 2-billion-liter throughput per year desalination plant on the Western Cape coast
2022	South Africa	Lambert's Bay Foods	Baseline study to support coastal waters discharge permit requirements for the Lambert's Bay Food processing plant, Lambert's Bay
2022	South Africa	Transnet National Ports Authority	Baseline survey of marine fauna, flora and antifouling contaminants - Port of Durban August 2022: Chapters 'Fish' & 'Water quality monitoring'.
2022	South Africa	Department of Environmental Affairs and Development Planning (DEA&DP)	Situation Assessment report 2022 for the Berg River Estuary
2022	South Africa	Nemai Consulting & Ugu district municipality.	Literature review of the hydrodynamic drivers of the uMzimkhulu Estuary, South Africa
2022	South Africa	World Wide Fund for Nature	GIS spatial data analysis of reef presence for the Saldanha Bay sea-based Aquaculture Development Zone
2022	South Africa	Transnet	Meta comparison of historical fish surveys inside the Port of Durban to inform baselines of fish assemblages in a system subjected to the impacts of ship hull cleaning
2022	South Africa/ Namibia	DebMarine Namibia	Taxonomic ID of benthic macrofauna for diamond recovery operations on the South African/Namibian border
2021	UK	Blue Marine Foundation	Feasibility study for siting on Marine National Parks around the UK. Collation of spatial data, social, economic and

			environmental data. GIS mapping, Marine Spatial Planning. Data analysis report writing
2021-2022	Maldives	Blue Marine Foundation	GIS mapping and spatial analysis, quantitative analysis of resource use (fisheries, tourism, fish exporters, local councils). Fisheries use, Catch per unit effort, Vessel Monitoring Systems. Report writing, data collection, data analysis semi-quantitative interviews/questionnaires consultation with industry and stakeholders
2021-2022	Maldives	Blue Marine Foundation	Socio-economic data collection, quantitative and qualitative data collection and analysis, reporting. Economic fisheries data
2013-2017	England	Department for Environment Food and Rural Affairs, UK Government	Report to UK Government. Annual reporting regarding assessment of benthic impacts of inshore pot fishing on benthic ecosystems. Underwater video monitoring, baited remote underwater video monitoring, image and video analysis, data analysis, report writing and presentation.
2019	England	Blue Marine Foundation	Field data collection of herring spawning events. Genetic comparison between herring populations. Identification of spawning events and habitat. Report writing and analysis
2021-2022	England	Blue Marine Foundation	Feasibility assessment of oyster restoration. Particle dispersal, larval dispersal and Larval settlement models. GIS analysis, site assessment and report writing
2021	UK	Blue Marine Foundation	Fisheries inside English Marine Protected areas. Review and analysis of fisheries management in England inshore and offshore MPAs. Mapping, report writing and presentation of results
2017,2018, 2021,2022	England	Natural England	Lyme Bay reporting on annual monitoring. Long-term monitoring time series data from ecosystem assessment – underwater video. Multivariate data analysis and reporting
2017	Gabon	GEOMAR	Fieldwork tracking juvenile turtles in the nearshore waters of Gabon. Acoustic telemetry, spatial data, remote sensing.
2014-2021	England	Offshore shellfish Ltd	Mariculture (offshore mussel farm) environmental impact. Underwater video, grab sampling, infaunal analysis, sediment status. Assemblage composition analysis – infaunal and epifaunal analysis. Video (towed video, ROV, baited video) analysis.

herewith certifies that

Adam Rees

Registration Number: 141530

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

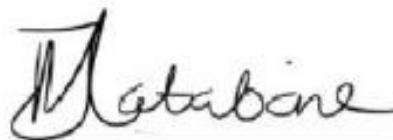
Aquatic Science (Professional Natural Scientist)
Environmental Science (Professional Natural Scientist)

Effective **30 September 2021**

Expires **31 March 2027**



President of Council



Chief Executive Officer



CURRICULUM VITAE

KENNETH HUTCHINGS

Born:	15 June 1972, South Africa
Nationality:	South African
Languages:	English excellent/Afrikaans good/ Xhosa fair
Present occupation:	Principal Consultant & Director
Work address:	8, Steenberg House, Silverwood Close, Tokai 7945 South Africa
Drivers licence:	Code 08, 30/07/1990
Commercial dive qualifications:	Class III scientific, Supervisor
Commercial skippers ticket:	Category B (< 9m, 40 NM, Dive, and night operations)
Email:	ken@anchorenvironmental.co.za

SUMMARY PROFILE

Dr Hutchings has more than 25 years of research and consulting experience in the fields of fisheries management, mariculture, estuarine research and management, marine and estuarine spatial planning, marine impact assessment, research and conservation strategy development, fishery socio-economic surveys and analyses, biological sampling and life-history analyses of fish (age and growth, reproduction, mortality, migration, diet, ecology), taxonomic methodology, population genetics, fisheries modelling, marine ecotoxicity trials, trace metal pollution and physico-chemical, ecological and biodiversity surveys of marine, estuarine and freshwater habitats. Dr Hutchings is experienced in developing estuarine and coastal management plans and in conducting public participation processes. Dr Hutchings is a research associate of the University of Cape Town's Marine Research Institute. He has excellent verbal and writing communication skills, is competent with software packages used in scientific research and consulting projects. He has published 20 scientific papers and compiled more than 100 consulting reports. Dr Hutchings is comfortable working as part of a team in both a leadership and mentoring position or as a team member. Dr Hutchings has participated in international collaborative studies in Angola, Mozambique, Tanzania, Namibia, Sierra Leone, Republic of Congo, Somalia and Mauritius. He has practical and research experience of most commercial fishing methods (hand, line, spear, pole, gill net, trammel, net, beach seine net, trap, longline, trawl and purse-seine). He has personally collected scientific data for the demersal trawl and longline hake fisheries, designed, implemented and managed multi-year fishery observer programmes for line, longline, lobster trap and demersal trawl fisheries in South Africa. He has project managed several long-term fishery and mariculture research and monitoring projects for the South African Department of Forestry, Fisheries and the Environment and numerous other consulting projects for state, NGO and private sector clients.

TERTIARY EDUCATION:

PhD Zoology – Fish taxonomy, life history, ecology and management, UCT (2005)

M.Sc. Zoology (with distinction) – Fisheries management, UCT (2000)

B.Sc. (Honours - First Class) Marine Biology, UCT (1997)

B.Sc. Zoology & Environmental and Geographical Science, University of Cape Town (1994)

Distinction in Zoology

RELEVANT WORK AND PROJECT EXPERIENCE

- Anchor Environmental Consultants (1999-present)
- PhD student, Line-fish research (under contract to MCM) (2001-2005)
- Research officer, Zoology Department, University of Cape Town (1998-2000)
- Demersal Trawl Fishery, scientific observer, University of Cape Town (1995)
- Commercial squid (freezer vessel), line-fish crew (deck boat), ski boat crew/skipper, Beach-seine fishing crew, boat-skipper, shore skipper, B & K fishing CC. Messrs. G. William, M. Johnson & B. Docke (1986-2006)

MEMBERSHIP OF PROFESSIONAL BODIES/ORGANISATIONS

- Professional Natural Scientist, the South African Council for Natural Scientific Professions (2014-present)
- Research Associate Marine Research Institute, Department of Biological Science, University of Cape Town (2006-present)
- Associate Technical Consultant, Marine Stewardship Council (2019-present)
- Linefish Scientific Working Group (1999-2001)

SCIENTIFIC PUBLICATIONS

- MALAN A, BICCARD A, DAWSON J, PAYNE R, SCHMIDT K, GIHWALA K N, **HUTCHINGS K**, LOUW D, SHIKEVA J, KAMWI B, KAIMBI L, VUMAZONKE J, MUTALENI M, SHANNON T, CHORDEKAR S, & V ROSS-GILLESPIE 2024: Diversity, distribution and knowledge gaps of Polychaeta on the continental shelf of southern Namibia, *African Zoology*, DOI: 10.1080/15627020.2024.2349648
- ASCHE F, GARLOCK TM, AKPALU W, AMAECHINA EB, BOTTA R, CHUKWUONE NA, EGGERT H, **HUTCHINGS K**, LOKINA R, TIBESIGWA B & J K TURPIE 2020. Fisheries performance in Africa: An analysis based on data from 14 countries. *Marine Policy*, 125, 104263. doi:10.1016/j.marpol.2020.104263.
- HORTON M, KERWATH S, PARKER D, WINKER H, LAMBERTH S, & **K. HUTCHINGS** 2019 Age, growth and per-recruit stock-assessment of *Chelon richardsonii* in Saldanha Bay and Langebaan Lagoon, South Africa. *African Journal of Marine Science*, 41: 313-324
- PARKER D, SE KERWATH, TF NÆSJE, CJ ARENDSE, FJ KEULDER-STENEVIK, **K HUTCHINGS**, BM CLARK, H WINKER, PD COWLEY & CG ATTWOOD 2017. When plenty is not enough: an assessment of the white stumpnose (*Rhabdosargus globiceps*) fishery of Saldanha Bay, South Africa, *African Journal of Marine Science*, 39:2, 153-166
- HUTCHINGS, K** & C.G ATTWOOD 2013 Belman (*Umbrina robinsoni*) In: Mann BQ. (Ed). Southern African Marine Linefish Species Profiles. Special publication, Oceanographic Research Institute, Durban 9:165-166.
- HUTCHINGS, K.** and M. H. GRIFFITHS 2010 - Life-history strategies of *Umbrina robinsoni* (Sciaenidae) in warm-temperate and sub-tropical South African marine reserves *African Journal of Marine Science* 32(1):37-53
- HUTCHINGS, K.** and M. H. GRIFFITHS 2010 – Assessment of South African *Umbrina robinsoni* based on per-recruit models *African Journal of Marine Science* 32(3): 511–523
- HUTCHINGS, K.** GRIFFITHS M. H. and S.J LAMBERTH 2010 - An investigation of the effect of temporal variation in growth rate of *Umbrina robinsoni* on biological reference point estimates calculated using per-recruit models. *African Journal of Marine Science* 32(3): 633–636
- CLARK, B.M., **HUTCHINGS, K.**, and S.J. LAMBERTH 2009. Long-term variations in the composition and abundance of fish in the Berg estuary, South Africa. *Transactions of the Royal Society of south Africa* 64(2): 238-258
- LAMBERTH, S.J., VAN NIEKERK, L and **K HUTCHINGS** 2008 Comparison of, and the effects of altered freshwater inflow on, fish assemblages of two contrasting South African

- estuaries: the cool-temperate Olifants and the warm-temperate Breede. *African Journal of Marine Science* **30(2)**: 311–336.
- HUTCHINGS, K., CLARK, B.M., ATKINSON, L.J. and C. G. ATTWOOD** 2008 - Evidence of recovery of the linefishery in the Berg River Estuary (Western Cape, South Africa) subsequent to closure of commercial gill netting. *African Journal of Marine Science*. **30(3)**: 507–517.
- HUTCHINGS, K., GRIFFITHS, M. H. and J. G. FIELD** 2006 – Regional variation in the life history of the canary drum *Umbrina canariensis* (Sciaenidae), in South African waters. *Fisheries Research* **77**:312-325.
- GRIFFITHS, C. L., VAN SITTERT, L., BEST, P. B., BROWN, A. C., CLARK, B. M., COOK, P. A., CRAWFORD, R. J. M., DAVID, J. H. M., DAVIES, B. R., GRIFFITHS, M. H., **HUTCHINGS, K.**, JERARDINO, A., KRUGER, N., LAMBERTH, S., LESLIE, R. W., MELVILLE-SMITH, R., TARR, R. and C. D. VAN DER LINGEN 2004 – Impacts of human activities on marine animal life in the Benguela: A historical overview. *Oceanogr. Mar. Biol. Ann. Rev.* **42**: 303-392.
- HUTCHINGS, K. and M. H. GRIFFITHS** 2005 - Identity and distribution of southern African sciaenid fish species of the genus *Umbrina*. *African Journal of Marine Science* **27(1)**: 1-22.
- HUTCHINGS, K. and S. J. LAMBERTH** 2003 - The likely impacts of an eastward expansion of the gill-net fishery in the Western Cape, South Africa; Implications for Management. *Maine and Freshwater Research* **54**: 39-56.
- HUTCHINGS, K. and S. J. LAMBERTH** 2002 – Catch and effort estimates for the gill and beach-seine net fisheries in the Western Cape, South Africa. *S. Afr. J. mar. Sci.* **24**: 205-225
- HUTCHINGS, K. and S. J. LAMBERTH** 2002 - By-catch in the gill and beach-seine net fisheries in the Western Cape, South Africa, with implications for management. *S. Afr. J. mar. Sci.* **24**: 227-241
- HUTCHINGS, K., LAMBERTH, S. J. and J. K. TURPIE** 2002 – Socio-economic characteristics of gill and beach-seine net fishers in the Western Cape, South Africa. *S. Afr. J. mar. Sci.* **24**: 243-262
- VAN TETS, I. G., **HUTCHINGS, K.** and S.W. NICHOLSON 2000 – Relative merits of using purified proteins and natural foods in studies of wildlife nutrition: the nitrogen requirements of a rodent pollinator. *African Zoology* **35(2)**: 207-215.
- HUTCHINGS, K., LAMBERTH, S. J. and C. L. GRIFFITHS** 1999 – Gill nets and line-fish, what is the catch? *SANCOR Occasional Report* **5**: 77-84

PROJECT EXPERIENCE

Period	Country	Client	Project, Tasks
2025	South Africa	City of Cape Town	End of Pipe Environmental Assessment and Monitoring Programme for the City's designated wastewater Marine Outfalls.
2024	South Africa	Transnet National Ports Authority	Baseline survey for marine fauna and flora and antifouling contaminants, Port of Mossel Bay.
2024	South Africa	Kleinzee Holdings	Marine and Coastal Impact Assessment for mining activities in the Buffels Marine Mining Area, Kleinzee, Northern Cape
2024	South Africa	CES/Vopak/Transnet	Estuarine specialist studies, including dispersion modelling in support of an EIA for the development of a Liquefied Natural Gas Import Terminal at the Port of Richards Bay, Kwazulu-Natal
2023-2024	Mozambique	ERM South Africa	Estuarine impact assessment for quay wall and yard expansion works, Maputo DP World Terminal, Maputo
2023-2024	South Africa	The Nature Conservancy	Marine invertebrate diving surveys and marine resource use assessment within the Table Mountain National Park Marine Protected Area. Project leader
2024	South Africa	WWF South Africa	Development of a management strategy for endangered, threatened or protected species encountered in the albacore tuna pole and line fishery, South Africa.
2023-2024	Namibia	De Beers Marine Namibia	De Beers Marine Namibia Benthic Environmental Monitoring Programme Atlantic 1 Mining License Area. 2022 Report Review.
2023-2024	South Africa	Zingce Environmental Solutions	Baseline Marine fauna and flora survey, Port of Ngqura. Project lead.
2023	South Africa	ECA Consulting	Deepening, lengthening and widening of berth 203 to 205, pier 2, container terminal, port of Durban — central sandbank mitigation plan.
2023	South Africa	African Tuna (Pty) Ltd	Feasibility study for the commercial harvesting of periwinkles and limpets on the west coast of South Africa.
2023	South Africa	St Helena Bay Water Quality Trust	The State of St Helena Bay Reporting.
2022-2023	Mozambique	Acer Africa & Kenmare	Long-term coral reef monitoring programme at Caldeira and Njovo islands, Mozambique. Fish specialist, project management.
2022-2023	South Africa	Irvin and Johnson Aquaculture Pty (Ltd)	Application for an abalone ranching concession. Project management and

Period	Country	Client	Project, Tasks
			execution.
2022-2023	South Africa	Hake Longline Association	Ad-hoc scientific advisory services.
2022-2023	Namibia and South Africa	Creocean and Total Energies E&P South Africa	Environmental baseline studies of five offshore blocks. Benthic ecological specialist studies. Responsible for project management and review.
2023	South Africa	WWF South Africa	Diving surveys of key invertebrate fauna in the Robben Island MPA. Project management and execution.
2022-2023	South Africa	Wild Oceans	An assessment of the Inshore Trawl Fishery in South Africa. Responsible for project management and review.
2022-2024	Sierra Leone	Iluka/Sierra Rutile/Digby Wells/Jones & Wagener	Environmental, Safety and Health Impact Assessment (ESHIA) and environmental Flow Assessment studies for mining of the Sembehun group of deposits in the Southern Province of Sierra Leone. Marine and Estuarine specialist.
2022	South Africa	Transnet National Ports Authority	Baseline survey marine fauna, flora and antifouling contaminants Port of Durban. Principal consultant responsible for project management and implementation.
2021-2024	South Africa	Diamond Coast Abalone	Environmental Monitoring and stock assessment for abalone ranching concession Area NC4, Northern Cape. Principal consultant responsible for project management and implementation.
2021-2025	South Africa	Department of Forestry, Fisheries and Environment (DFFE).	Specialist monitoring programme and management recommendations for the Saldanha Bay Aquaculture Development Zone. Principal consultant responsible for project management and implementation.
2021-2023	South Africa	Department of Forestry, Fisheries and Environment (DFFE).	Review of independent stock assessment abalone ranching concession area EC1. Principal consultant responsible for review of stock assessment report, diving verification surveys and recommendations for sustainable future harvest quantities.
2021-2022	South Africa	Trans Atlantic Diamonds	Marine Specialist Studies and Basic Assessment Processes for offshore concession Areas 14A and 11C. Principal Consultant responsible for marine specialist reporting, basic assessment report review and oversight (EAP).
2021	South Africa	Nsovo Environmental Consulting	Marine ecology impact assessment for proposed DNG Energy (Pty) Ltd Busisiwe (Coega 1) and Cheyeza (Coega 2) Gas to Power facilities and associated

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			infrastructure. Principal Consultant responsible for project review.
2021	South Africa	V&A Waterfront, Cape Town	Marine specialist study and dispersion modelling for the East Pier District cooling plant outfall at the V&A Waterfront. Principal Consultant responsible for project review.
2021	South Africa	Allan Gray (Pty) Ltd	Effluent Quality Audit of the Awarded Coastal Waters Discharge Permit (2013/002/WC/VICTORIA & ALFRED) for the seawater cooling system and desalination plant at No. 1 Silo Square, V&A Waterfront. Principal Consultant responsible for project review.
2021	South Africa	Guillaume Nel Environmental Consultants	Estuarine constraints analysis for the proposed development on the remaining extent 37 of farm 23 (Uitkomst), Paternoster. Principal Consultant responsible for project review and oversight.
2021	South Africa	Habitat Link Consulting.	Marina Martinique pipeline repair and maintenance. Marine Specialist Report: Assessment of impacts on intertidal and sub-tidal environment. Principal Consultant responsible for project review and oversight.
2021	South Africa	Nomalungelo Faku	Feasibility study for a pearl farm in the greater Nelson Mandela Metropolitan Area. Principal consultant responsible for project design, review and oversight.
2021	Somalia	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (Kenya)	Training on data analysis and introduction to electronic data collection for fishery data collection officers at MoFMR, Kismayo. International fisheries expert responsible for project implementation.
2021	South Africa	Guillaume Nel Environmental Consultants	Estuarine Impact Assessment for Development of Erf 222 and 223, Weir Road, Milnerton. Principal consultant responsible for project review and oversight.
2021	South Africa	PHS Consulting	Marine specialist study and dispersion modelling for the proposed expansion of the West Point fish meal processing plant, St Helena Bay. Principal consultant responsible for project review and oversight.
2021 & 2023	South Africa	WWF-South Africa	Environmental Specialist Benthic Monitoring programme for the Saldanha Bay Aquaculture Development Zone. Principal consultant responsible for project

Period	Country	Client	Project, Tasks
			review and oversight.
2021-2022	South Africa	Sea Harvest Corporation	Coastal waters discharge permit Environmental monitoring. Principal consultant responsible for project review and oversight.
2020-2021	South Africa	EDTEA KZN	Development of an Estuary Management Plan for the Uthongathi Estuary, KwaZulu-Natal. Project review.
2020-2021	Sierra Leone	Iluka/Sierra Rutile/Digby Wells	Environmental, Safety and Health Impact Assessment (ESHIA) review for mining of the Sembahun group of deposits in the Southern Province of Sierra Leone. Estuarine specialist.
2020	South Africa	Western Cape Government	Value of the Berg Estuary and Importance of Management Interventions. Biodiversity team leader and fisheries expert responsible for research and reporting.
2020-2021	South Africa	City of Cape Town Metropolitan	Effluent Pipelines Biomonitoring Principal consultant responsible for project review and oversight.
2020	South Africa	Department of Environment Forestry and Fisheries (DEFF)	Fishery Independent Abalone Surveys. Principal consultant responsible for project implementation and oversight.
2020	South Africa	Department of Environment Forestry and Fisheries (DEFF)	Environmental Specialist Monitoring of the Saldanha Bay Aquaculture Development Zone. Principal consultant responsible for project review and oversight.
2019	Mauritius	International Ocean Institute — African Region.	Biofouling project in Port Louis harbour, Mauritius Phase III – dispersion modelling, BDI determination and sediment contamination. Principal consultant responsible for project review and oversight.
2019	South Africa	Environment for Development Initiative, University of Gothenberg	Completion of Fishery Performance Indicators (see Anderson et al 2015) for South African small pelagic, hake deep-sea trawl, west coast rock lobster and hake longline sectors. Principal consultant who undertook the research, consultation with industry completion of FPI spreadsheets and summary profiles.
2019	South Africa	Doringbaai Abalone	Risk and environmental assessment and public participation process to support a Phase 2 application to undertake abalone ranching. Project leader.
2019-2020	South Africa	South African National Parks	Subtidal surveys of commercially important and indicator invertebrate and fish species within the Table Mountain Marine Protected Area. Project leader.

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2019	Mozambique	Golder Mozambique/ Sasol Petroleum Mozambique Exploration Limitada	Marine specialist impact assessment for proposed offshore explorations in shallow water portions of blocks 16 & 19, Inhambane and Sofala provinces, Mozambique. Project leader responsible for study design, implementation and reporting.
2018-2019	Namibia	Namibian DeBeers	Sandy beach, rocky intertidal and subtidal monitoring programme. Studies on the effects of mining activities and mitigation measures to avoid or minimise impacts on the affected environment. Sandy beach team leader, survey design, implementation, analysis and reporting.
2018-2020	South Africa	Umhlathuze Water	Environmental monitoring of the Richards Bay Pipelines. Project leader, physical oceanography and fish specialist.
2018-2019	South Africa	Department of Agriculture, Forestry and Fisheries	Marine specialist impact assessment study for the declaration of proposed bivalve and finfish aquaculture development zones in Algoa Bay. Principal consultant responsible for marine ecological assessment, review of EIA, public presentation and stakeholder engagement.
2018	South Africa	Diamond Coast Aquaculture	Basic Assessment Process for proposed upgrades to the diamond coast aquaculture facility Kleinsee, Northern Cape.
2018	South Africa	Port Nolloth Sea Farms Ranching (Pty) Ltd	Basic Assessment process for a proposed abalone holding and processing facility.
2018	Somaliland	WSP, DP World	Marine and coastal specialist Environmental, Health and Social Impact Assessment for proposed Berbera Port expansion.
2018	Namibia	Ministry of Mines and Energy	Marine benthic baseline study of intertidal and subtidal habitats in vicinity of new oil and gas terminal. Fish, sandy beach invertebrate and sea bird specialist.
2018	Republic of Congo	The Biodiversity Company, Kola Potash	Oceanographic and benthic surveys and ecotoxicity trials to assess potential impacts of proposed potash processing discharge, jetty construction and transshipment of product. Project leader.
2017	South Africa	Viking Fishing Group	Socio-economic assessment of a 60% reduction in Viking Fishing Group's allocation in the inshore demersal trawl fishery. Fisheries expert responsible for project supervision and review.
2017-2018	Sierra Leone	Sierra Rutile PTY Ltd	Fish and fisheries expert assess downstream impacts of rutile mining

Period	Country	Client	Project, Tasks
			operation on downstream estuarine and marine habitats.
2017	South Africa	Southern Cross Salmon Pty Ltd.	On-site oceanographic monitoring and environmental impact assessment for proposed salmon sea cage farm, Saldanha Bay
2017, 2021	South Africa	National Nuclear Regulator	Marine and fisheries expert review of Thyspunt site safety report submitted by Eskom.
2016-2017	South Africa	Royal Society for the Protection of Birds	Design and conduct a feeding trial experiment to assess the uptake of the rodenticide brodifacoum by Tristan Rock lobsters <i>Jasus paulensis</i> . Principal consultant responsible for all aspects of the study, including permitting, experimental design and setup, data analysis and reporting.
2016-2017	South Africa	Department of Water and Sanitation	Classification of and resource quality objectives for the water resources of the Berg and Breede water management areas. Senior consultant responsible for status quo descriptions of estuaries in the two study areas and fish specialist for ecological reserve determination studies on nine estuaries.
2016	South Africa	WorleyParsons RSA (Pty) Ltd and Oiltanking MOGS (Pty)	Marine Impact Assessment for sea water intake and discharge facility at Saldanha Bay. Senior consultant responsible for report.
2016	South Africa	MOGS (Pty) Ltd	Marine baseline report for import facility for natural gas in Saldanha Bay.
2016	South Africa	Port Owen Marina Authority	ADCP measurement and analysis of current velocity in relation to tidal phase in the Berg River Estuary. Development of a timetable for disposal of dredge spoil that is compliant with conditions stipulated in the environmental authorization. Senior consultant responsible for survey and reporting.
2016-2024	South Africa	DeBeers Marine Namibia	Collaboration on survey design and statistical analysis of data collected as part of a long-term benthic monitoring programme. Scientific review of reporting.
2016	South Africa	SE Solutions (Pty) Ltd and South32 Aluminium SA Limited	Prepare marine and estuarine specialist study for EIA for a desalination plant in Richards Bay to supply Hillside Aluminium with process water. Study leader, field investigation and report compilation.
2016	South Africa	City of Cape Town	Preparation of estuary maintenance plan impact assessment reports for eight

Period	Country	Client	Project, Tasks
			estuaries within the megacity boundaries. Study leader undertook site visits, liaised with city staff and compiled reports.
2016	South Africa	Atlantic Salmon Pty Ltd.	Deploy and retrieve an acoustic Doppler current profiler to measure currents at a proposed salmon farm site in St Helena Bay. Analyse and present data.
2015-2016	South Africa	Mossel Bay Municipality	Preparation an estuary management plan for the Hartenbos Estuary. Supervisory role in development of plans, presentation and chairing of public meeting.
2014-2016	South Africa	Transnet National Ports Authority	Field survey team leader for the implementation of a water, sediment quality and biological monitoring programme in the Port of Durban. Supervision of analysis and reporting.
2014-2016	South Africa	Coega Development Corporation	Assessment of impacts of wastewater discharge from Coega Industrial Development Zone, Algoa Bay. Conduct oceanographic data analysis, marine and marine baseline study.
2014-2016	South Africa	Nelson Mandela Bay Metro, GIBB	Assessment of impacts of wastewater discharge from a new WWTW at Cape Recife, Algoa Bay. Oceanographic, bathymetry and ecological survey team leader, data analysis and reporting.
2006-2024	Namibia	NamDeb Namibia	Sandy beach macrofauna and sediment quality monitoring programme for the Bogenfels and MA1 Mining Licence Areas, Namibia. Studies reported on the effects of mining activities and mitigation measures to avoid or minimise impacts on the affected environment. Sandy beach team leader, survey design, implementation, analysis and reporting.
2015	South Africa	NWJ Environmental	Impact assessment for a proposed sand mining operation on the Umzumbe Estuary, KwaZulu-Natal. Ecological and physio-chemical estuarine survey design, implementation and reporting.
2015	South Africa	Marutleng SHE Services	Marine Impact Assessment Simonstown-Glencairn Railway Rehabilitation and Maintenance Work. Sandy beach and rocky shore survey design, implementation and reporting.
2015	South Africa	AquaTech	Risk assessment for in-water hull cleaning operations in the Port of Durban, South Africa. Contribution to methodology, supervision of sampling protocol, review of report.

Period	Country	Client	Project, Tasks
2015	Namibia	Pisces Environmental Services	Gecko Namibia Vision Industrial Park Development. Compilation of baseline field survey ichthyofauna report.
2014-2015	South Africa	South African Pelagic Fishing Industry Association	Assessment of the socio-economic impacts of a reduction in the sardine minimum Total Allowable Catch (TAC). Project leader responsible for design, data collection by means of interviews with industry and fishery scientists, socio-economic analysis and reporting.
2014	South Africa	Molapong Aquaculture	Risk Assessment for culture of King and Coho salmon in South Africa. Reporting and review.
2014	South Africa	Transnet National Ports Authority	Assessment of potential impacts of the proposed Durban Dig Out Port of the annual sardine migration up the East coast of South Africa. Research and reporting.
2014	South Africa	WWF-SA	Assist with the development of a Fisheries Improvement Project for Small Scale Fisheries in the Kogelberg. Undertaking fisheries assessments using the Marine Stewardship Council benchmarking tool, workshops and reporting.
2014	South Africa	Tronnox Namaqua Sands, Matzikamma Municipality, SRK	Environmental impact assessment for an aquaculture facility at Doringbaai, Northern Cape. Assessment of sites for intake and discharge infrastructure and potential environmental impacts of proposed abalone and finfish aquaculture discharges on the marine environment.
2014	South Africa	Cape Nature	Rezoning and realignment of borders for Betty's Bay, Goukamma and Robberg marine protected areas in South Africa. Fisheries impacts, advice and review.
2014-2024	South Africa	Port Nolloth Sea Farms Ranching (PTY) LTD. Diamond Coast Aquaculture. Diamond Coast Abalone	Baseline survey and monitoring for abalone ranching concession areas NC2, NC3 and NC4. Team leader responsible for sub tidal ecological survey design, implementation and reporting.
2013-2014	South Africa	iSimangaliso Wetland Park Authority	Assessment of the hydrological, hydrodynamic and ecological functioning of the Lake St Lucia Estuarine System and formulation of recommendations for rehabilitation and improved management of the system. Responsible for an assessment of marine fishery impacts under past, present and future management scenarios.
2013	South Africa	Cape Nature,	Assessment of impacts of an oil spill on

Period	Country	Client	Project, Tasks
		Department of Environmental Affairs	sandy beach and rocky intertidal communities in the Goukamma MPA. Project leader responsible for field survey design and implementation.
2013	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Development of a Strategy for Research in the Fisheries Sector. Principal consultant responsible for consultation, data acquisition and reporting.
2013	South Africa	Transnet National Ports Authority	Marine specialist study as part of an EIA for upgrading the General Maintenance Quay (GMQ) in the Port of Saldanha Bay. Field survey leader.
2013	South Africa	Sea Harvest	Assessment of fish factory effluent water quality. Sampling, analysis and reporting.
2013, 2015-2016	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Diving Surveys of the Eastern Cape Abalone Resource. Study leader responsible for planning, implementation and reporting.
2012	South Africa	South African National Parks	Fisheries consultant for a study of the potential impacts of the Addo Elephant National Park Marine Protected Area on commercial fisheries and their value. Tasks included collection of data by means of interviews with fishing industry representatives and government scientists, data analysis and reporting.
2012	Mauritius	Mauritius Oceanography Institute	Diving team leader for alien species, and water and sediment quality assessment of Port Louis, Mauritius.
2012	South Africa	Transnet National Ports Authority	Marine specialist appointed to assess potential impacts of iron ore oxide (Fe ₂ O ₃) on the marine flora and fauna of Saldanha Bay. Analysis of storm water runoff.
2012	South Africa	Amathole Water Board	Marine specialist appointed to assess the suitability of different sites and the impacts of reverse osmosis desalination plant discharge on the marine environment.
2010-2013	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Principal consultant as marine ecology and aquaculture specialist on an EIA for four Marine Aquaculture Development Zones (MADZs) in the Eastern Cape, South Africa. Project tasks included reviewing available technology and its suitability for use at each of the selected sites, identifying key risks and impacts that could arise from the culture of selected species on the sites including impacts on existing beneficial uses, and developing an Environmental Management and Monitoring Plan for each site as a whole as well as individual concession areas within each site.

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2011	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Principal consultant on a Strategic Environmental Assessment (SEA) to identify potential sea-based finfish aquaculture development zones (ADZ) off the South African coastline. The study entailed identifying and applying a suite of quantitative site selection criteria in a geographical information system (GIS) framework to identify suitable sites for sea based finfish culture in South Africa, taking account of environmental suitability, environmental sensitivity, and user conflict considerations.
2011	South Africa	Element Consulting Engineers	Marine specialist baseline report for a reverse osmosis desalination plant at Lamberts Bay. Responsible for sub-tidal ecological survey design, implementation, analysis and reporting.
2011	South Africa	Really Useful Investments no 72 (PTY) LTD	Environmental assessment for the abalone (<i>Haliotis midae</i>) ranching right application (phase 2) in the Northern Cape (area NC2). Desktop research and reporting.
2011	South Africa	Council for Scientific and Industrial Research (CSIR)	Benthic macrofauna and fish baseline survey for a reverse osmosis desalination plant at Saldanha. Survey team leader responsible for design, implementation analysis and reporting.
2010	South Africa	Department of Environmental Affairs & Development Planning, Western Cape Government	Assessment of the effects of heavy metal accumulation from land based sources on the Diep River Estuary. Principal consultant on a study assessing trace metal pollution in the Diep estuary in the City of Cape Town, to investigate potential sources of pollution and to prepare management recommendations for addressing principal sources of pollution.
2010	South Africa	Port Owen Marina Authority	Assessment of Port Owen marina dredging activities on the Berg River estuarine fish and macrobenthos communities. Senior consultant responsible for survey and reporting.
2010	South Africa	Chand Environmental	Marine and coastal specialist appointed to assess the status and sensitivity of the coastal marine environment off Partridge Point on the Cape Peninsula, and likely impacts that would arise from development of the site.
2009-2019	South Africa	Various companies	Consultant on a series of environmental impact assessments for desalination plants at Sedgfield, Plettenberg Bay, Witsands,

Period	Country	Client	Project, Tasks
			Saldanha Bay, Mossel Bay and Port Nolloth, and Cape Town. (7 separate appointments).
2009-2011	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.)/Cape Nature/Marine & Coastal Management (MCM)	Consultant appointed to develop a management plans for the Olifants, Berg, and Uilkraals Estuaries, South Africa. (Three separate appointments). Projects entailed preparing situation assessments and strategic management plans for the Olifants, Berg and Uilkraals estuaries that included recommendations for establishment of a new marine protected area, terrestrial protected area, zonation plans for each of these elements, visitor management plans, and recommendations for institutional development. Consultant appointed for the implementation of the Verloerenvlei estuary management plan. All projects included presentation of plans and consultation with stakeholder leading to the establishment of estuary management forums comprising management agency representatives and local stakeholders.
2009-2011	South Africa	WWF-SA, Lotto Programme	Scientific advisor on a shore-based fisheries monitoring programme coordinating a team of 20 fisheries monitors at six sites on the South and East coasts of South Africa. Tasks included on-going training, quality control and report reviews.
2009-2010	South Africa	WWF-SA/Cape Action for People and the Environment (C.A.P.E.)	Fisheries consultant for the preparation of marine and coastal spatial plans and socio-economic assessments for the Kogelberg Biosphere Reserve and Garden Route Initiative. The project involved mapping biodiversity pattern and processes in the marine and coastal environment, spatial mapping of economic value, good and services, and of threats to these ecosystems.
2009	South Africa	West Coast District Municipality, Jeffares & Green (Pty) Ltd	Principal consultant on an assessment of the Jakkalsvlei estuary, the purpose of which was to describe and assess the ecological impacts of illegal excavation and infilling activities that took place during July 2008, and to draft rehabilitation plan to mitigate any impacts.
2009	South Africa	City of Cape Town	Consultant on project to prepare a situation assessment for the Coastal Monitoring Programme for the City of Cape

Period	Country	Client	Project, Tasks
			Town (City of Cape Town). Preparation of an overview report on the conservation status and sensitivity of the City of Cape Town Coast including estuaries.
2009	South Africa	Doug Jeffery Environmental Consultants	Senior consultant on an assessment of the status and sensitivity of the coastal marine environment off Oudekraal on the Cape Peninsula with an assessment of potential constraints relating to impacts to the marine environment on the development of the site.
2002, 2009, 2015-2018	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM	Estimation of west coast rock lobster catch and effort by the recreational fishery sector. Responsible for telephone survey data analysis and reporting. Project included a series of workshops aimed at resolving inconsistencies in previous surveys and developing improved methodology for future surveys.
2009	South Africa	Chand Environmental Consulting	Marine and coastal specialist appointed to assess the status and sensitivity of the coastal marine environment off Oudekraal on the Cape Peninsula, and likely impacts that would arise from development of the site.
2008-2011	South Africa	Century City Property Owners Association	Principal consultant on a study to assess the effectiveness of a fish eradication programme conducted in the Century City wetlands and canals using the ichthyocide rotenone, and for development of recommendation for future management of the system
2007-2011	South Africa	Resource Ballast Technology (Pty) Ltd	Consultant appointed as independent assessor of efficacy of a newly developed ballast water treatment system and evaluation (risk assessment) of the residual toxicity of ballast water treated with the system. Project entailed verifying the efficacy of the ballast water treatment system as well as literature survey and laboratory toxicity testing to assess the residual acute and chronic toxicity of the treated ballast water to a variety of different organisms and potential risks posed by the treated ballast water to the environment and human health.
2007-2011	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management	Scientific advisor of a fisheries monitoring programme designed to assess levels of fishing mortality, stock abundance indices and to evaluate the effectiveness of

Period	Country	Client	Project, Tasks
		(DEAT: MCM)	management measures for the commercial and recreational linefishery, tuna pole, hake longline, west coast rock lobster, Inshore demersal trawl and hake handline fishing in South African waters. Scientific advisor was responsible for recruiting and training a team of fishery observers who were deployed on-board vessels and at strategic landing sites around the country, quality control of all data collected and review of data reports.
2007-2010	Ghana	Tullow Oil Plc	Consultant responsible for preparation of Environmental Impact Assessment, Environmental Overview and identification of Environmental Best Management Practise (BMP) required for seismic surveying and exploratory drilling for offshore oil and gas resources in the Tano shallow water and Deep water blocks in Ghana. (Three separate EIA studies).
2006-2011	Tanzania	International Conservation Union (IUCN)/Pangani Water Basin Office, Tanzania	International mentor of the Estuary Team for a project entitled “Flows for People and the Environment: Supporting Sustainable Land Management in the Pangani Basin (Tanzania)”. The estuary component of the project included conducting a health assessment of the Pangani estuary with the Tanzanian national team and the development of a flow assessment tool to guide allocation of freshwater flow in the system.
2006	South Africa	Department of Science and Technology	Investigation of stakeholder requirements and potential host institutions for the South African National Antarctic Programme (SANAP).
2005-2007	Angola	BCLME Programme/ United Nation Development Programme (UNDP)/ UNOPS/Global Environment Facility (GEF)	Consultant on a project aimed at assessing the status of biodiversity along the Angola coastline. The project entailed completing a series of field surveys at selected localities at approximately 100 km spacing along the Angolan coastline at which inshore fish, rock intertidal and sandy beach biota were surveyed. Data were analysed with a view to identifying biogeographic patterns in Angolan coastal fauna and flora.
2005-2007	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.),	Consultant on a biodiversity and economic assessment and development of an integrated conservation plan for CAPE

Period	Country	Client	Project, Tasks
		Cape Nature, and Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	estuaries. The project comprised filling estuary biodiversity data gaps (collection and collation of new botanical, fish and bird data for temperate South African estuaries).
2007, 2005	South Africa	Transnet-National Ports Authority (Transnet NPA)	Consultant on ballast water, flora and fauna survey in the Ports of Durban and Port Elizabeth. Surveys were conducted in representative examples of all habitat types present in the Port of Durban and Port Elizabeth to identify all species present in the port, including all alien and potentially cryptogenic species. Responsible for sampling and reporting.
2005	South Africa	National Empowerment Fund (NEF)	Principal consultant on a due diligence (feasibility) study to assess the feasibility of a proposed eel aquaculture and processing operation in the Eastern cape, South Africa, focussing on biological, ecological, logistic and legislative considerations of the proposed project.
2001-2005	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Project leader on a research programme that investigated the taxonomy, biology and management of South African Sciaenid fish of the genus <i>Umbrina</i> . Responsible for project design, sampling strategy, biological sampling and processing of samples to provide data on taxonomy, age and growth, reproduction and population genetics. Analysis and use of these data in stock assessments and management recommendations.
2005	South Africa	Emross Consulting CC.	Marine specialist for the assessment of the potential impacts of a boat launching site on the marine environment at Mbotyi River Mouth.
2004-2024	South Africa	Saldanha Bay Water Quality Forum Trust (SBWQMFT)	Senior consultant on a team appointed to develop a series of “State of the Bay” Monitoring Programme and Reports for Saldanha Bay and Langebaan Lagoon in 2004, and annually between 2008 and 2024. The project involved collation and analysis of historic data from a wide range of disciplines, identification of key indicators for the reporting system, as well as initiating new data collection and survey programmes, and the production of annual monitoring reports and yearly State of the Bay Reports.

Period	Country	Client	Project, Tasks
2003-2005	South Africa	Department of Water Affairs & Forestry (DWAF)	Estuarine and fisheries consultant on the Berg River Baseline Monitoring Programme prior to the construction of the Skuifraam Dam. The study spanned a period of three years and required a multidisciplinary approach. Duties included assisting specialists from a wide range of disciplines including water quality, sociology, macro invertebrates, fish, avifauna, vegetation and algae.
2001-2003	South Africa	Department of Environmental Affairs & Tourism/ Rhodes University	Fisheries specialist contracted to assist with an Economic Sectoral Study of the South African Fishing Industry. The consultant was responsible for collecting requisite data on the linefish, sector.
2001	South Africa	GEF/UNDP/IMO Globallast Programme	Fish scientist on a ballast water surveys in the Port of Saldanha. The objective of the study was to survey representative examples of all habitat types present in the ports with a view to developing a full list of all species including all alien and potential cryptogenic species in the port.
1999-2000	South Africa	Foundation for Research Development	Researcher on a project to assess the impacts of exploitation of wonderworm <i>Marphysa sanguinea</i> on bouldershore habitats on the Cape Peninsula, South Africa. The project included field surveys, literature review, statistical analysis of data and report production.
1998-2000, 2007-2011	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Scientific advisor and operations manager of an offshore, boat-based fisheries monitoring programme designed to supply and deploy scientific observers aboard fishing vessels for the inshore trawl, hake longline and west coast rock lobster fisheries. Responsibilities of the scientific advisor included ensuring that observers were trained to collect accurate data on the nature of fisheries operations, catch composition, by-catch mortality, fish biology, quantity and size range of discarded target species, and biological samples as required. Data were captured electronically and submitted to the client for use in stock assessment and resource management programme.
1998-2000	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management	Lead researcher on a 3-year project that assessed the catch, effort and socioeconomic status of the Western Cape gill and beach-seine net fisheries.

Period	Country	Client	Project, Tasks
		(DEAT: MCM)	Responsible for project design and implementation. Included sampling of commercial fish catches, conducting detailed socio-economic interviews with industry participants, experimental netting and interpretation of the findings into management recommendations.

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Kenneth Hutchings

Registration Number: 400039/17

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

in the following field(s) of practice (Schedule 1 of the Act)

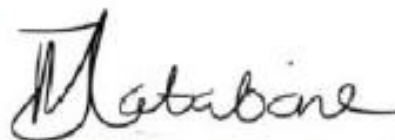
Environmental Science (Professional Natural Scientist)

Effective **25 January 2017**

Expires **31 March 2027**



President of Council



Chief Executive Officer



To verify this certificate scan this code

CURRICULUM VITAE

KEVIN MIKUS SCHMIDT

SACNASP: Professional Natural Scientist #117752

BORN: 25 October 1991; Baltimore, Maryland

AGE: 34

NATIONALITY: United States of America

PERMANENT RESIDENCE: South Africa

ACADEMIC QUALIFICATIONS:

MSc Applied Marine Science, 2016, University of Cape Town – Marine Research Institute

BSc (Hon Equivalent) Environmental Science, 2013, University of Delaware – College of Earth, Ocean and Environment

OTHER QUALIFICATIONS: Medically in date Class IV Scientific/ Commercial Diver (South Africa), SAMSA Cat B Skipper with dive endorsement (South Africa), PADI Staff Instructor #329403, Technical/ Rebreather Diver, Merchant Shipping (Training and Certification) STCW (expires 2027), Level 3 Advanced First Aid

SKILLS: Scientific Diving, Matlab, Big Data Management, Satellite Imagery, Remotely Sensed Reanalysis Climate Data, ArcGIS, Water Resource Management, Watershed Hydrologic Modelling, Google Earth Engine, Delft3D Hydrodynamic Modelling, Adobe Lightroom/ Premier Pro, MS suite, R-Studio

LANGUAGE PROFICIENCY: English (Excellent), German (Basic)

POSTAL ADDRESS: Suite 8 Steenberg House, Silverwood Close, Tokai, Cape Town, 7945

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E-MAIL: KevinS@anchorenvironmental.co.za

WORK PHONE: (+27) 021-701 3420 ext. 228

FAX: (+27) 021-701 5280

EMPLOYMENT HISTORY: Dec 2017 – Current: Senior Consultant (Anchor Environmental Consultants)

2017: PADI Instructor/Technician, MASS Diving

2016-2017: Analyst, Researcher, Author, CSIR-SOCCO

2015-2016: UCT Graduate Research, Ma-Re, CSIR-SOCCO

2014: PADI Instructor/Technician for Reef Divers

2009 – 2013: University of Delaware Research, UMBC REU

2006 – 2014: Baltimore Aquarium

SUMMARY PROFILE: Kevin has an undergraduate degree (BSc) in Marine Ecosystem Sciences with a minor in Geography from the University of Delaware and a graduate degree (MSc) in Applied Marine Sciences and Remote Sensing from the University of Cape Town. During his undergraduate degree, he investigated the influence of anthropogenic climate change on community dynamics of coral reefs and their associated ecosystems. During his graduate degree, he collaborated with scientists from the Southern Ocean Carbon and Climate Observatory (SOCCO) to investigate the wind field variability of the Southern Ocean using WaveGlider technology and remotely sensed satellite reanalysis data. Kevin has experience working in the United States, throughout the Caribbean, Greenland, South Africa, Namibia, Angola, Mozambique, Madagascar, Kenya, Guinea, Sierra Leone, Somaliland, and Ghana. As a qualified commercial scientific diver with 15 years of diving experience, he is experienced in performing coral reef, seagrass, and mangrove ecological surveys and assessments. Kevin is also a

qualified small craft skipper and has extensive experience working at sea both offshore and along the coast. He has participated in multiple offshore scientific survey campaigns and has spent more than 6 months working at sea as a field researcher and scientist. He is also a qualified technician and has experience deploying and installing scientific instrumentation such as CTDs and ADCPs to characterise the physical environment and monitor key water quality parameters. As a GIS specialist, Kevin actively incorporates satellite-derived data “on the ground”, performing validation and extrapolation tasks to broaden the spatial and temporal coverage of atmospheric, land and oceanographic datasets. Kevin uses remotely sensed environmental variables, satellite imagery, and machine learning to bridge the gap between ecology and oceanography and to increase the efficacy of ecological surveying techniques and the strategic implementation of conservation management strategies.

LONG TERM PROJECTS/ ANNUAL CAMPAIGNS

Period	Country	Clients	Project, Tasks, Instruments, and Software
Sep 2021 - Present	Great Brak, South Africa	Southern Estuarine Rehabilitation Action Group (SERAG)	Design, installation, and maintenance of long-term monitoring equipment for the Great Brak Estuary (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) AquaTROLL 600 CTD with Temperature, Salinity, Oxygen, Chlorophyll A sondes (3) Google Earth Engine, Matlab
Oct 2022 – Present	Offshore Southern Africa - Namibia and South Africa	Creocean; Total Energies E&P South Africa (TEEPSA), Total Energies E&P Namibia (TEEPNA)	Total Energies E&P South Africa & Namibia Offshore Environmental Baseline Study of 5 offshore concessions (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Spatial interpolation and mapping of benthic diversity metrics and water quality parameters gathered during offshore campaign (3) ArcPro, Matlab, Google Earth Engine
Dec 2021 – Jan 2024	Namibia & South Africa	De Beers Marine Namibia (DBMN)	Conceptual Design (Phase 1) and Development (Phase 2) of an environmental database and marine sediment fines discharge model (1) GIS Analyst, Remote Sensing Specialist, Near and Far Field Hydrodynamic Modelling Specialist, Report Writing (2) Nortek Signature 250 ADCP (upward facing deployment in 123m depth for 12 months), Sonardyne Acoustic Releases, HOBO Tidbit Thermistor Array (3) ArcPro, Matlab, Delft3D, Grafana, Google Earth Engine
Bi-monthly instrument servicing, 2x annual sampling campaigns Apr 2021 - Present	Saldanha Bay, South Africa	WWF South Africa, Department of Environment Forestry and Fisheries (DEFF)	Specialist monitoring in compliance with the environmental sampling plan, management program and environmental authorisation for the Saldanha Bay Aquaculture Development Zone (ADZ) (1) Commercial Diver, GIS Analyst (2) 4x JFE Advantech Rinko-W oxygen optical sensors, 1x SeaBird SUNA nitrate sensor (3) ArcPro

Annual monitoring Apr 2020 – Present	Northern Cape, South Africa	Aqunion, Portion 2 of Klipfontein Farm no 711	Environmental monitoring and stock assessment activities for Aquinion abalone ranching in the Northern Cape (Area NC 4) (1) Commercial Diver, GIS Analyst (2) Underwater slates (data capture), Transects, GoPro (3) ArcPro
Conducted every 5 years. Summers of 2019, 2024	Cape Town, South Africa	Table Mountain National Park (TMNP)	Table Mountain National Parks (TMNP) Fish and Invertebrate monitoring programme (1) Commercial Diver, GIS Analyst, Report Writing (2) Underwater slates (data capture), Transects, GoPro (3) ArcPro
Bi-monthly deployment and recovery Jan 2019-Present	Cape Town, South Africa	City of Cape Town, Marine Outfalls Monitoring Plan	Design and implementation of an environmental monitoring programme for domestic effluent outfalls offshore of Hout Bay, Camps Bay and Green Point in Cape Town (1) Commercial Diver, GIS Analyst (2) Deployment and recovery of 39 subsurface bio-monitoring moorings, with floats ~8m below the surface (3) ArcPro, GPS
Bi-monthly instrument servicing, Apr 2018 – Apr 2020	Breede River, South Africa	Turnkey Water Solutions, Hessequa Local Municipality	Baseline assessment and long-term environmental monitoring of a solar powered desalination plant on the Breede River (1) Commercial Diver, Data Analyst (2) AquaTROLL 200 CTD, SeaBird CTD, Van Veen Grab, Hach WQ Meter (oxygen, salinity, pH, and redox probes) (3) Matlab
Annually, one month sampling campaign, Oct 2017 - Present	Namibia & South Africa	De Beers Marine Namibia (DBMN)	Environmental Monitoring Programme: Atlantic 1 Mining License Area Benthic and Metocean Monitoring Campaign (1) GIS Analyst, Remote Sensing Specialist, At sea scientist, Report Writing (2) Van Veen grab, Drop Camera, Ski-Monkey (towed camera system), SeaBird CTD + Niskin Rosette, Water and Sediment eDNA kits (NatureMetrics) (3) ArcPro, Matlab, SeaGIS TransectMeasure
Bi-annual sampling campaign, 2017, 2019, 2021, 2023, 2025	Namibia & South Africa	NAMDEB Diamond Corporation	Offshore Environmental Monitoring Programme in the Midwater Mining License Area: Annual Benthic Sampling Campaign (1) GIS Analyst, Remote Sensing Specialist, At sea scientist, Report Writing (2) Van Veen grab, Drop Camera, SeaBird CTD + Niskin Rosette, Water and Sediment eDNA kits (NatureMetrics) (3) ArcPro, Matlab
Annually, one week sampling campaign, Apr 2017 - Present	Saldanha Bay, South Africa	Saldanha Bay Water Quality Forum Trust (SBWQFT)	Environmental monitoring programme: Saldanha Bay and Langebaan Lagoon State of the Bay (SOB) Annual Report (1) Commercial Diver, GIS Analyst (all chapters), Remote Sensing Specialist, Report Writing –

			responsible for the coastal erosion and aquatic macrophytes chapters (2) LP compressor sediment suction sampler, AquaTROLL200 CTD, Hach WQ Meter (redox probe) (3) ArcPro, Matlab
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SELECT WORK EXPERIENCE:

Period	Country	Clients	Project, Tasks, Instruments, and Software
Dec 2025 – Present	Pemba, Mozambique	Exxon Mobile, ERM Consulting	Feasibility study on coral reef relocation in Palma Bay, Mozambique, assessment of potential impacts associated with dredging activities (1) GIS specialist, Coral reef ecology expert (2) Spatial assessment of impacted corals per habitat type; designed relocation methodology and what equipment and manpower would be required to effect such a move; assessed how much of the relocated coral is likely to survive over the long term; proposed additional supplementary interventions can assist in achieving the full magnitude of the biodiversity offset required; assessed tolerance to and mortality of corals related to turbidity and sedimentation. (3) ArcPro
Nov 2025 – Present	Saldanha Bay, South Africa	WWF UK	Early Warning Systems project for Saldanha Bay to monitor whale (cetaceans) movements (1) Commercial dive supervisor, technician (2) Installation and maintenance of acoustic hydrophone coupled with telemetry systems (Vodafone/ Vodacom sponsored) to enable live acoustic monitoring, coupled with infrared and thermal imaging cameras. (3) Hydrophone
Oct 2025 – Present	Herolds Bay, South Africa	Legacy Environmental Management Consulting	Herold's Bay Wastewater Treatment Works (WWTW) - Coastal Water Discharge Authorisation (1) Project lead, Marine ecology specialist, Numerical dispersion modelling, Report writing (2) Marine ecological study and environmental impact assessment for the proposed upgrades to the Herolds Bay WWTW. (3) ArcPro, CORMIX
Sept 2025 – Feb 2026	Richards Bay, South Africa	Transnet National Ports Authority (TNPA), RCE Consultants	Port of Richards Bay: Berths 802 & 803 Expansion, Marine Ecological Impact Assessment and Climate Change Specialist Study (1) Project lead, Marine ecology specialist, GIS Specialist, Remote Sensing Specialist, Report writing (2) Marine ecological study and environmental impact assessment for the proposed expansion of Berths 800 in the Port of Richards Bay, in addition to a climate change specialist study (3) ArcPro, Matlab
May 2025 – Oct 2025	Cape Town, South Africa	Infinity Environmental (Pty) Ltd	Hydrodynamic Modelling of the Zandvlei Estuary to Assess the Impacts of Dredging (1) Field scientist, Remote Sensing Specialist, Hydrodynamic model developer

			(2) Delineated the watershed boundaries of the Zandvlei Estuary and structured the Delft3D mesh (3) ArcPro, Delft3D
Mar 2025	Cape Town, South Africa	Richards Summers Inc.	Identification of the Position of the High-Water Mark in front of a Residential Property in Clifton, Cape Town (1) Field scientist, Remote Sensing Specialist, Report writing (2) Determination of the highwater mark by means of ecological and geological surveying and expertise (3) ArcPro
Apr 2025 – May 2025	Hermanus, South Africa	WEC-Consult (Pty) Ltd	Marine Ecological Compliance Monitoring for Hermanus Wastewater Treatment Works (WWTW) Coastal Waters Discharge Permit (CWDP) (1) Field scientist, report writing (2) Assess rocky shore intertidal biota, subtidal biota, and trace metals in mussels (<i>Mytilus galloprovincialis</i>) in the vicinity of the WWTW outfall as part of the required ecological monitoring in terms of the CWDP (3) ArcPro
Mar 2025 – May 2025	Offshore Angola Concession 47	HCV Africa	Environmental, Social, and Impact Assessment (ESIA) study for an environmental licence for proposed exploration activities in Block 47 (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Marine Spatial Planning: map the boundaries of Ecologically and Biologically sensitive areas with respect to operations (3) ArcPro
Feb 2025 - Present	Moma, Mozambique	ACER (Africa)	Assessment of Kenmare Mine Operations Impact to Marine Environment and Fish Stock of Coral Reefs at Caldeira And Njovo Islands (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Map the change in extent of the mine over 2008 – present day from satellite imagery, assess relative increase in population and associated stress to the marine environment (3) ArcPro, Matlab
Jan 2025	Kleinzee, South Africa	W Nel Environmental Consulting Services	WCNES Kleinzee Holdings: Marine Specialist Impact Assessment For Mining Activities in the Buffels Marine Mining Area, Kleinzee (1) GIS Analyst, Report Writing (2) Map marine and coastal ecosystems in the mining concession as classified by the 2018 Biodiversity Assessment (3) ArcPro
Feb 2025 – Aug 2025	Concession Block SASA 2C, South African West Coast	Belton Park Trading 127 (Pty) Ltd	Beltan Park Impact Monitoring Survey: Concession Block SASA 2C (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Monitor the impacts of mining activity on the biological and physical environment in the inshore and offshore regions of the concession (3) ArcPro
Apr 2025 – July 2025	Boegoebaai, South Africa	Centre for Scientific and Industrial	Boegoebaai Strategic Environmental Assessment: Marine Ecological Specialist Study

		Research (CSIR)	(1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Marine Spatial Planning, mapping of critical biodiversity of areas and protected areas (3) ArcPro, Matlab
Feb 2024 – Sept 2024	Cape Town, South Africa	The Two Oceans Aquarium Foundation	Baseline survey of marine fauna and flora as part of the proposed expansion of Granger Bay (1) Commercial Diver, GIS Analyst, Remote Sensing Specialist, Report Writing (2) LP compressor sediment suction sampler, Garmin contour plotting for non-engineering spec bathymetry survey (3) ArcPro, Matlab
Dec 2023 – May 2024	Doringbaai, South Africa	WKN Windcurrent, SLR Consulting (Africa)	WKN Benguela H2 Project - Marine Baseline Study for Coastal Water Discharge Permit (CWDP), pre-feasibility study for the establishment of a green hydrogen project (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Teledyne Workhorse 600 ADCP deployment and recovery, current and surface wave data processing and analyses, thermistor array (3) ArcPro, Matlab, Google Earth Engine
Nov 2023	Gansbaai, South Africa	Gansbaai Marine (PTY) LTD	Marine impact assessment for the offloading of cooling water and fish processing water in the port of Gansbaai (1) Field scientist, GIS Analyst, Report Writing (2) Seabird CTD, Drop Camera (3) ArcPro, Adobe Premier Pro and Lightroom
May 2023 – August 2023	Kenya	Environment for Development, Kenya (EFD Kenya), University of Nairobi	Marine and Coastal Ecosystem Services Mapping, Assessment, Valuation and Accounting in six Coastal Counties (Mombasa, Kwale, Kilifi, Tana-River, Taita-Taveta and Lamu) in Kenya (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Sentinel 2 Satellite Imagery processing, automated image classification applications for mapping visible coastal environments and ecosystems (3) ArcPro, Google Earth Engine
Mar 2023 – May 2023	Bon Ami, Guinea	Dynamic Mining SAS, SLR Consulting Ltd.	Bon Ami Bauxite Mine: Marine surveys of port and transshipment area (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Satellite Imagery; Mangrove mapping (3) ArcPro, Matlab, Google Earth Engine
Mar 2023	Knysna Estuary, South Africa	Sharples Environmental Services (SES)	Estuarine impact assessment/ compliance statement for the proposed development of a residential house on portion 87 of Uitzigt 216 Knysna (1) GIS Analyst, Remote Sensing Specialist (2) Satellite Imagery; Salt Marsh and wetland vegetation mapping (3) ArcPro, Google Earth Engine

Jan 2023 – Jun 2023	Richards Bay, South Africa	Transnet Port Authority	Port of Richards Bay Masterplan: Estuarine Ecological Baseline Study to inform the development of a Masterplan for the Port of Richard Bay (1) GIS Analyst, Remote Sensing Specialist (2) Satellite Imagery; Mangrove and wetland vegetation mapping (3) ArcPro, Google Earth Engine
3 Surveys, May 2020, Feb 2023, Feb 2025	Somerset West, Cape Town, South Africa	Rheinmetall Denel Munition RF (Pty) Ltd	Environmental monitoring and management programme for Rheinmetall Denel Munition coastal waters discharge permit (1) Field scientist (2) Sediment hand corer, Hach WQ Meter (Temperature, Salinity, Oxygen, Redox, pH probes) (3) GPS Basecamp
Jan 2023 – Sep 2023	Berbera, Somaliland	DP World, Somaliland Port Authority	Environmental assessment for the Phase 1 expansion of the Port of Bosaso, Somaliland (1) Commercial Diver, GIS Analyst, Report Writing (2) LP (surface supply system) and HP Compressor, all dive equipment (3) ArcPro, GPS
2 Surveys, Mar 2020 & Jan 2023	Robben Island, South Africa	City of Cape Town Department of Environmental Affairs: Fisheries Management	Fishery Independent Abalone Surveys (FIAS) in Robben Island MPA (1) Commercial Diver, GIS Analyst, Report Writing (2) Underwater slates (data capture), Transects, GoPro (3) ArcPro *Forms part of Table Mountain National Parks (TMNP) & South African National Parks (SANParks) long term monitoring plan
June 2022 – Oct 2022	Tamale (White Volta River Basin), Ghana	Ministry of Sanitation and Water Resources (MSWR), the Nature Conservancy (TNC)	Development of a water fund for Tamale (Ghana) – assessing the return on investment of nature-based solutions to address water security for Tamale metropolitan assembly (1) GIS Analyst, Remote Sensing Specialist, Watershed Hydrologic Modeller, Report Writing (2) Adapted ECMWF-ERA5 climate parameters for use in simulating the quantity of surface and groundwater flows as well as the overland and suspended sediment yield per business and management approach cases (3) ArcPro, ArcSWAT, Matlab, Google Earth Engine *Additional clients: Catholic Relief Services (CRS), Ghana Water Company Limited (GWCL), Water Resources Commission (WRC), Environmental Protection Agency (EPA), Forestry Commission (FC), Tamale Metropolitan Assembly (TaMA), Northern Regional Coordinating Council (NRCC)
May 2022 – Feb 2024	Richards Bay, South Africa	ACER (Africa)	Marine environmental assessment and seabird monitoring programme for a proposed offshore windfarm (1) GIS Analyst, Remote Sensing Specialist (2) Seabird abundance and diversity mapping, ecosystem services and use case mapping

			(3) ArcPro
Jan 2022 – Feb 2023	Durban, South Africa	Transnet SOC Ltd	Baseline survey of marine fauna, flora, and antifouling contaminants to assess changes in fauna and flora in the port of Durban for a period of 12 months (1) Commercial Diver, GIS Analyst, Report Writing (2) Wall scrape sampling equipment, photo-quadrats, SeaBird CTD, Seine netting (intertidal fish sampling), plankton and zooplankton tow nets (3) ArcPro
Dec 2021 – July 2022	Kwazulu-Natal, South Africa	Nemai Consulting	Basic Assessment process and a Water Use Licence Application (WULA) on behalf of the Ugu District Municipality for the proposed development of a weir in the uMzimkhulu River. (1) GIS Analyst, Remote Sensing Specialist, Watershed Hydrologic Modeller, Report Writing (2) Adapted ECMWF-ERA5 climate parameters for use in simulating the quantity of surface and groundwater flows as part of a hydrodynamic modelling study to understand the salinity drivers and effects within the uMzimkhulu estuary, Kwazulu-Natal (3) ArcPro, ArcSWAT, Matlab, Google Earth Engine
Jun 2021 – Mar 2022	South Africa West Coast	Trans Atlantic Diamonds (Pty) Ltd	Marine specialist Impact Assessment for exploration and prospecting activities in concession areas 7c, 10b, 11c, 12b, 14a&c (1) GIS Analyst, Remote Sensing Specialist (2) Mapping of MPAs, delineation of reef and sensitive habitats, coastal threat and protection status, calculated proportion of the average national total catch of coastal and pelagic fisheries within concession areas (3) ArcPro, Matlab
Jun 2021 – Jul 2021	Olifants Estuary, South Africa	Mineral Sand Resources (Pty) Ltd (MSR); Tormin Mineral Sands Project	Estuarine and freshwater specialist study (1) GIS Analyst, Remote Sensing Specialist, Watershed Hydrologic Modeller, Report Writing (2) Adapted ECMWF-ERA5 climate parameters for use in simulating the quantity of surface and groundwater flows as part of a hydrodynamic modelling study to understand the impacts of a proposed coastal mine on ephemeral stream flow (3) ArcPro, ArcSWAT, Matlab, Google Earth Engine
Apr 2021 – May 2021	Greenland	De Beers Group	Environmental mitigation assessment for planned geophysical survey on the west Greenland continental shelf (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Mapping of MPAs, delineation of sensitive habitats, coastal threat and protection status, mapped migration routes of sensitive species and historic fisheries activity and catch

			(3) ArcPro, Matlab
Feb 2021 – Jun 2021	Cape Town, South Africa	V&A Waterfront Management Authority	Economic assessment of recreational sailing in cape town: making the case for investment in the proposed Granger Bay marina Desktop study: Questionnaires were designed and face to face interviews were undertaken with representatives from the six main marinas and yacht clubs in the Greater Cape Town area, as well as a number of stakeholders from the boat building and boat repair industry. An online survey was disseminated to members of the yacht clubs and marinas in Cape Town and visiting vessels to these clubs.
Nov 2020 – May 2021	Sierra Leone, West Africa	Sierra Rutile Limited	Environmental, Safety and Health Impact Assessment (ESHIA) for mining of Rutile in Area 1 in the Southern Province of Sierra Leone (1) GIS Analyst, Remote Sensing Specialist, Watershed Hydrologic Modeller, Report Writing (2) Delineated watershed boundaries, logical flow paths, and developed a supervised classification effort to identify and isolate sensitive habitats for focused in-situ sampling. (3) ArcPro, ArcSWAT, Matlab, Google Earth Engine
Oct 2020 – Jan 2022	Saldanha Bay, South Africa	Sea Harvest Corporation (Pty) Ltd	Updated draft Coastal Waters Discharge Permit (CWDP) (1) Commercial Diver (2) AquaTROLL 200 CTD long term data management (3) Matlab
Oct 2020 – Dec 2020	St Helena Bay, South Africa	St Helena Bay Water Quality Trust	St Helena State of the Bay Annual Monitoring Report (1) Commercial Diver, GIS Analyst, Remote Sensing Specialist, Report Writing (2) Van Veen grab, SeaBird CTD, Hach WQ Meter (redox probe) (3) ArcPro, Matlab
Nov 2019 – Jul 2020	Kwa-Zulu Natal, South Africa	UN Environment: Ecosystem Services	Conduct scenario-based assessments of policies for land restoration in the Thukela river catchment area of Kwa-Zulu Natal (1) GIS Analyst, Remote Sensing Specialist, Watershed Hydrologic Modeller, Report Writing (2) Adapted ECMWF-ERA5 climate parameters for use in simulating the quantity of surface and groundwater flows as part of a hydrodynamic modelling study. This work served as a conceptual design of a provincial-scale watershed simulation layered with land use change; a Business as Usual (BaU) vs Restored landscape assessment on the provision of groundwater. (3) ArcPro, ArcSWAT, Matlab, Google Earth Engine

Apr 2019 – Jan 2020	Cape Town, South Africa	Atlantic Salmon	Specialist marine impact studies for a proposed Atlantic Salmon farm in the Waterfront (1) GIS Analyst, Remote Sensing Specialist, Hydrodynamic modeller (2) SeaBird CTD, Hach WQ Meter (redox probe) (3) ArcPro, Matlab, Delft3D
Mar 2019 – Mar 2020	Sperrgebiet National Park, Elizabeth Bay, Namibia	Pisces Environmental Services Pty Ltd/, Namdeb Diamond Corporation	Environmental monitoring programme: Atlantic 1 Mining License Area, Coastal Ecological Impact Campaign (1) Commercial diver, Field scientist, Report Writing (2) Intertidal and sub-tidal quadrat surveys, Sediment hand corer, Hach WQ Meter (Temperature, Salinity, Oxygen, Redox, pH probes) (3) GPS Basecamp
Nov 2019 – Jun 2020	Inhambane, Mozambique	Golder Associados Moçambique Limitada/ Sasol Petroleum Mozambique Exploration Limitada	Environmental impact assessment for 2D and 3D seismic surveys and exploratory drilling in Block 16 & 19, offshore in Inhambane Province, Mozambique (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Mapping of MPAs, delineation of sensitive habitats, coastal threat and protection status, mapped migration routes of sensitive species and historic fisheries activity and catch (3) ArcPro, Matlab
Jan 2019 – Dec 2021	Richards Bay, South Africa	Mhlathuze Effluent Monitoring Program	Toxicity testing, water, sediment and flora and fauna monitoring for Mhlathuze Water Effluent Pipelines (1) GIS Analyst, Remote Sensing Specialist, Report Writing (2) Mapping of heavy and trace metals (Al, Fe, As, Cd, Cu, Cr, Hg, Ni, Pb, Zn), developed forecast assessments based on historic data gathered (3) ArcPro, Matlab
Jan 2019 – Nov 2019	Stillbai, South Africa	Doug Jeffery Environmental Consultants	Wetland and Stream Assessment for proposed construction of arterial road in Stillbaai (1) GIS Analyst, Remote Sensing Specialist, Watershed Hydrologic Modeller, Report Writing (2) Delineated watershed boundaries, logical flow paths, and developed a supervised classification effort to identify and isolate sensitive habitats for focused in-situ sampling. (3) ArcPro, ArcSWAT, Matlab, Google Earth Engine
Jan 2019 – Jan 2020	Maputo, Mozambique	Conseng and JG Afrika (Pty) Ltd, Mozal Aluminium Smelter	Estuarine specialist report for proposed MOZAL Matola River pipeline (1) Field scientist, GIS Analyst, Report Writing (2) Sediment hand corer, Van Veen grab, Hach WQ Meter (Temperature, Salinity, Oxygen, Redox, pH probes), SeaBird CTD, bathymetry surveying (3) ArcPro, Matlab, GPS
Apr 2018	South Africa, 4 miles offshore Algoa Bay	Mainport Africa	Assessment of biofouling community collected from MV Cherry Blossom (1) Commercial Diver (2) Wall scrape sampling equipment, photo-quadrats (3) Adobe Premier Pro and Lightroom

PREVIOUS EMPLOYMENT

Period	Employer	Location	Client	Description
One month, annually, 2017 – Present	Pisces Divers	Cintsa, South Africa	Sardine Run Expeditions	Sardine Run Expedition Guide Sardine Run Expedition Guide - Driving 4x4 Land Cruiser with 9m RHIB boat on trailer - Assisting skipper during beach/surf launches - Assuming skipper responsibilities upon request of primary skipper - Spotter, educator and in water guide on snorkel or scuba during wildlife encounters with whales, dolphins, sharks, seals, baitfish and seabirds - In water photography and videography
Seasonally 2014, 2016, 2018	Reef Divers	Nosy Be, Madagascar	Operation Wallacea (UK)	Scientific Diver, Lecturer, Technician Stereo-Video Fish Assemblage Surveying, Coral/ Invert Benthic Line Transect Surveying, Rugosity and Habitat Assessment (3D Modelling).
2016-2017	MASS Divers	Massachusetts, USA		Scuba Instructor, Equipment Technician, and sales associate
2016	GEOMAR - Helmholtz-Zentrum für Ozeanforschung Kiel	South Africa (Cape Town) – Brazil (Rio de Janeiro)	FS METEOR CRUISE M124	Onboard Scientist (1 month cruise) Performed a cross-oceanic basin lower atmosphere/upper ocean physical and biogeochemical survey along approximately 30°S in the sparsely sampled South Atlantic Ocean. - Use of Acoustic Doppler Current Profilers, CTDs, uCTD/ RapidCast systems, Multinets (Hydrobios), Sunphotometers (Microtops)
2016-2017	Southern Ocean Carbon and Climate Observatory (SOCCO)	Cape Town, South Africa	CSIR – Cape Town	Remote Sensing Data Analyst, Report Writing, Lead Author Processed data from Waveglider deployments from 2015-2016 (post MSc graduation). Submitted research to American Meteorological Society Journal for Atmospheric and Ocean Technology (AMS JTECH), in final form July 2017, and published online December 2017. “Evaluation of satellite and reanalysis wind products with <i>in situ</i> Wave Glider wind observations in the Southern Ocean”
March - June 2016	Odyssey Dive	Vilankulo, Mozambique		Scuba Instructor, Equipment Technician, and Dive Leader
Jan – Dec 2014	Reef Divers	Pretoria, South Africa		Scuba Instructor, Equipment Technician, and Dive Leader
2010 – 2013	Blue Horizons Dive Center	Pennsylvania, USA		Scuba Instructor, Equipment Technician, and Dive Leader

EDUCATION

Period	University	Location	Department	Description
2015-2016	University of Cape Town	Cape Town, South Africa	University of Cape Town/ Marine Research Institute/ Southern Ocean Carbon and Climate Observatory (SOCCO)	MSc Applied Marine Science Remote sensing (satellite derived ocean products) validation task with <i>in situ</i> measurements by WaveGlider technology. Application of Matlab for statistical and data analysis.
2009 – 2013	University of Delaware	Newark, Delaware, USA	College of Earth, Ocean, and Environment	BSc Environmental Science (4 year) Minor in Geography Investigated the anthropogenic drivers of community phase shifts in coral reef environments.

STUDENT SUPERVISION

Name	University	Degree	Thesis Title	Year
Emily Gammon	University of Cape Town	MSc	“Evaluation of the Operational Mercator global ocean analysis and forecast system modelled current vector product with in-situ ADCP data in the Southern Atlantic Ocean”	2023 - 2024

PUBLICATION RECORD

Project Reports

Clark BM, Bovim LA, Rees A, Wright AG, Hutchings K, Dawson J, Malan A, Schmidt K, Payne R, Gazeau B, Swart C, Armitage MPA, Christensen Z, Biccard A, Rajeev H, Le Gall L, Gammon E, Parker A, Charles A & Conrad J. 2025. The State of Saldanha Bay and Langebaan Lagoon 2025. Report no. 2260/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the Saldanha Bay Water Quality Trust. 407 pp.

Schmidt K, Christensen Z, & Clark B. 2025. Richards Bay Berths 802 & 803 Climate Change Specialist Study. Report no. 2311/2 prepared by Anchor Environmental Consultants (Pty) Ltd for RCE Consultants and Transnet National Port Authority (TNPA). 33 pp.

Schmidt K. & Clark B. 2025. Richards Bay Berths 802 & 803 Marine Ecological Impact Assessment. Report no. 2311/1 prepared by Anchor Environmental Consultants (Pty) Ltd for RCE Consultants and Transnet National Port Authority (TNPA). 90 pp.

Schmidt K & Clark B. Identification of the position of the high-water mark in front of a residential property in Clifton, Cape town. Report no 2259 prepared by Anchor Environmental Consultants (Pty) Ltd. 17 pp.

Gazeau B, Biccard A, Hutchings K, Schmidt KM & Dawson J. 2025. Marine Ecological Impact Assessment For Hermanus Wastewater Treatment Works (WWTW). Report no. 2255 prepared by Anchor Environmental Consultants (Pty) Ltd. 45 pp.

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- Ho, Y., Wright, AG., Schmidt, KM., Malan, A., Gammon, EJ. & Clark, BM. 2025. Ecosystems Services Specialist Report for Block 47, Angola. Report no. 2254/5 prepared by Anchor Environmental Consultants (Pty) Ltd for HCV Africa. 63 pp.
- Biccard A, Payne RP, Henry T, Malan A, Ho Y, Schmidt KM and K Hutchings. 2025. Belton Park Impact Monitoring Survey 2025: SASA-2C. Report no. 2229/1 prepared by Anchor Environmental Consultants (Pty) Ltd for Belton Park Trading 127 (Pty) Ltd. 42 pp.
- Dawson J, Payne R, Malan A, Schmidt K, and H Rajeev 2024. Baseline survey of marine habitat and community structure, Granger Bay. Report no. 2184/1 prepared by Anchor Environmental Consultants (Pty) Ltd for The Two Oceans Aquarium Foundation. 71 pp.
- Biccard A, Payne RP, Henry T, Malan A, Gammon E, Rees A, Ho Y, Schmidt KM, Wright A, Rajeev H, Nashima P, Januarie D, Kanyemba J, Bovim LA and Clark BM. 2024. De Beers Marine Namibia Benthic Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2023 Sampling Campaign. Report prepared for De Beers Marine Namibia (Pty) Ltd by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC2137
- Biccard A, Payne RP, Henry T, Ho Y, Malan A, Schmidt KM, Nashima P, Januarie D and J Kanyemba. 2024. Namdeb Environmental Monitoring Programme in the Midwater Mining Licence Area: 2023 Benthic sampling Campaign. Report prepared for Namdeb Diamond Corporation (Pty) Ltd. by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC2141
- Clark BM, Rees A, Hutchings K, Bovim LA, Dawson J, Malan A, Schmidt K, Gammon E, Payne R, Ho Y, Christensen Z, Biccard A, Rajeev H, Parker A, Conrad J & Wright A. 2024. The State of Saldanha Bay and Langebaan Lagoon 2024. Report no. 2183 prepared by Anchor Environmental Consultants (Pty) Ltd for the Saldanha Bay Water Quality Forum Trust. 367 pp.
- Hutchings, K, Gardner. K, Rees A, Schmidt K, Christensen Z and L. Bovim 2024. Marine Invertebrate Diving Surveys and Marine Resource Use Assessment Within the Table Mountain National Park Marine Protected Area Interim Field Survey Report. 2162/15 prepared by Anchor Environmental Consultants (Pty) Ltd for The Nature Conservancy. 112pp.
- Biccard A, Payne R, Malan A, Nashima P, Schmidt K, Gammon E, Henry T, Wright A and BM Clark. 2024. Marine Baseline Study for WKN Benguela H2 Project, Doringbaai. Report no. 2164/2 prepared by Anchor Environmental Consultants (Pty) Ltd for SLR Consulting (Africa). 106 pp.
- Swart C, Bovim LA, Schmidt K, Biccard A & Wright AG. 2024. Water Quality and Marine Ecology Impact Assessment for Gansbaai Marine, Western Cape, in Fulfilment of awarded CWDP conditions. Report no. 2147/3 prepared by Anchor Environmental Consultants (Pty) Ltd for Gansbaai Marine (Pty) Ltd. 88 pp.
- Anchor Environmental Consultants. 2023. Accounting for Kenya's marine and coastal ecosystem assets: extent, condition and ecosystem services physical flows. UN Environment Programme. Report no. 2131/1
- Payne R, Steffani N, Biccard A, Hutchings K, Ariefdien R, Schmidt K, Ramjattan K, Malan A, Dawson J & Clark BM. 2023. Total Energies E&P Namibia (TEEPNA) Environmental Baseline Study –

Block 2912 Benthic Macrofauna. Specialist Report no. 2056/1 prepared by Anchor Environmental Consultants (Pty) Ltd for Creoclean. 59 pp.

Payne R, Steffani N, Biccard A, Hutchings K, Ariefdien R, Schmidt K, Ramjattan K, Malan A, Dawson J, Mtsokoba S, Nkwentsha O, Malgas M & Clark BM. 2023. Total Energies E&P South Africa (TEEPSA) Environmental Baseline Study – Block DWOB Benthic Macrofauna. Specialist Report no. 2056/2A prepared by Anchor Environmental Consultants (Pty) Ltd for Creoclean. 69 pp.

Ramjattan K, Ariefdien R, Malan A, Dawson J, Payne R, Steffani N, Schmidt K, Biccard A & K Hutchings. 2023. Total Energies E&P South Africa (TEEPSA) Environmental Baseline Study – Block DWOB ROV report. Specialist Report no. 2056/2B prepared by Anchor Environmental Consultants (Pty) Ltd for Creoclean. 52 pp.

Dawson J, Malan A, Ariefdien R, Payne, R, Schmidt K, Ramjattan K, Biccard A & Hutchings K. 2023. Total Energies E&P South Africa (TEEPSA) Environmental Baseline Study – Block 11B/12B ROV Report. Report no. 2056/3 prepared by Anchor Environmental Consultants (Pty) Ltd for Benthic Solutions Limited. 91 pp.

Payne R, Steffani N, Biccard A, Hutchings K, Ariefdien R, Schmidt K, Ramjattan K, Malan A, Dawson J, Mtsokoba S, Nkwentsha O, Malgas M & Clark BM. 2023. Total Energies E&P South Africa (TEEPSA) Environmental Baseline Study – Block 5/6/7 Benthic Macrofauna. Specialist Report no. 2056/4A prepared by Anchor Environmental Consultants (Pty) Ltd for Creoclean. 58 pp.

Malan A, Dawson J, Ramjattan K, Ariefdien R, Payne R, Steffani N, Schmidt K, Biccard A & K Hutchings. 2023. Total Energies E&P South Africa (TEEPSA) Environmental Baseline Study – Block 5/6/7 ROV report. Specialist Report no. 2056/4B prepared by Anchor Environmental Consultants (Pty) Ltd for Creoclean. 76 pp.

Biccard A, Payne RP, Ho Y, Malan A, Hutchings K, Clark BMC, Schmidt KM, Henry TT and S Mtsokoba. 2023. De Beers Marine Namibia Benthic Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2022 Sampling Campaign. Report prepared for De Beers Marine Namibia (Pty) Ltd by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC2051

Clark BM, Hutchings K, Swart C, Bovim LA, Dawson J, Payne R, Biccard A, Schmidt K, Rees A, Armitage M, Ho Y, Christensen Z, Ndou J, Henry T, Malan A, Mtsokoba S, Dalasile S, Parker A & Conrad J. 2023. The State of Saldanha Bay and Langebaan Lagoon 2023. 2023. Report no. 2088 prepared by Anchor Environmental Consultants (Pty) Ltd. Prepared for the Saldanha Bay Water Quality Forum Trust. 516 pp.

Malan A, Clark, B, Ndou J, Bovim L, Schmidt K & Mtsokoba S. 2023. Port of Richards Bay Masterplan: Ecological Baseline Study. Report no. 2106/3 prepared by Anchor Environmental Consultants (Pty) Ltd for Transnet National Ports Authority. 117 pp.

Biccard A, Payne RP, Clark BM, Ariefdien R, Schmidt KM, Gihwala KN, Dawson J, Gammon E, Ramjattan K, Malan A, Mtsokoba S and T Henry. 2023. De Beers Marine Namibia Benthic Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2021 Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC 1961/1.

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- Bovim L, Rees A, Ramjattan K, Schmidt K & Clark B. 2023. Bon Ami Bauxite Mine: Marine Ecological Assessment of Port and Transshipment Area. Report no. 2105/1 prepared by Anchor Environmental Consultants (Pty) Ltd for SLR Consulting Ltd. 107 pp.
- Wright A, Rees A, Thewlis G Schmidt K & BM Clark. 2023. Umzimkhulu Estuary far-field hydrodynamic model, scenario analysis and impact statement for the proposed development of the Umzimkhulu River weir and associated infrastructure, KwaZulu-Natal. Specialist Report no. 1986/1 prepared by Anchor Environmental Consultants (Pty) Ltd for Nema Consulting. 119 pp.
- Hutchings K, Biccard A, Schmidt and Clark BM. 2022. Marine specialist impact assessment for exploration and prospecting activities in South African Sea Area 14C. Specialist Report no. 2006/2 prepared by Anchor Environmental (Pty) Ltd for Trans Atlantic Diamonds (Pty) Ltd. 86 pp.
- Hutchings K, Biccard A, Armitage MPA, Schmidt K and Clark BM. 2022. Marine specialist impact assessment for exploration and prospecting activities in South African Sea Area 10B. Specialist Report no. 2039/2 prepared by Anchor Environmental (Pty) Ltd for Trans Atlantic Diamonds (Pty) Ltd. 90 pp.
- Hutchings K, Biccard A, Armitage MPA, Schmidt K, and Clark BM. 2022. Marine specialist impact assessment for exploration and prospecting activities in South African Sea Area 7C. Specialist Report no. 2038/2 prepared by Anchor Environmental (Pty) Ltd for Trans Atlantic Diamonds (Pty) Ltd. 91 pp.
- Anchor Environmental Consultants (AEC). 2022. The State of Saldanha Bay and Langebaan Lagoon 2021/2022. Technical Report September 2022. Prepared for the Saldanha Bay Water Quality Forum Trust. Cape Town.
- Hutchings K, Biccard A, Rees A, Gihwala K, Payne R, Louw S, Wright A Schmidt, K and Clark BM. 2022. Marine baseline report Port of Durban, fauna, flora and antifoulant contaminants. Specialist Report no. 1996/1 prepared by Anchor Research and Monitoring (Pty) Ltd for Transnet National Ports Authority. 211 pp
- Biccard A, Payne RP, Ariefdien R, Schmidt KM, Gihwala KN, Gammon E and S Mtsokoba. 2022. NAMDEB Diamond Corporation (Pty) Ltd Environmental Monitoring Programme in the Midwater Mining Licence Area: 2021 Benthic Sampling Campaign. Report prepared for NAMDEB by Anchor Environmental Consultants. Report no. 1994/1
- Letley, G., Turpie, J., Gardner, K., Kleynhans, M., Schmidt, K. & Hassiem, R. 2022. Development of a Business Case for the Tamale Water Fund. Final Technical Report submitted by Anchor Environmental Consultants to Catholic Relief Services.
- Schmidt KM, AG Wright & BM Clark. 2022. Development of a metocean monitoring system, database and tailings plume model for Debmarine Namibia. Phase 1: Conceptual design of the environmental database, data dashboard and numerical model. Report no. 2007/1 prepared by Anchor Environmental Consultants (Pty) Ltd for Debmarine Namibia and Anglo American. 55 pp.
- Biccard A, Hutchings K, Schmidt K and BM Clark 2021. Marine specialist impact assessment for exploration and prospecting activities in South African Sea Area 14A. Specialist Report no.

1987/1 prepared by Anchor Environmental (Pty) Ltd for Trans Atlantic Diamonds (Pty) Ltd.
55 pp.

- Clark BM, Letley G, and K Schmidt. 2021. Economic Assessment of Recreational Sailing in Cape Town: Making the case for investment in the proposed Granger Bay Marina. Socio-economic assessment. Report No. AEC 1930/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the V&A Waterfront
- Clark BM, Hutchings K, Biccard A, Turpie J, Dawson J, Gihwala K, Swart C, Sedick S, Wright A, Schmidt K, Weiss J, Makhosonke A, Mostert B, Brown E, Laird M, Conrad J, Parker A, Holloway M and Blecher I. 2021. The State of Saldanha Bay and Langebaan Lagoon 2021, Technical Report. Report No. AEC 1936/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the Saldanha Bay Water Quality Forum Trust, October 2021.
- Biccard, A, BM Clark and KM Schmidt. 2021. Environmental Mitigation Assessment for Planned High Resolution Geophysical Surveys on the West Greenland Continental Shelf. Report prepared for De Beers Group by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC 1925/1.
- Biccard, A., K. Gihwala, B.M. Clark, S. Sedick, C. Swart, E.A. Brown, B.P. Mostert, J. Dawson, S Mtsokoba, A. Makhosonke and K. Schmidt. 2020. De Beers Marine Namibia Environmental Monitoring Programme: Atlantic 1 Mining Licence Area 2019 Benthic Sampling Campaign. Report prepared for De Beers Marine Namibia by Anchor Environmental Consultants (Pty) Ltd. Report no. AEC 1840.
- Clark BM, Hutchings K, Biccard A, Brown E, Dawson J, Laird M, Gihwala K, Swart C, Makhosonke A, Sedick S, Turpie J, Schmidt K, and Mostert B. 2020. The State of Saldanha Bay and Langebaan Lagoon 2020, Technical Report. Report No. AEC 1876/1 prepared by Anchor Environmental Consultants (Pty) Ltd for the Saldanha Bay Water Quality Forum Trust, October 2020.
- Dawson J, Schmidt KM and B Clark. 2019. Water quality monitoring of the estuarine environment at the reverse osmosis plant on the Breede River Estuary, Witsand, South Africa. Report no. 1831/2 prepared by Anchor Environmental Consultants (Pty) Ltd for Turnkey Water Solutions. Pp 19.
- Wright, A.G., Schmidt, K., Mostert, B., Swart, C., Clark, B. 2019. ESTUARINE SPECIALIST REPORT FOR THE MOZAL MATOLA RIVER PIPELINE, MOZAMBIQUE: ESTUARINE IMPACT ASSESSMENT.

Journal

- Watson, Schmidt, Pillay, and von der Heyden. "Habitat suitability modelling supports conservation and restoration of the endangered seagrass *Zostera capensis*" submitted to Marine Ecology Progress Series (MEPS) on 26 February 2024 – in review
- Malan, A., Biccard, A., Dawson, J., Payne, R., Schmidt, K., Gihwala, K. N., Ross-Gillespie, V. 2024. Diversity, distribution and knowledge gaps of Polychaeta on the continental shelf of southern Namibia. *African Zoology*, 1–16.
<https://doi.org/10.1080/15627020.2024.2349648>

Turpie J.K., Letley G.K., Weiss J., Schmidt K. 2022. Accounting for ecosystem services and asset value: pilot accounts for KwaZulu-Natal, South Africa. *One Ecosystem* 7:e86392.
<https://doi.org/10.3897/oneeco.7.e86392>

Turpie, J.K., Letley, G., Schmidt, K., Weiss, J., O'Farrell and Jewitt, D. 2021. The potential costs and benefits of addressing land degradation in the Thukela catchment, KwaZulu-Natal, South Africa: NCAVES project report: <https://seea.un.org/content/knowledge-base>

Turpie, J.K., Letley, G., Schmidt, K., Weiss, J., O'Farrell and Jewitt, D. 2020. Towards a method for accounting for ecosystem services and asset value: Pilot accounts for KwaZulu-Natal, South Africa, 2005-2011. Available at: <https://seea.un.org/content/knowledge-base>

Thesis

Schmidt, K.M., S. Swart, C. Reason, and S. Nicholson, 2017: Evaluation of Satellite and Reanalysis Wind Products with In Situ Wave Glider Wind Observations in the Southern Ocean. *J. Atmos. Oceanic Technol.*, 34, 2551–2568, <https://doi.org/10.1175/JTECH-D-17-0079.1>



Kevin Schmidt
23 January 2025



herewith certifies that
Kevin Mikus Schmidt
Registration Number: 117752
is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)
Environmental Science (Professional Natural Scientist)

Effective **20 March 2018**

Expires **31 March 2027**



President of Council

Chief Executive Officer



CURRICULUM VITAE

LILY ASTRID BOVIM

ACADEMIC QUALIFICATIONS:

MSc Marine Biological Resources Management, 2020, Ghent University (Belgium), University of the Algarve (Portugal), Galway-Mayo Institute of Technology (Ireland)

BSc (Hons) Biological Sciences, 2015, University of Cape Town

BSc Marine Biology and Ocean & Atmosphere Sciences, 2014, University of Cape Town

OTHER QUALIFICATIONS AND TRAINING:

Class V Commercial/Scientific Diver, 2023, UCT Research Diving Unit

Marine Mammal Observer (MMO) Mitigation Training, 2024, JNCC

Basic Offshore Survival Induction Emergency Training (BOSIET) with CA-EBS, 2022, OPITO

SASS5 Biomonitoring Course, 2017, Freshwater Research Centre

WRC Seagoing Safety Familiarization (STCW A-VI/I) Certificate, 2016

Advanced Open Water Diver, PADI

Level 1 First Aid, 2023, MST & PEC

COUNTRY EXPERIENCE: South Africa, Guinea, Germany, Portugal, Mozambique, Nigeria, Madagascar, Ghana

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Basic), French (Basic)

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EMPLOYMENT HISTORY:

2022-present: Consultant: Marine Ecosystems & Resources (Anchor Environmental Consultants)

April-June 2019: Intern (Thünen Institute of Baltic Sea Fisheries, Germany)

2017-2018: DST-NRF Intern (Freshwater Research Centre)

SUMMARY PROFILE

Lily Bovim is a marine ecologist with a strong academic foundation and diverse field experience across Southern Africa and beyond. She holds an MSc in Marine Biological Resources Management (*magna cum laude*), awarded jointly by Ghent University, the University of the Algarve, and the Galway-Mayo Institute of Technology. She also holds a BSc Honours degree in Biological Sciences and a BSc in Marine Biology and Ocean & Atmosphere Sciences (Oceanography) from the University of Cape Town. She is a registered Professional Natural Scientist (SACNASP 172158). As a Consultant in Anchor's Marine Ecosystems & Resources team, Lily contributes to a wide range of marine and estuarine projects through impact assessments, environmental audits, baseline surveys, monitoring programme design, scientific diving, and specialist studies. Her fieldwork experience includes ichthyofauna and rocky intertidal surveys, benthic sampling, water and effluent quality sampling, and offshore oceanographic and deep-sea sampling. She has in-country scientific experience across South Africa and in Guinea, Mozambique, Portugal, and Germany. Lily is a medically fit Class V Scientific Commercial Diver and certified Marine Mammal Observer. Her technical skills include data analysis (R, PRIMER), GIS mapping, and basic graphic design.

SKILLS: R programming, MS Office Suite, PRIMER, GIS, Inkscape, MMO, scientific diving

MEMBERSHIP OF PROFESSIONAL BODIES/ORGANISATIONS:

SACNASP Professional Natural Scientist (172158 Aquatic Science)

SELECT PROJECT EXPERIENCE

Period	Country	Clients	Project, Tasks
2025-2026	South Africa	Gansbaai Marine	Marine survey report (water quality, effluent quality, rocky shore survey, toxicity testing and impact assessment) in fulfilment of CWDP conditions Project lead, marine ecology specialist
2026	Ghana	SLR/ Helios	Environmental Carrying Capacity Due Diligence assessment for Nile Tilapia aquaculture farming, Lake Volta, Ghana Co-author
2025-2026	South Africa	WSP Group Africa (Pty) Ltd	Thyspunt and Bantamsklip proposed Nuclear Power Plant Environmental and Social Impact Assessment (ESIA): Marine Ecology and Fisheries Impact Assessment Specialist Study Field scientist
2025	South Africa	CES - Environmental and Social Advisory Services	Marine Impact Assessment and Dispersion Model studies for a CWDP Application for a Brackish Water Reverse Osmosis Desalination Plant Discharge at Port Alfred Field scientist
2025	Mozambique	Kenmare/ Acer Africa	Long-term water quality, coral reef, reef fish, turtle and fisheries monitoring programme at Caldeira and Njovo Islands, Mozambique Marine ecology specialist
2025	South Africa	uMngeni-uThukela Water	Biannual Coastal Waters Discharge Permit effluent quality compliance audits Data analyst, audit specialist
2025	Madagascar	ERM for Base Resources Limited	IFC compliant marine coastal specialist studies for the Base Toliara Project ESIA, Madagascar. Marine ecology specialist
2025	South Africa	ECA Consulting	Marine/Estuarine Impact Assessment for the proposed development of a Liquefied Petroleum Gas Terminal, Island View Precinct, Port of Durban Marine/estuarine ecology specialist
2023-2026	South Africa	Saldanha Bay Water Quality Trust	The State of Saldanha Bay and Langebaan Lagoon; ongoing annual ecological monitoring of Saldanha Bay and Langebaan Lagoon. Ichthyofauna specialist and co-editor
2024-2025	South Africa	WSP Group Africa (Pty) Ltd	Port of Durban Point Container Terminal Reconfiguration Environmental and Social Impact Assessment (ESIA): Marine Ecology and Avifauna Impact Assessment Specialist Study Marine ecology specialist
2025	South Africa	Gansbaai Marine	Development of a Marine Monitoring Programme Project lead and marine ecology specialist
2025	South Africa	Creocean Environnement & Océanographie	Total Energies E&P South Africa Offshore Environmental Baseline Study Benthic expert on board the Pacific Goldfinch, assisting with oceanographic data collection, benthic sampling and identification of deep-sea fauna from video footage.
2025	South Africa	Diamond Coast Abalone	Environmental monitoring and stock assessment for abalone ranching in Hondeklipbaai, Northern Cape. Marine ecology specialist and scientific diver
2025	South Africa	Port Nolloth Sea Farms	Abalone Ranching Concession Area NC3 Environmental Monitoring Survey Report Scientific diver and marine ecology specialist
2024-2027	South Africa	Department of Forestry, Fisheries and the Environment (DFFE)	Environmental Specialist Monitoring of the Saldanha Bay Aquaculture Development Zone. Scientific diver for the deployment and servicing of oxygen and nitrate probes, benthic macrofauna, Annual Chemical Survey and Reef survey in the ADZ.
2024-2025	South Africa	Infinity Environmental (Pty) Ltd	Estuarine Impact Assessment and Hydrodynamic Modelling study to assess impacts of the proposed dredging of Milnerton Lagoon on estuarine function and water quality. Marine/estuarine ecology specialist
2024	South Africa	Kleinzee Holdings	Marine and Coastal Impact Assessment for mining activities in the Buffels Marine Mining Area, Kleinzee, Northern Cape Field scientist, marine ecology specialist

2024	South Africa	Diamond Coast Aquaculture	Environmental monitoring and stock assessment for abalone ranching in Kleinsee, Northern Cape. Marine ecology specialist, scientific diver
2024	South Africa	Gansbaai Marine	Gansbaai Marine Effluent Analysis Compliance Audits Project lead, main audit author
2024	South Africa	Transnet National Ports Authority	Baseline survey for marine fauna and flora monitoring, Port of Mossel Bay Scientific diver, field scientist, ichthyofauna specialist
2024	South Africa	Two Oceans Aquarium Foundation	Baseline survey of Marine Fauna and Flora, Granger Bay. Scientific diver
2024	South Africa	Zingce Environmental Solutions/ Transnet	Baseline survey of marine fauna, flora and antifouling contaminants, Port of Ngqura. Marine ecology specialist, scientific diver, field scientist.
2024	South Africa	CES/ Vopak/ Transnet	Estuarine specialist studies in support of an EIA for the development of a Liquefied Natural Gas Import Terminal at the Port of Richards Bay, KwaZulu-Natal. Co-author, ichthyofauna specialist, field scientist.
2023-2024	Mozambique	ERM - Environmental Resources Management for DP World	Marine/estuarine specialist study for an Environmental and Social Impact Assessment (ESIA) application for proposed expansion of the Maputo container terminal in the Port of Maputo, Mozambique. Marine/estuarine ecology specialist
2023	South Africa	Gansbaai Marine	Water Quality and Marine Ecology Impact Assessment for Gansbaai Marine, Western Cape, in Fulfilment of awarded CWDP conditions. Project manager, marine ecologist & field scientist
2023-2024	South Africa	SANParks	Aerial survey of marine users of Table Mountain National Park Marine Protected Area and Subtidal surveys of commercially important invertebrates and indicator species within the Table Mountain Marine Protected Area. Field scientist (helicopter survey) & scientific diver.
2023-2024	South Africa	Nemai Consulting & Ugu District Municipality.	Estuarine offset/Compensation Plan: Assessment of the proposed development of the weir component of UBWSS in the uMzimkhulu Estuary GIS specialist
2023	Mozambique	Consultec – Consultores Associados, Lda.	Best Practicable Environmental Option (BPEO) and Marine Impact Assessment study of elevated phenol content in produced water discharge for Coral South FLNG, Mozambique. Marine ecology specialist
2023	Nigeria	ERM - Environmental Resources Management	Gap analysis and desktop estuarine component of Environmental and Social Impact Assessment (ESIA) for the MM Port FZE Project at the Federal Ocean Terminal, Onne Port Complex, Nigeria Marine ecologist, lead author
2023	South Africa	SANParks	Robben Island rocky shore survey Field scientist
2023	Mozambique	Consultec – Consultores Associados, Lda.	Best Practicable Environmental Option (BPEO) and Dispersion Modelling Study for Inshore Drilling Water Discharge, Pemba Bay Moçambique Field scientist, marine ecology specialist
2023	South Africa	Transnet	Port of Richards Bay estuary baseline ecological study, with focus on the fish community. Ichthyofauna specialist, co-author
2023	South Africa	Port Own Marina Authority	Assessment of invertebrate and fish fauna in the Berg Estuary channel and recommendations for disposal of dredge water Field scientist
2023	Guinea	Dynamic Mining/ SLR Consulting	Environmental assessment for a bauxite export facility in the prefecture of Boke, Republic of Guinea In-country field scientist, marine/estuarine ecologist
2022-2023	South Africa	Lucky Star Limited, Pioneer Fishing (WC) (Pty) Ltd	Dumping at Sea Permit application: marine environmental constraints analysis, site selection and impact statement. Marine ecology specialist
2022-2023	South Africa	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)/ IWS	Economic, technical, legal, environmental, and social assessment of the suitability of desalination plants as water source for green hydrogen projects in South Africa Primary author, marine ecology specialist

2022-2023	South Africa	Total Energies/WSP	Marine and fisheries study as part of an ESHIA for an offshore production right and environmental authorisation applications for Block 11b/12b Marine ecology specialist
2022-2024	Sierra Leone	Iluka/ Sierra Rutile/ Digby Wells/ Jones & Wagener	Environmental, Safety and Health Impact Assessment (ESHIA) and environmental Flow Assessment studies for mining of the Sembahun group of deposits in the Southern Province of Sierra Leone. Marine and estuarine specialist
2022-2023	South Africa	SAMSA/ Impact Economix	Assessment of opportunities, challenges and risks associated with growing the maritime economy with off-shore Bunkering in St Helena Bay Marine ecology and fisheries specialist
2022	South Africa	Ugu District Municipality/ Nema	Estuarine impact assessment and environmental flow assessment for the development of a weir on the uMzimkhulu estuary, KZN province Marine/estuarine ecology specialist
2022	South Africa	ECA Consulting	Estuarine Specialist Study for Development of Erf 578, uMzimkhulu Estuary Marine/estuarine ecology specialist
2022	South Africa	Impact Economix	Environmental Status Quo Report for Potential Ship-to-Ship Bunkering Operations in St Helena Bay Marine ecology and fisheries specialist
2022-2024	South Africa	Mhlathuze Water	Biannual Coastal Waters Discharge Permit effluent quality compliance audits Data analyst, co-author
2022	South Africa	Karpowership SA/ Triplo4	Marine, estuarine, fisheries and avifauna specialist studies for EIAs three power stations in the Port of Saldanha, Coega and Richards Bay Marine ecology specialist

PUBLICATION RECORD

Winkler AC, **Bovim L**, Macena BC, Gandra M, Erzini K, Afonso P, Abecasis D. 2023. Depth and temperature preferences of meagre, *Argyrosomus regius*, as revealed by satellite telemetry. Plos one, 18(11):e0288706.

Bragg CJ, Paxton BR, Shelton JM, **Bovim LA** and Dallas HF. 2017. Freshwater Fishes of the Cape Fold Ecoregion and Climate Change: Volume 2: Policy Uptake Strategy. Prepared on behalf of the Table Mountain Fund by the Freshwater Research Centre. 14pp.

THESES

Bovim LA. 2020. Depth and temperature preferences of satellite-tagged meagre, *Argyrosomus regius*, in the NE Atlantic. MSc Thesis, University of the Algarve, 43 pp.

Bovim LA. 2015. Stomatal response to smoke – could it prevent hydraulic death? BSc Hons. Thesis, University of Cape Town, 23 pp.

Bovim LA. 2015. Patterns of abundance and diversity among intertidal fishes of Struisbaai, South Africa. BSc Hons. Thesis, University of Cape Town, 34 pp.



herewith certifies that

Lily Astrid Bovim

Registration Number: 172158

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

in the following field(s) of practice (Schedule 1 of the Act)

Aquatic Science (Professional Natural Scientist)

Effective 22 January 2025

Expires 31 March 2027



President of Council

Chief Executive Officer



CURRICULUM VITAE

BARRY MALCOLM CLARK

BORN: 25 August 1968; Livingstone, Zambia

AGE: 57 YEARS

NATIONALITY: South African, British

ACADEMIC QUALIFICATIONS:

Ph.D. Marine Biology, 1997, University of Cape Town

BSc (Hons) Marine Biology, 1991, University of Cape Town

BSc Zoology and Ocean & Atmosphere Science, 1990, University of Cape Town

OTHER QUALIFICATIONS: Scientific diver, Diving supervisor, Small boat skipper

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Good)

COUNTRY EXPERIENCE: South Africa, Namibia, Lesotho, Mozambique, Tanzania, Kenya, Mauritius, Seychelles, Angola, Ghana, Cote d'Ivoire, Nigeria, Liberia, Sierra Leone, Somaliland, Republic of Congo, Egypt, United Arab Emirates, Azerbaijan

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EMPLOYMENT HISTORY: 1991-1993 – Scientific Officer, University of Cape Town
2000-2002 – Marine Coordinator, Cape Peninsula National Park
1996-Present - Director, Anchor Environmental Consultants (Pty) Ltd
2002-Present – Research Associate, University of Cape Town

SUMMARY PROFILE

Dr Barry Clark has thirty-five years' experience in marine biological research and consulting on coastal zone and marine issues. He has worked as a scientific researcher, lecturer and consultant and has experience in tropical, subtropical and temperate ecosystems. He is presently Director of an Environmental Consultancy firm (Anchor Environmental Consultants) and Research Associate at the University of Cape Town. As a consultant has been concerned primarily with conservation planning, monitoring and assessment of human impacts on estuarine, rocky shore, sandy beach, mangrove, and coral reef ecosystems as well as coastal and littoral zone processes, aquaculture and fisheries. Dr Clark is the author of 27 scientific publications in class A scientific journals as well as numerous scientific reports and popular articles in the free press. Geographically, his main area of expertise is southern Africa (South Africa, Lesotho, Namibia, Mozambique, Tanzania, Seychelles, Mauritius, Madagascar and Angola), but he also has working experience from elsewhere in Africa (Republic of Congo, Sierra Leone, Republic of Guinea, Liberia, Cote d'Ivoire, Ghana, Nigeria), the Middle East (UAE, Saudi Arabia) and Europe (Azerbaijan, Greenland).

MEMBERSHIP OF PROFESSIONAL BODIES/ORGANISATIONS

- Professional Natural Scientist, registered with the South African Council for Natural Scientific Professions (2004-)
- Professional member of the South African Institute of Ecologists and Environmental Scientists (2000-)
- South African representative to the SURVAS Network (Synthesis and Upscaling of Sea-level Rise Vulnerability Assessment Studies) (2000-)
- Member of the International Association of Impact Assessors (IAIA) (2000-)
- Member of the Subsistence Fisheries Task Group (1999-2000)
- Member of the Subsistence Fisheries Advisory Group (2000-2002)
- Member of the South African Network for Coastal and Oceanic Research (SANCOR) Economics Task Team

STUDENT SUPERVISION

Name	Institution	Degree	Thesis title	Year
Vici Napier	UCT	MSc	Value and management of the subsistence fishery at Knysna Estuary, South Africa	2004-2005
Khara Shine	UCT	MSc	Biogeographic Patterns and Diversity in Demersal Fish off the south and west coasts of South Africa: Implications for Conservation	2006-2007
Bomikazi Tshingana	UKZN	MSc	Relating flora, fauna and environmental parameters of Durban Bay Sandbanks	2017-2018
Josef Shikeva	UNAM	MSc	The use of underwater video footage as a tool in the assessment of mining related impacts on the hard-bottom benthic environment in southern Namibia	2018-2019
Nomcebo Dhlalani	US	MSc	ICP-MS analysis of trace metals in Pacific Oysters (<i>Crassostrea gigas</i>) within the Port of Saldanha, South Africa	2019-2020

SELECTED PROJECT EXPERIENCE

Period	Country	Client	Project, Tasks
2026	South Africa	Confluence Strategic Development/ Tinley Manor	Environmental Impact Assessment for installation of share net and drum lines at Tinley Manor, KZN.
2025-2026	Namibia	Hyphen	Baseline and Environmental Impact Assessment for the development of a large-scale Green Hydrogen project in Lüderitz, Namibia
2025-2026	South Africa	IFA Hotels & Resorts	Environmental Impact Assessment for the extension of the Zimbali Lakes Development and Zimbali Country Estate on the uThongathi Estuary
2025	Mozambique	ERM/ExxonMobil	Assessment of impacts of dredging a pipeline corridor on coral reef ecosystems in Pemba Bay, Mozambique and feasibility of relocating coral affected by the development

Period	Country	Client	Project, Tasks
2024-2025	South Africa	Department of Forestry, Fisheries and Environment/ WILDTRUST	Development of a management plan for the Southeast Atlantic Seamount, Southwest Indian Seamount Namaqua Fossil Forest Marine Protected Areas
2025	South Africa	AMSOL	Environmental Management Plan for Ship-to- Ship Bunkering operations in Algoa Bay, South Africa. Included oil spill modelling and response plan, noise management plan, and an oiled wildlife preparedness and response plan
2025	South Africa	ASN/Acer Africa	Environmental Impact Assessment for three submarine telecommunications cable landings in South Africa for the GAFAM projects
2025	Mozambique	Kenmare/Acer Africa	Long-term water quality, coral reef, reef fish, turtle and fisheries monitoring programme at Caldeira and Njovo Islands, Mozambique
2025	South Africa	CSIR/SANEDI/ NCEDA/TNPA	Strategic Environmental Assessment for development of a deep water port off Boegoebaai, South Africa
2025	Madagascar	ERM/Base Resources Limited	Marine Coastal Related Specialist Studies for the Base Toliara Mineral Sands Project, Madagascar.
2025	Angola	HCV Africa	Marine Biodiversity Assessment and Ecosystem Services Assessment for deep-water exploratory drilling in Block 47, Lower Congo Basin, Angola
2025	South Africa	Richards Summers Inc.	Delineation of the position of the high water mark in Clifton, Cape Town
2025	Zanzibar	ERM Consulting Tanzania Ltd	Health, Safety, Environmental and Social Due Diligence Services for Zanzibar Ferry Terminal. IFC PS1 and PS6 compliance ESIA review
2025	South Africa	SLR Consulting (Africa)	Block 11b/12b Environmental and Social Impact Assessment (ESIA): Marine Ecology Impact Assessment Specialist Study update
2024-2026	South Africa	Dube Tradeport	Environmental Impact Assessment of the KZN Automotive Supply Park (ASP) on the Msimbazi and Illovo estuaries
2024-2026	South Africa	Overstrand Local Municipality	Onrus Catchment to Coast (C2C) Programme: Estuarine Ecological Health Assessment Report and Maintenance Management Plan (MMP), Rehabilitation of the Main Onrus palmiet peat wetland
2025	South Africa	L'Office Français de la Biodiversité (OFB) & SANParks	Krom & Wildevloevlei Estuary Situation Assessment Reports (SARs), State of Knowledge Reports for Addo, Robben Island & Namaqua Marine Protected Areas (MPA)
2024-2027	South Africa	City of Cape Town and Infinity Environmental	Receiving Environment Monitoring Programme for the City of Cape Town Marine Wastewater Outfalls
2025	South Africa	City of Cape Town and Infinity Environmental	Description of Receiving environment, impact assessment and development of a Monitoring programme for the City of Cape Town small marine outfalls.
2025	South Africa	Infinity Environmental (Pty) Ltd / V&A Waterfront	Marine Impact Assessment for and EIA Amendment process the proposed Granger Bay reclamation/revetment, V&A Waterfront, Cape Town
2025	Zanzibar	ERM Consulting Tanzania Ltd	Health, Safety, Environmental and Social Due Diligence Services for Zanzibar Ferry Terminal. IFC PS1 and PS6 compliance ESIA review

Period	Country	Client	Project, Tasks
2025	Angola	HCV Africa	Marine Biodiversity Assessment and Ecosystem Services Assessment for deep-water exploratory drilling in Block 47, Lower Congo Basin, Angola
2024-2025	South Africa	National Sea Rescue Institute (NSRI)	Environmental Impact Assessment for the Proposed Upgrades the NSRI Bakoven Rescue Base.
2024	South Africa	SLR/Genesis	Marine and avifauna specialist studies for a Scoping assessment for proposed Offshore Windfarms off Durban, Port Elizabeth and Namaqualand, South Africa
2024	South Africa	Infinity Environmental (Pty) Ltd	Estuarine Impact Assessment and Hydrodynamic Modelling (Delft3D) to assess impacts of the proposed dredging of Milnerton Lagoon on estuarine function and water quality
2024	South Africa	CES/Vopak/Transnet	Estuarine specialist studies, including dispersion modelling in support of an EIA for the development of a Liquefied Natural Gas Import Terminal at the Port of Richards Bay, Kwazulu-Natal
2023-2024	South Africa	The Nature Conservancy/Table Mountain National Park	Marine invertebrate surveys and marine resource use assessment within the Table Mountain National Park Marine Protected Area.
2023	Saudi Arabia	NEOM	Marine conservation spatial planning through Marxan, for the NEOM (Saudi Arabia) marine and coastal region to support regionwide conservation planning efforts
2023	Kenya	UNEP/ University of Nairobi	Mapping and valuation of ecosystem services and ecosystem assets of Kenya's marine and coastal environment
2023	South Africa	TNPA/MPA MOT/ Exigent	Strategic Environmental Assessment for the Port of Richards Bay Masterplan
2023	Puntland, Somalia	DP World	Environmental assessment for the Phase 1 expansion of the Port of Bosaso, Somaliland
2023	South Africa	GIZ/Institute for Water Studies(IWS)	Assessment of the economic, technical, legal, environmental, and social suitability of desalination plants as a water source for Green Hydrogen projects in South Africa
2023	Sierra Leone	Sierra Rutile/Jones & Wagener/HACH	Environmental Flow Assessment for a new rutile mine in the Southern Province of Sierra Leone
2023	Angola	ENI/Saipem/ Shelter	Development of a Biodiversity Action Plan (BAP) for offshore LNG mining and an onshore Gas Treatment Plant in Soyo, Angola
2023	Guinea	Dynamic Mining/SRL	Environmental assessment for a bauxite export facility in the prefecture of Boke, Republic of Guinea
2023	Somaliland	DP World	Implementation of a coral relocation programme to transplant coral threatened by the expansion of the Port of Berbera, Somaliland
2022-2023	Sierra Leone	Iluka/Sierra Rutile/Digby Wells	Environmental, Safety and Health Impact Assessment (ESHIA) for mining of the Sembehun group of deposits in the Southern Province of Sierra Leone
2022-2023	South Africa	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Impact Water Solutions (Pty) Ltd	GIZ Green Hydrogen Desalination Study to provide strategic information on the techno-economic, legal, environmental, and social applicability of desalination plants as water source for green hydrogen projects in South Africa. Decision-support analyses for four locations. Review of ESIA report. CorMIX model to assess effluent dispersion for preferred ESIA scenario and inform outfall design.

Period	Country	Client	Project, Tasks
2022	South Africa	Sasol/WSP	Screening analysis for proposed green hydrogen project, at Boegoebaai, Northern Cape
2022	South Africa	ECA Consulting	Avifauna impact assessment for the Maydon Wharf Deepening and Widening Project, Port of Durban.
2022	Somaliland	DP World	Development of a Biodiversity Action Plan (BAP) and Biodiversity Offset Management Plan (BOMP) for the Phase 1 expansion for the Port of Berbera, Somaliland
2022	South Africa	City of Cape Town/ Lukhozi Engineers	Update of the Mouth Management Plan for the Zandvlei estuary, South Africa
2022	South Africa	Karpowership SA/ Triplo 4	Marine, estuarine, fisheries and avifauna specialist studies for EIAs three power stations in the Port of Saldanha, Coega and Richards Bay
2022	South Africa	City of Cape Town/Infinity Environmental	Updating of the Zandvlei and Diep Estuary Management Plan
2022	Namibia	DeBeers Group/Anglo American	Design and development of a sediment generation control and long-term effects predictive model & monitoring system for Debmarine Namibia
2022	South Africa	GIZ/IWS	Economic, technical, legal, environmental, and social assessment of the suitability of desalination plants as water source for green hydrogen projects in South Africa
2022	South Africa	Genesis-Hexicon/Acer Africa	Marine and avifauna environmental assessment and seabird monitoring programme for a proposed Offshore Windfarm in KZN, South Africa
2022	South Africa	SAMSA/Impact Economix	Assessment of opportunities, challenges and risks associated with growing the maritime economy with offshore Bunkering in St Helena Bay
2022, 2025	Mozambique	Kenmare/Acer Africa	Long-term coral reef monitoring programme at Caldeira and Njovo Islands, Mozambique
2022	South Africa	Ugu District Municipality/ Nemaï	Estuarine impact assessment and environmental flow assessment for the development of a weir on the Umzimkhulu estuary, KZN province
2021-2023	South Africa	WSP Group Africa (Pty) Ltd	Total Energies Block 11b/12b Environmental and Social Impact Assessment (ESIA): Marine Ecology Impact Assessment Specialist Study.
2021-2022	South Africa	Transnet National Ports Authority	Baseline survey of marine fauna and flora, sediment and water in the Port of Durban for monitoring of in-water hull cleaning activities
2021-2022	Namibia	Benguela Current Commission	Development of national legislation for the effective implementation of the Ballast Water Convention in Namibia
2021, 2025	South Africa	Mossel Bay Municipality, SERAG	Preparation of a Maintenance Management Plans for the Great Brak Estuary
2021	South Africa	Nsovo Environmental Consulting	Marine ecology impact assessment for proposed DNG Energy (Pty) Ltd Busisiwe (Coega 1) and Cheyeza (Coega 2) Gas to Power facilities and associated infrastructure.
2021	Somaliland	DP World/WSP	Marine specialist study as part of an ESHIA for the Phase 2 expansion of the Port of Berbera, Somaliland
2021	South Africa	V & A Waterfront	Economic impact analysis of the proposed Granger Bay Marina
2021	Greenland	DeBeers Marine (Pty) Ltd	Environmental Mitigation Assessment for geophysical surveys off West Greenland
2021	South Africa	Cliff Path Action Group/Ecosense	Environmental impact assessment for a proposed pedestrian path connecting the two parts of the Hermanus Cliff Path

Period	Country	Client	Project, Tasks
2021	South Africa	IDM Consultants	Environmental impact assessment for the proposed Msimbazi River Estate in KwaZulu-Natal
2020-2021	South Africa	Department of Economic Development, Tourism and Environmental Affairs (EDTEA) KZN	Development of an Estuary Management Plan for the Uthongathi Estuary, KwaZulu-Natal
2020-2026	South Africa	Department of Forestry, Fisheries and the Environment	Environmental assessment and monitoring for a sea-based Aquaculture Development Zone (ADZ) in Saldanha Bay
2020	South Africa	DeBeers Marine (Pty) Ltd	Near- and far-field effluent dispersion modelling study and impact assessment for a proposed SWRO plant in the Port of Cape Town
2020	South Africa	V&A Waterfront	Dispersion modelling study and environmental impact assessment and for the East Pier District cooling plant in the Port of Cape Town
2020	South Africa	IFC World Bank/ Royal Haskoning DHV	Technical, environmental and social due diligence for the Umdloti and Umkhomazi wastewater treatment works (WWTW)
2020	Kenya	Ministry of Water, Sanitation and Irrigation of Kenya / Aurecon	Kenya Water Security And Climate Resilience Project - Development and piloting of a resource directed measures (RDM) Framework for Kenya
2020	South Africa	DeBeers Marine (Pty) Ltd	Specialist environmental assessment of the Namaqua Fossil Forest Marine Protected Area and proposed Ecologically or Biologically Significant Marine Area (EBSA)
2020	South Africa	ATKV/Cape EA Prac	Comparative ecological impact assessment for the ATKV Hartenbos dune stabilisation study
2020	South Africa	Diamond Coastal Aquaculture	Design and implementation of an environmental monitoring programme for an abalone ranching operation at Kleinzee, Northern Cape.
2020	South Africa	TNPA/Chand Environmental	Environmental Impact Assessment for a Reverse Osmosis Desalination Plant in the Port of Cape Town
2020	South Africa	Department Forestry Fisheries & Environment	Implementation of an environmental monitoring programme for the Saldanha Bay Aquaculture Development Zone
2020	South Africa	V&A Waterfront	Environmental impact assessment and dispersion modelling study for the East Pier District cooling plant outfall at the V&A Waterfront, Port of Cape Town
2019-2020	South Africa	South African National Parks	Subtidal surveys of commercially important and indicator invertebrate and fish species within the Table Mountain Marine Protected Area. Project leader.
2019-2020	South Africa	City of Cape Town	Design and implementation of an environmental monitoring programme for domestic effluent outfalls offshore of Hout Bay, Camps Bay and Green Point in Cape Town
2019	Mozambique	Golder Mozambique/ Sasol Petroleum Mozambique Exploration Limitada	Marine specialist impact assessment for proposed offshore explorations in shallow water portions of blocks 16 & 19, Inhambane and Sofala provinces, Mozambique.
2019	South Africa	Vopak/SRK Consulting	Environmental Impact Assessment for Vopak-Reatile Terminal Richards Bay, a bulk liquid storage and handling facility

Period	Country	Client	Project, Tasks
2019	South Africa	Rheinmetall Denel Munition	Design and implementation of an environmental monitoring programme for the Rheinmetall Denel Munitions facility in Helderberg
2019	Somaliland	WSP/DP World	Marine specialist study for an Environmental and Social Impact assessment (ESIA) for the upgrade of Berbera Port, Somaliland
2018/2019	Sierra Leone	Iluka/Sierra Rutile/SRK Consulting	Environmental, Safety and Health Impact Assessment (ESHIA) for mining of Rutile in Area 1 in the Southern Province of Sierra Leone
2018-2019	Mozambique	Golder/ Sasol	Environmental impact assessment for 2D and 3D seismic surveys and exploratory drilling in Block 16 & 19, offshore in Inhambane Province, Mozambique
2018-2021	South Africa	Mhlathuze Water	Toxicity testing, water, sediment and flora and fauna monitoring for Mhlathuze Water Effluent Pipelines, in Richards Bay, South Africa
2018	South Africa	City of Mhlathuze	Environmental Impact Assessment for construction of a new bridge over the Mzingazi Canal at the Richards Bay Waterfront
2018	Republic of Congo	Kola Potash	Marine ecology impact assessment, baseline studies and toxicity testing for the Kola Potash project, Republic of Congo
2018	South Africa	Sun International/ GCX Analytics	Marine ecology impact assessment for discharge of brine effluent from a Reverse Osmosis desalination plant in Granger Bay
2018	Mozambique	JG Afrika/ Mozal	Estuarine impact assessment for discharge of brine effluent from a Reverse Osmosis desalination plant into Maputo Bay
2018	South Africa	Kleinsee Mariculture	Environmental Impact Assessment for construction and operation of abalone holding tanks and associated infrastructure at Kleinsee.
2018	South Africa	ArcelorMittal Saldanha	Marine ecology impact assessments for the discharge of brine effluent from a Reverse Osmosis desalination plant
2018	South Africa	Diamond Coast Abalone	Environmental Impact Assessment for an Aquaculture Farm in Kleinsee, Northern Cape
2018	South Africa	G7 Renewable Energies (Pty) Ltd	Marine ecology impact assessment for discharge of brine effluent from a Reverse Osmosis desalination plant in Gordon's Bay, South Africa
2018	South Africa	Mainport Africa	Assessment of biofouling community collected from MV Cherry Blossom
2017-2018	Sierra Leone	Iluka/Sierra Rutile (Ltd)	Marine and estuarine specialist studies for an Environmental, Social and Health Impact Assessment (ESHIA) for proposed expansions to Sierra Rutile Limited's mining operations in Sierra Leone
2017	South Africa	Advisian, City of Cape Town	Marine ecology impact assessments for nine desalination plants for the Cape Town Emergency Water Resilience Project
2017	South Africa	Hospitality Property Fund	Marine ecology impact assessment and Coastal Waters Discharge Permit application for a desalination plant at the Westin Hotel, Cape Town.
2017	South Africa	GIBB, Transnet National Ports Authority	Strategic Environmental Assessment for Port of Cape Town - Oceanographic and ecological significance and sensitivity of the Port of Cape Town and surrounding areas

Period	Country	Client	Project, Tasks
2017	South Africa	Shell Downstream South Africa (Pty) Ltd	Specialist marine ecology report for coastal water discharge permit application for Shell Downstream South Africa (Pty) Ltd Bulk Chemicals Storage Facility, Port Elizabeth
2017	South Africa	Viking Fishing (Pty) Ltd	Socio-economic assessment of a 60% reduction in Viking fishing group's allocation in the inshore demersal trawl fishery
2016-2019	South Africa	Department of Water & Sanitation	Classification of and determine the Resource Quality Objectives for significant water resources within (1) the Berg Water Management Area and (2) the Breede Gouritz Water Management Area (2 separate appointments). Project leader on the estuaries component of both projects.
2016-2017	South Africa	SIROCCON Consulting Engineers & Project Managers	Specialist marine impact studies for a proposed Atlantic Salmon farm at Dwarskersbos
2016-2017	South Africa	CEN Environnemental Mangement Unit, Nelson Mandela Metro	Dispersion modelling for the Driftsands Waste Water Treatment Works, Port Elizabeth, South Africa
2016-2017	South Africa	Tongaat Hullet	Marine ecology impact assessment for a proposed beach enhancement initiative at Tinley Manor
2016-2017	South Africa	Nemai Consulting, Transnet National Ports Authority	Marine Impact Assessment for the proposed offshore sand winning for developments within the Port of Durban, KwaZulu Natal
2016-2017	South Africa	Department of Environmental Affairs	Revision and update of the South African Water Quality Guidelines for Coastal and Marine Waters – 2017. Natural Environment, Mariculture and Industrial Use
2016-2017	South Africa	Royal Society for Protection of Birds	Assessment of the effects of exposure to brodifacoum pellet bait on Tristan Rock Lobster Jasus paulensis
2016-2017	South Africa	Elandsfontein Exploration and Mining (Pty) Ltd	Assessment of the impacts of the Elandsfontein Phosphate Mine on Langebaan Lagoon
2016-2017	South Africa	Department of Agriculture, Forestry, Fisheries	Assessment of catch and effort in the West Coast Rock Lobster recreational fishery
2016-2017	Namibia	Namdeb Diamond Company	Benthic macrofauna and sediment quality monitoring programme for the Mid-water license region, Namibia
2016	South Africa	Department of Water & Sanitation	Reserve determination study of selected surface water and groundwater resources in the Usuthu/Mhlathuze Water Management Area. Lake St Lucia Intermediate EWR Assessment
2016	South Africa	DeBeers Group of Companies	Assessment of mining-related impacts on macrofaunal benthic communities in the Northern Inshore Area of Mining Licence Area MPT 25-2011 and subsequent recovery
2016	South Africa	Advisian, Oiltanking Mogs Saldanha (RF) (Pty) Ltd	Marine ecological specialist study for the proposed HDPE pipeline and sea water intake and discharge for Oiltanking Mogs Saldanha (Rf) (Pty) Ltd
2016	Republic of Congo	Southern Waters, International Finance Corporation	Aquatic Biodiversity Assessment for the Sounda Hydropower Project
2016	South Africa	Southern Cross Salmon	Marine specialist environmental impact report for a proposed salmon and trout sea cage farm Jutten Island Saldanha -

Period	Country	Client	Project, Tasks
2016	South Africa	Port Owen Marina Authority	Assessment of currents and invertebrate and fish fauna in the Berg Estuary channel and recommendations for disposal of dredge water
2014-2016	South Africa	Coega Development Corporation	Assessment of impacts of wastewater discharge from Coega Industrial Development Zone, Algoa Bay. Conduct oceanographic data analysis, marine and marine baseline study.
2016	Lesotho	Lesotho Highlands Development Authority	Specialist study of freshwater fish populations present in rivers and streams adjacent to the proposed Polihali Dam in the Lesotho Highlands
2016	South Africa	Transnet National Ports Authority	Baseline ecological assessment of marine and estuarine fauna and flora at Pier 1 and Salisbury Island, Port of Durban and an assessment of the potential impacts associated with the upgrade and expansion of the terminal.
2016	South Africa	Transnet National Ports Authority	Assessment of ecosystem goods and services associated with Durban Bay any assessment of potential impacts associated with the development of the Container Terminal at Pier 1 and Salisbury Island
2016	South Africa	ACC Agriculture	Risk assessment for introduction of Camelina sativina as a commercial crop into South Africa
2015	Liberia	Conservation International	Identification and profiling of priority mangrove sites in Liberia through remote sensing and field surveys and identification and delineation of two coastal and marine protected areas
2015	South Africa	AquaTech	Risk assessment for in-water hull cleaning operations in the Port of Durban, South Africa
2015	Tanzania	Aurecon, Schlumberger	Environmental impact assessment for a supply base for Schlumberger in Mtwara port, Tanzania
2015	South Africa	Cape Nature	Environmental flows assessment for the Klein River estuary, South Africa
2015	South Africa	Mossel Bay Municipality	Preparation an estuary management plan for the Hartenbos Estuary
2015	South Africa	Department of Environmental Affairs	Development of an assessment framework for management of effluent discharged from land-based sources to the marine environment in South Africa
2015	Seychelles	Raffles Hotel, Aurecon	Assessment of impacts of diesel spill on a mangrove forest community on Praslin Island, Seychelles
2014-2026	Namibia	DeBeers Marine Namibia	Benthic macrofauna and sediment quality monitoring programme for the Atlantic 1 Mining Licence Area, Namibia
2014-2016	South Africa	Transnet National Ports Authority	Baseline monitoring programme for all sandbank areas in the Port of Durban.
2014-2015	South Africa	Transnet National Ports Authority	Design and implementation of a water and sediment quality monitoring programme in the Port of Durban
2014-2015	South Africa	Oceana/SRK	Application for a coastal water discharge permit for the Lucky Star Fish Processing Plant, St Helena Bay
2014-2015	South Africa	Coega Development Corporation	Assessment of impacts of wastewater discharge from Coega Industrial Development Zone, Algoa Bay
2014-2015	South Africa	Cape Nature	Environmental flow assessment for the Heuningnes estuary, South Africa
2014-2015	South Africa	South African Pelagic Fishing Industry Association	Assessment of the socio-economic impacts of a reduction in the sardine minimum Total Allowable Catch (TAC)
2014-2015	South Africa	Nelson Mandela Bay Metro, GIBB	Assessment of impacts of waste water discharge from a new WWTW at Cape Recife, Algoa Bay

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2014	Seychelles	USAID	Implementation of the “reef gardening” approach for restoration of coral reefs on Praslin Island, Seychelles, lost as a result of El Nino and global warming induced bleaching events.
2014	South Africa	Molapong Aquaculture	Risk Assessment for culture of King and Coho salmon in South Africa
2014	South Africa	NWJ Environmental	Impact assessment for a proposed sand mining operation on the Umzumbe Estuary, KwaZulu-Natal
2014	Mozambique	Marine Stewardship Council	Scoping study to assess potential impacts of upgrading the cruise liner facilities at Portuguese Island, Mozambique
2014	South Africa	Bayside Aluminium, WSP	Environmental impact assessment for the decommissioning of the Bayside Aluminium Smelter, Richards Bay
2014	South Africa	Tronnox Namaqua Sands, SRK	Assessment of impacts of a seawater intake for the Tronnox Namaqua Sands mineral processing facility, Northern Cape
2014	South Africa	AquaConcepts	Risk assessment for import of ornamental marine fish species into South Africa
2014	South Africa	Dormac, WSP	Assessment of impact associated with the development of a floating dry dock in the Port of Durban, South Africa
2014	South Africa	Transnet National Ports Authority	Assessment of potential impacts of the proposed Durban Dig Out Port of the annual sardine migration up the East coast of South Africa
2014	South Africa	WWF-SA	Design and development of a Fisheries Improvement Project for Small Scale Fisheries in the Kogelberg
2014	South Africa	Tronnox Namaqua Sands, Matzikamma Municipality, SRK	Environmental impact assessment for an aquaculture facility at Doringbaai, Northern Cape
2014	Tanzania	Aurecon	Development of a Spatial Development Framework for the coastal environment in the Mtwara/Mikandani Municipal area, Tanzania
2014	South Africa	WSP/ Engen	Assessment of the impacts of an oil spill on mangrove forest communities in the Port of Richards Bay, South Africa
2014	South Africa	Frontier Rare Earths, Coastal Environmental Services	Assessment of impacts of a seawater intake for the Frontier Rare Earths mineral processing facility, Northern Cape
2014	South Africa	Cape Nature	Rezoning and realignment of borders for Betty’s Bay, Goukamma and Robberg marine protected areas in South Africa
2013-2014	South Africa	Paardevelei Properties	Assessment of the likely impacts of associated with a new stormwater management system at Paardevelei
2013-2014	South Africa	iSimangaliso Wetland Park Authority	Assessment of the hydrological, hydrodynamic and ecological functioning of the Lake St Lucia Estuarine System and formulation of recommendations for rehabilitation and improved management of the system.
2013-2014	Lesotho	Lesotho Highlands Development Authority	Assessment of the impacts of land use changes and other pressures related to the construction and operation of the Katse and Mohale Dams on its catchment area and attendant fish populations
2013	South Africa	Cape Nature, Department of Environmental Affairs	Assessment of impacts of an oil spill on sandy beach and rocky intertidal communities in the Goukamma MPA

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2013	South Africa	Transnet National Ports Authority	Marine specialist study as part of an EIA for upgrading the General Maintenance Quay (GMQ) in the Port of Saldanha Bay
2013	Namibia	LL Namibia Phosphates	Review and update of a Scoping Report and Environmental Management Plan for prospecting for phosphorus deposits in Mining Licence Area 159 off the coast of Namibia
2012-2013	South Africa	Department of Agriculture, Forestry & Fisheries	Biodiversity Risk and Benefit Assessments (BRBAs) for the seven most important alien species used in the aquaculture industry in South Africa including Pacific oyster <i>Crassostrea gigas</i> , Mediterranean mussel <i>Mytilus galloprovincialis</i> , sharptooth catfish <i>Clarius gariepinus</i> , rainbow trout <i>Onchorhynchus mykiss</i> , brown trout <i>Salmo trutta</i> , Nile Tilapia <i>Oreochromis niloticus</i> and Marron <i>Cherax tenuimanus</i> .
2012-2013	South Africa	Abagold (Pty) Lt	Environmental Impact Assessment for the construction and operation of a wave energy converter (WEC), pump assistance pond and effluent pipe turbine for the Abagold abalone farm.
2012-2013	South Africa	East London Industrial Development Zone	Feasibility study for the establishment of an Aquaculture and Biotechnology Business Incubator for the East London Industrial Development Zone.
2012	Mozambique	Consultec Lda	Water quality assessment and toxicity testing for a proposed coal transfer facility in Beira, Mozambique
2012	Mauritius	Mauritius Oceanography Institute	Alien species, and water and sediment quality assessment of Port Louis, Mauritius.
2012	Namibia	Ministry of Environment and Tourism	Study to identify a set of Core National Environmental Indicators Network (NCEIS), Integrated State of Environment Baseline Report (ISoER) for Namibia's Protected Area Network (PAN), and Coastal and Marine Ecosystems.
2012	South Africa	uMkhanyakude District Municipality/ Nema Consulting	District-Wide Environmental Management Framework for the uMkhanyakude District Municipality
2012	South Africa	ACE Coastal Environmental Services	Cable Route Study and Marine Specialist study as part of an Environmental Impact Assessment (EIA) for the installation of the proposed ACE telecommunications cable landing at Yzerfontein, South Africa
2012	South Africa	Transnet National Ports Authority	Assessment of potential impacts of iron ore oxide (Fe ₂ O ₃) on the marine flora and fauna of Saldanha Bay.
2012	South Africa	Department of Water Affairs/ Nema Consulting	Environmental Impact Assessment for the Ncwabeni OCS Dam on the Mzimkhulu estuary
2012	South Africa	East London Industrial Development Zone	Seawater Quality Monitoring Program for aquaculture developments in the East London Industrial Development Zone
2012	South Africa	Transnet National Ports Authority/ Nema Consulting	Environmental Impact Assessment for the deepening, lengthening and widening of Pier 2 in the container terminal of the Port of Durban.
2011	South Africa	City of Cape Town	Development of water quality indices and related reporting tools for Inland and coastal waters of the City of Cape Town
2011	South Africa	Overstrand District Municipality/ SSI	Environmental impact assessment for a Waste Water Treatment Works in the Overstrand District Municipality

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2010-2013	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Environmental impact assessment for four Marine Aquaculture Development Zones (MADZs) in the Eastern Cape, South Africa.
2010	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Strategic Environmental Assessment (SEA) to identify potential sea-based finfish aquaculture development zones (ADZ) off the South African coastline.
2010	South Africa	Doug Jeffery Environmental Consultants	Environmental impact assessment for an illegal tide pool constructed at Danger Point, Gansbaai.
2010	South Africa	Department of Environmental Affairs & Development Planning, Western Cape Government	Evaluation of boat launching sites in the Western Cape.
2010	South Africa	Department of Environmental Affairs & Development Planning, Western Cape Government	Assessment of the effects of heavy metal accumulation from land based sources on the Diep River Estuary.
2010	South Africa, Namibia	UNDP-GEF Orange-Senqu Strategic Action Programme	Assessment of the impact of changes in the flow regime of the Orange-Senqu River and its impacts on the degradation of the estuary and the broader Benguela Current System.
2010	Tanzania	BRL/ SWECO/ SADC	Baseline description and health assessment for the Rovuma Basin, Tanzania.
2010	South Africa	Water Research Commission, Department of Water Affairs	Update of methods for estimation of freshwater flow requirements for estuaries in South Africa.
2010	South Africa	Chand Environmental	Assessment of the status and sensitivity of the coastal marine environment off Partridge Point on the Cape Peninsula, and likely impacts that would arise from development of the site.
2010	South Africa	Element Consulting Engineers (Pty) Ltd	Environmental impact assessment for a proposed residential and resort development at Trekoskraal on the marine environment.
2009-2011	South Africa	Various companies	Environmental impact assessments for a suite of desalination plants at Sedgefield, Plettenberg Bay, Witsands, Saldanha Bay, and Port Nolloth. (Five separate appointments.)
2009-2011	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.)/Cape Nature/Marine & Coastal Management (MCM)	Development of Situation Assessment Reports and Estuary Management Plans for the Olifants, Verlorenvlei, Berg, Uilkraals, and Great Brak Estuaries, South Africa. (Five separate appointments).
2009-2011	South Africa	WWF-SA, Lotto Programme	Recreational fisheries monitoring programme coordinating a team of 20 fisheries monitors at 6 sites on the South and East coasts of South Africa.
2009-2010	Azerbaijan	United National Development Programme, Azerbaijan Country Office	International consultant appointed to prepare Project Identification Form (PIF) and Project Preparation Grant (PPG) for a GEF medium-size project on the expansion of the marine and coastal protected area network in Azerbaijan.

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2009-2010	South Africa	Department of Water Affairs & Forestry	Assessment of the nature, distribution and value of aquatic ecosystem services of the Olifants, Inkomati And Usutu To Mhlatuze Water Management in South Africa.
2009-2010	South Africa	WWF-SA/Cape Action for People and the Environment (C.A.P.E.)	Project leader responsible for the preparation of marine and coastal spatial plans and socio-economic assessments for the Kogelberg Biosphere Reserve and Garden Route Initiative.
2009-2010	South Africa	Department of Water Affairs	Environmental Flow Assessment for the Berg Estuary which including preparing scenario assessments of the likely environmental and socio-economic consequences variable freshwater allocation for the estuary.
2009	South Africa	West Coast District Municipality, Jeffares & Green (Pty) Ltd	Environmental assessment of the Jakkalsvlei estuary, and of ecological impacts of illegal excavation and infilling activities
2009	Global	UNDP	Researcher on an assessment of the impact of climate change on the Global Fisheries sector and opportunities and incentives required for adaptation
2009	South Africa	City of Cape Town	Design of a Coastal Monitoring Programme for the City of Cape Town (City of Cape Town).
2009	South Africa	Sturrock Shipping (Pty) Ltd	Marine ecological expert responsible for assessment of marine fouling on vessel, Rita Knutsen.
2009	South Africa	Doug Jeffery Environmental Consultants	Assessment of the status and sensitivity of the coastal marine environment off Oudekraal on the Cape Peninsula
2008-2011	South Africa	Century City Property Owners Association	Assessment of the effectiveness of a fish eradication programme conducted in the Century City wetlands and canals using the ichthyocide rotenone.
2008-2009	Tanzania, Kenya	Programme for the Sustainable Management of the Coastal Zone of the Countries of the Indian Ocean	Design and implementation of training courses and workshops on Information for Fisheries Co-Management in Dar es Salaam, Tanzania and Mombassa, Kenya.
2008	South Africa	Water Research Commission, Fresh Water Consulting Group	Marine specialist on a project to develop a classification system for wetlands in South Africa.
2008	South Africa	Water Research Commission (WRC)	Design and development of an integrated ecological-economic model to be used to assess freshwater flow requirements for the East-Kleinemonde estuary, a temporally open-closed estuary on the East coast of South Africa.
2008	South Africa	DCD-Dorbyl (Pty) Ltd	Environmental audit of Globe Engineering Works (Pty) Ltd, DCD-Dorbyl (Pty) Ltd and Natulis Marine (Pty) Ltd (Nautilus), three engineering companies based in the Port of Cape Town, South Africa
2008	Angola	Tullow Oil Plc	Environmental Impact Assessment, Environmental Overview and identification of Environmental Best Management Practise (BMP) required for seismic surveying and exploratory drilling for offshore oil and gas resources in Blocks 1, Angola.
2008	South Africa	Department of Environmental Affairs & Development Planning/SRK Consulting	Marine and coastal specialist contributing to the preparation of the State of the Environment Report (SoER) for the Western Cape Province, South Africa.

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2008	South Africa	CSIR/Transnet National Ports Authority (Transnet-NPA)	Independent consultant appointed to review an Environmental Impact Assessment and Environmental Management Plan for dredging and dredge spoil disposal for the Ben Schoeman Dock, Port Of Cape Town.
2008	South Africa	Transnet National Ports Authority (Transnet-NPA)/SRK/PD Naidoo & Associates	Independent consultant appointed to review Marine Specialist study components of an Environmental Impact Assessment for extension of the iron ore export terminal and associated ore handling facilities in Saldanha Bay, South Africa
2007-2011	South Africa	Resource Ballast Technology (Pty) Ltd	Independent assessor of efficacy of a newly developed ballast water treatment system and evaluation (risk assessment) of the residual toxicity of ballast water treated with the system.
2007-2011	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Shore based fisheries monitoring programme designed to assess levels of fishing mortality, stock abundance indices and to evaluate the effectiveness of management measures for the commercial and recreational linefishery, tuna pole and hake handline fishing in South African waters.
2007-2011	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Offshore, boat-based fisheries monitoring programme designed to supply and deploy aboard fishing vessels, competent, suitably trained and equipped scientific observers for the inshore trawl, hake longline and west coast rock lobster fisheries.
2007-2010	Ghana	Tullow Oil Plc	Environmental Impact Assessment, Environmental Overview and identification of Environmental Best Management Practice (BMP) required for seismic surveying and exploratory drilling for offshore oil and gas resources in the Tano shallow water and Deep water blocks in Ghana. (Three separate EIA studies).
2007	South Africa	Shelley Point Breakwater (Pty) Ltd/Doug Jeffery Environmental Consultants	Environmental Impact Assessment for the Shelly Point Small Craft Harbour.
2007	South Africa	University of Cape Town	Project supervisor on a study on fish populations in three False Bay estuaries (Zandvlei, Eerste and Lourens).
2006-2011	Tanzania	International Conservation Union (IUCN)/Pangani Water Basin Office, Tanzania	International mentor of the Estuary Team for a project entitled "Flows for People and the Environment: Supporting Sustainable Land Management in the Pangani Basin (Tanzania)".
2006-2007	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.) and World Wildlife Foundation (WWF)	Project leader responsible for development of a fine scale conservation plan for the Agulhas Marine Bioregion.
2006-2007	South Africa	Department of Science and Technology (DST) and the South African Environmental Observation Network (SAEON)	Consultant appointed to lead the process of developing a data management facility for the South African National Antarctica Programme (SANAP) in consultation with the SANAP research and management community.

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2006	South Africa	Seaton Thompson and Associates and Tintswalo Atlantic (Pty) Ltd	Environmental Impact Assessment for a proposed guest lodge development at Koelbaai, under Chapman's Peak Drive, in the Table Mountain National Park (TMNP)
2006	Mozambique	Ministry of Co-ordination of the Environment/ World Bank/European Union	Team leader (Expert level I) appointed to prepare a Country Environmental Profile for Mozambique.
2005-2008	South Africa	Port Nolloth Sea Farms (Pty) Ltd/ Department of Environmental Affairs and Tourism (DEAT)	Assessment of ecological impacts and biological and economic viability of abalone ranching in South African west coast.
2005-2007	Angola	BCLME Programme/ United Nation Development Programme (UNDP)/ UNOPS/Global Environment Facility (GEF)	Assessment of the status of biodiversity along the Angola coastline.
2005-2007	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.), Cape Nature, and Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Biodiversity and economic assessment and development of an integrated conservation plan for CAPE estuaries.
2005-2007	Angola, Namibia, South Africa	BCLME Programme/ United Nation Development Programme (UNDP)/ UNOPS/Global Environment Facility (GEF)	Assessment of human capacity, training and infrastructure available within the three countries bordering the BCLME – Angola, Namibia and South Africa.
2007, 2005	South Africa	Transnet-National Ports Authority (Transnet NPA)	Ballast water, flora and fauna survey in the Ports of Durban and Port Elizabeth.
2005	South Africa	Department of Environmental Affairs and Tourism (DEAT)	National State of the Environment Report (SoER) for South Africa.
2005	South Africa	Department of Environmental Affairs and Tourism (DEAT)	Assessment of the marine and coastal tourism potential for the Arniston fishing harbour.
2005	Angola, Namibia, South Africa	Benguela Current Large Marine Ecosystem (BCLME) Programme (UNDP/World Bank)	Development of and operationalisation of an affordable, sustainable and user-friendly State of Ecosystem Information System (SEIS) for the BCLME region (Angola, Namibia, South Africa).
2005	South Africa	National Empowerment Fund (NEF)	Due diligence (feasibility) study to assess the feasibility of a proposed eel aquaculture and processing operation in the Eastern cape, South Africa.

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2005	South Africa	Department of Environmental Affairs & Tourism	Supervisor on a project to assess the socio-economic value and ecological impacts of the subsistence fishery for sand and mud prawns, and fish in the Knysna estuary, South Africa
2004-2026	South Africa	Saldanha Bay Water Quality Forum Trust (SBWQMFT)	Preparation of a series of "State of the Bay" Monitoring Programme and Reports for Saldanha Bay and Langebaan Lagoon in 2004, and annually between 2008 and 2017.
2004-2008	South Africa	WWF-SA/South African National Parks	Development and implementation of a coastal monitoring programme for the Table Mountain National Park Marine Protected Area.
2004-2005	South Africa	Department of Environmental Affairs and Tourism (DEAT)	Formulation of recommendations on an appropriate permit fees and permitting systems for recreational SCUBA divers and SCUBA diving tour operators in Aliwal Shoal, Pondoland, Bird Island, Tsitsikamma and Table Mountain National Park Marine Protected Areas (MPAs).
2004	South Africa	I & J	Environmental Impact Assessment for an abalone farm at Danger Point, Western Cape.
2004	DRC, Angola, Namibia, South Africa, Mozamb., Tanz., Mauritius, Seychelles	EU-SADC MCS Fisheries Programme	Production of instructional material and the holding of a seminar on the effects of pollutants, illegal fishing methods and the requirements of relevant conventions signed by the SADC states.
2004	South Africa	City of Cape Town	Environmental Impact Assessment for a coastal walkway between St James and Kalk Bay, in False Bay, South Africa.
2004	South Africa	City of Cape Town	Environmental Impact Assessment to assess impacts of an education centre and tidal pool, at Bordjiesrif in False Bay, South Africa.
2004	Mozambique	Southern African Development Community/ Government of Mozambique	Production of a policy document and strategy for fisheries Monitoring Control Surveillance in Mozambique.
2004	South Africa	Botanical Society of South Africa	Preparation of guidelines to assist environmental assessment practitioners in selecting biodiversity specialists for involvement in Environmental Impact
2004	Southern Africa	IPCC/ START Programme	Desktop assessment of the likely impacts of climate change on estuaries in southern Africa.
2004	South Africa	EKZN Wildlife Service/ Department of Environmental Affairs and Tourism (DEAT)	Review and assessment of the management of subsistence fisheries in KwaZulu-Natal, South Africa.
2003-2005	South Africa	Department of Water Affairs & Forestry (DWAF)	Project manager, estuarine coordinator and fisheries specialist on the Berg River Baseline Monitoring Programme.
2003-2004	South Africa/ Namibia/ Angola	BCLME Programme/ UNDP/ UNOPS/ GEF	Capacity and Needs Assessment for the Benguela Current Large Marine Ecosystem (BCLME) Project involving three countries – Angola, Namibia and South Africa.
2003-2004	South Africa	Makana Marine and Projects	Environmental Impact Assessment for the development of a new ship repair facility in the Port of Cape Town.
2003-2004	South Africa	World Wildlife Fund, South Africa (WWF-SA)	Production of a business plan for the proposed Kogelberg Marine Park.

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2003-2004	South Africa	Department of Environmental Affairs and Tourism (DEAT)	Strategic Environmental Assessment to guide the implementation of regulations promulgated under the National Environmental Management Act 1998: Control of Vehicles in the Coastal Zone.
2003	South Africa	Globallast Programme/ IMO/UNDP/ GEF	Development of a Ballast Water Management Plan for the Port of Saldanha, South Africa.
2003	South Africa, Namibia and Angola	Global International Waters Assessment (GIWA) Programme/ GEF	Global International Water Assessment (GIWA) for the Benguela region (South Africa, Namibia and Angola).
2002-2003	South Africa	Cape Action for People and the Environment / World Bank/ UNDP	Lead consultant on the Marine and Coastal Component of the Cape Action for People and the Environment (C.A.P.E.) programme responsible for the developing components of the Project Concept Document (PCD) and Project Implementation Plan (PIP).
2002-2003	Namibia	Namdeb Diamond Company	Environmental Impact Assessment for the Wet Overburden Mining System in Mining Area 1, Oranjemund, Namibia.
2002-2003	South Africa	Department of Environmental Affairs & Tourism	Assessment of the quantity of abalone caught by recreational fishers during the 2002/2003 fishing season.
2002-2003	South Africa	Water Research Commission, Department of Water Affairs & Forestry	Assessment of the relative contribution and importance of individual estuaries to overall estuarine biodiversity in South Africa.
2002-2003	South Africa	National Ports Authority/ Globallast Programme	Baseline survey of subtidal reef biota and reef fish off Jaheel & St Croix Islands, Algoa Bay.
2002	Africa	GEF/UNDP UNESCO/IOC/ACOPS	Regional Technical Coordinator for the Working Group on Sustainable Use of Living Resources as part of Phase 2 of the GEF MSP Sub-Saharan Africa Project (GF/6010-0016): Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa.
2002	South Africa	Department of Environmental Affairs & Tourism	Acoustic tracking study of the West Coast rock lobster (<i>Jasus lalandii</i>) in the Hermanus Whale Sanctuary, on the south-west coast of South Africa.
2002	Namibia	Namdeb Diamond Company	Environmental assessment of sandy beaches in Mining Area 1, Oranjemund, Namibia and an environmental baseline study in a previously unexploited area on the coast.
2002	South Africa	National Research Foundation	Launch the Marine and Coastal Node of the South African Environmental Observatory Network (SAEON) programme.
2002	South Africa	Department of Environmental Affairs & Tourism	Assessment of sardine migration habitats off the East coast of South Africa.
2002	South Africa	Department of Environmental Affairs & Tourism	Fisheries monitoring programme for an experimental hoop-net fishery for west coast rock lobster off Cape Hangklip, South Africa.
2002	South Africa	University of Rhode Island/ History of Marine Animal Populations	Desktop assessment of the likely impacts of climate change on the ecosystem functioning and fisheries of the Benguela ecosystem, South Africa.
2002	Seychelles		Assessment of the status of fisheries, fish stocks, and approaches to fisheries management in the Seychelles

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2001-2002, 2009-2010	South Africa	Department of Environmental Affairs & Tourism	Assessment of the quantity of west coast rock lobster caught by recreational fishers during the 2001/2002 and 2009/2010 fishing seasons.
2001-2003	South Africa	Department of Environmental Affairs & Tourism/ Rhodes University	Economic Sectoral Study of the South African Fishing Industry.
2001-2002	South Africa	AECI/SYNEXUS	Assessment of risks to marine life and human health resulting from disposal of contaminated groundwater from the Umbogintwini waste disposal site.
2001	South Africa	GEF/UNDP/IMO Globalballast Programme	Ballast water fauna and flora survey in the Port of Saldanha.
2001	South Africa	Nitrogen Products	Marine specialist on an EIA to assess impacts of effluent disposal on the marine environment from a fertilizer factory.
2001	South Africa	Maribus Industries	Application for a seawater lease and mariculture permit for a Gracilaria farm in St Helena Bay, South Africa
2001	United Arab Emirates	Dubai Municipality/ Martin Mid-East	Assessment of impacts of effluent discharges and shipbuilding activities on Dubai Creek, UAE.
2000-2002	South Africa	South African National Parks	Marine Coordinator Cape Peninsula National Park, responsible for the design and development of a marine component for the newly established Cape Peninsula National Park.
2000-2002	South Africa	Freshwater Consulting Group	Assessment and monitoring changes in the fish community of the Koekdou River following construction of a new dam on the system
2000-2001	Africa	GEF/UNDP UNESCO/IOC/ACOPS	National coordinator for South Africa on Phase 1 of the GEF MSP Sub-Saharan Africa Project (GF/6010-0016): Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa.
2000-2001	South Africa	SRK Consulting and PD Naidoo and Associates	Environmental Impact Assessment of potential impacts of the extension of the iron ore handling facility in Saldanha Bay on the marine environment and mariculture activities.
2000	South Africa	City of Cape Town/ Southern Water Ecological Research and Consulting	Environmental Impact Assessment for the upgrade of a rubble weir and other mouth management options for the Zandvlei estuary.
2000	South Africa	On Track Developments/ Chand Environmental	Environmental Impact Assessment for the redevelopment of the Sea Point Pavilion site, Cape Town
2000	South Africa	City of Cape Town/ Southern Water Ecological Research and Consulting	Freshwater fish specialist on the Zeekoeivlei and Rondevlei restoration project.
2000	Africa	SURVAS	National representative on the SURVAS Network tasked with assessing Vulnerability & Adaptation to Impacts of Accelerated Sea-Level Rise in Africa.
1999-2000	South Africa	United States Department of Energy/ Department of Environmental Affairs and Tourism, South Africa	Assessment of the effects of climate change on marine biodiversity in South Africa.

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1999-2000	South Africa	Foundation for Research Development	Assessment of impacts of exploitation of wonderworm <i>Marphysa sanguinea</i> on bouldershore habitats on the Cape Peninsula, South Africa.
1999-2000	South Africa	Department of Environmental Affairs & Tourism, South Africa	National Co-ordinator of the Subsistence Fisheries Programme designed to identify subsistence fishing communities in South Africa, to assess socio-economic profiles and resource harvesting techniques and to provide recommendations for the implementation of appropriate management systems for these fishers.
1999	South Africa	Ridge Management/ Eric van den Honert Environmental Consulting	Environmental Impact Assessment for for the Soetwater Mariculture Project (an abalone and seaweed aquaculture initiative) on the marine environment.
1999	South Africa	City of Cape Town/ Southern Water Ecological Research and Consulting	Environmental Impact Assessment for the construction of a foot bridge over the Zandvlei estuary.
1999	South Africa	City of Cape Town/ Southern Water Ecological Research and Consulting	Environmental Impact Assessment for flood mitigation measures (artificial wetland) on the Silvermine estuary.
1999	South Africa	City of Cape Town/ Freshwater Consulting Group	Fish specialist appointed to assess the ecological importance of Zoarvlei (a freshwater wetland) for marine, estuarine and freshwater fish species.
1999	South Africa	City of Cape Town/ Southern Water Ecological Research and Consulting	Environmental Impact Assessment for upgrading the Zandvlei Water Treatment Works on the Eerste estuary.
1999	South Africa	Jakobsbaai Abalone Farm	Assessment of the application of anolytes to control red-tide dinoflagellates <i>Scripsiella trochoidea</i> in the mariculture industry.
1999	South Africa	Southern Water Ecological Research and Consulting	Guidelines for stocking Capricorn Lake (a shallow dendritic lake in the Capricorn Science and Business Park Lake) with fish
1998-1999	Mozambique	ARCO International Oil and Gas Company/ Austral	Environmental Impact Assessment for onshore and offshore seismic exploration and exploratory drilling for oil and gas in Sofala Bay (Beira) area in Mozambique.
1998-1999	South Africa/ Namibia/ Angola	GEF/UNDP/ Benguela Current Large Marine Ecosystem Programme (BCLME)	Production of an "Integrated Overview of Diamond Mining in the Benguela Current Region" as part of the synthesis and assessment of information on the Benguela Current Large Marine Ecosystem (BCLME) project.
1998	Namibia	Government of Namibia/ Desert Research Foundation of Namibia	Environmental Impact Assessment for a new Fishing Port at Möwe Bay, Skeleton Coast, Namibia.
1998	Namibia	Namdeb Diamond Company	Environmental Impact Assessment for the Elizabeth Bay Mine, Lüderitz, Namibia.
1998	South Africa	Marine Diamond Mines Association/ Sue Lane & Robin Carter & Associates	Generic Environmental Baseline Report on the status of the marine environment, fisheries and coastal utilisation in the South African west coast marine diamond 'a' concession areas, surf zone and admiralty strip.

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1998	South Africa	Blaauberg Municipality/ World Wide Fund for Nature (WWF-SA)	Assessment of the intensity and impact of bait collecting activities on the ecology of the Diep River estuary, South Africa.
1998	South Africa	De Beers Namaqualand/Gibb Africa	Environmental Impact Assessment for the construction of a bridge across the Buffels estuary near Kleinsee.
1997-2012	Namibia	Namdeb Diamond Company	Baseline and Environmental Impact Assessment for beach diamond mining in the Bogenfels Mining Licence Area in the Sperrgebiet, Namibia. Sequential appointment for studies undertaken in 1997, 1998, and annually from 2004-2011.
1997-1998, 2000-2001, 2009-2011	South Africa	Department of Environmental Affairs & Tourism/ Department of Agriculture, Forestry & Fisheries	Implementation of an offshore, boat-based fisheries monitoring programme designed to supply and deploy aboard fishing vessels, competent, suitably trained and equipped scientific observers for the offshore trawl, inshore trawl, hake longline and west coast rock lobster fisheries.
1997-1998	South Africa	Foundation for Research Development/ University of Cape Town	Assessment of the enhanced utilisation and management of demersal fish resources off the east, south and west coasts of South Africa.
1997	United Arab Emirates	Adnoc-Borealis Petrochemicals/Martin Mid-East	Environmental Impact Assessment and Baseline Survey for a new petro-chemicals plant in Dubai, UAE.
1996	South Africa	Rein's Nature Reserve	Assessment of the status of exploited marine species in a small marine reserve near Mossel Bay, South Africa.
1994-1996	South Africa	Sea Fisheries Research Institute/ World-wide Fund for Nature (SA)	Assessment of the impact of commercial beach-seine netting on the fish and invertebrates in False Bay, South Africa.
1990	South Africa	Seafarm Products	Assessment of the impact of fish predation on the cultured mussel, <i>Mytilus galloprovincialis</i> , in the Seafarm Dam, South Africa.

PUBLICATION RECORD

Scientific papers

CLARK, B.M., TURPIE, J.K., CULLIS, J.D.S., DAWSON, J., DOBINSON, L., KUNNEKE M.M. & HORN, A. in press 2022.

The impacts of long-term flow reductions and an extreme drought on a large, permanently open estuary, and implications for setting the ecological reserve. *Water SA* 48(2) xxx–xxx.

SHELTON, J.M., **CLARK, B.M.**, SEPHAKA, T. & TURPIE, J.K. 2016. Population crash in Lesotho's endemic Maloti minnow *Pseudobarbus quathlambae* following invasion by translocated smallmouth yellowfish *Lebeobarbus aeneus*. *Aquatic Conservation: Marine and Freshwater Ecosystems*. DOI: 10.1002/aqc.2633.

Clark, B.M. 2009. Introduction – The Berg River Baseline Monitoring Programme. *Transactions of the Royal Society of South Africa* 64(2): 95,

- Clark, B.M.** & S. Taljaard. 2009. Historic changes in inorganic nutrient loading and its effects on water quality biota of the Berg estuary, South Africa. *Transactions of the Royal Society of South Africa* 64(1) In press
- Clark, B.M.**, Hutchings, K. & Lamberth, S.J. 2009. Long-term variations in composition and abundance of fish in the Berg estuary, South Africa. *Transactions of the Royal Society of South Africa* 64(2): 238–258.
- Clark, B.M.**, Impson, D. & J. Rall. 2009. Present status and historical changes in the fish fauna of the Berg River, South Africa. *Transactions of the Royal Society of South Africa* 64(2): 142–163
- Clark, B.M.** 2005. Climate change: A looming challenge for fisheries management in southern Africa. *Marine Policy* 30 (1): 84-95.
- Clark, B.M.**, Hauck, M., Harris, J., Salo, K. and E. Russell. 2002. Identification of subsistence fishers, fishing areas, resource use and activities. *South Africa Journal of Marine Science* 24: 425-438.
- Clark, B.M.** 1996. Variation in surf zone fish community structure across a wave exposure gradient. *Est. cstl. Shelf Sci.* 44: 659-674.
- Clark, B.M.** 1996. Marine diamond mining activities off Namibia: do they really pose a threat to island biota? *S.A. Comm. Mar.* 5(3): 16.
- Clark, B.M.** & B.A. Bennett 1993. Are juvenile fish an issue in the trek net controversy? *Fish, fishers and fisheries, Proc. 2nd Mar. Recreational Angling Symp., Durban, October 1992*. Beckley, L.E. & R.P. van der Elst (eds.) *Spec. Publ. oceanogr. Res. Inst. S. Afr.* 2: 157-159.
- Clark, B.M.**, B.A. Bennett & S.J. Lamberth 1994. A comparison of the ichthyofauna of two estuaries and their adjacent surf-zones, with an assessment of the effects of beach-seining on the nursery function of estuaries for fish. *S. Afr. J. mar. Sci.* 14: 121-131.
- Clark, B.M.**, B.A. Bennett & S.J. Lamberth 1994. Assessment of the impact of commercial beach-seine netting on juvenile teleosts in the surf-zone of False bay, South Africa. *South Africa Journal of Marine Science* 14: 255-262.
- Clark, B.M.**, B.A. Bennett & S.J. Lamberth 1996. Factors affecting spatial variability in seine net catches of fish in the surf-zone of False Bay, South Africa. *Mar. Ecol. Prog. Ser.* 131: 17-34.
- Clark, B.M.**, B.A. Bennett & S.J. Lamberth 1996. Temporal variations in surf-zone fish assemblages from False Bay, South Africa. *Mar. Ecol. Prog. Ser.* 131: 35-47.
- Branch, G.M. and **Clark, B.M.** 2006. Fish stocks and their management: The changing face of fisheries in South Africa. *Marine Policy* 30 (1): 3-17.
- Hutchings, K., **Clark, B.M.**, Atkinson, L.J. & C. G. Attwood. 2008. Evidence of recovery of the linefishery in the Berg River Estuary, Western Cape, South Africa, subsequent to closure of commercial gillnetting. *African Journal of Marine Science* 2008, 30 (3): 507–517.
- Napier V.R., J.K. Turpie & **B.M. Clark**. 2009. Value and management of the subsistence fishery at Knysna estuary, South Africa. *African Journal of Marine Science* In press
- Branch, G.M., May, J., Roberts, B., Russell, E., **Clark, B.M.** 2002. Case studies on the socio-economic characteristics and lifestyles of subsistence and informal fishers in South Africa. *South Africa Journal of Marine Science* 24: 439-462.

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- Harris, J.M., Sowman, M., Branch, G.M., **Clark, B.M.**, Cockroft, A.C., Coetzee, C., Dye, A.H., Hauck, M., Johnston, A., Kati-Kati, L., Maseko, Z., Salo, K., Sauer, W.H.H., Siqwana-Ndulo, N. and J. Beaumont. 2002. The process of developing a management system for subsistence fisheries in South Africa: recognizing and formalizing a marginalized fishing sector in South Africa. *South Africa Journal of Marine Science* 24: 405-424.
- Hauck, M., Sowman, M., Russel, E., **Clark, B.M.**, Harris, J.M., Venter, A., Beaumont, J. and Z. Maseko. 2002. Perceptions of subsistence and informal fishers in South Africa. *South Africa Journal of Marine Science* 24: 464-474
- Hutchings K., Rees A., Pulfrich A., **Clark B.** 2025. Effects of diamond mining on sandy beaches in southern Namibia – the use of *Tylos granulatus* (Isopoda: Oniscidea) as an indicator species. *African Journal of Marine Science*, 47(3), 281–294. <https://doi.org/10.2989/1814232X.2025.2562031>.
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- Lamberth, S.J., B.A. Bennett & **B.M. Clark** 1995. Seasonality of beach-seine catches in False Bay, South Africa, and implications for management. *S. Afr. J. mar. Sci.* 15: 157-167.
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- Lamberth SJ, Branch GM & **BM Clark** 2010. Estuarine refugia and fish responses to a large anoxic, hydrogen sulphide, “black tide” event in the adjacent marine environment. *Est. cstl. Shelf Sci.* 86: 203-215

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- Napier, V.R., Turpie, J.K. & **B.M. Clark**. 2009. Value and management of the subsistence fishery at Knysna Estuary, South Africa. *African Journal of Marine Science* 31(3): 297–310.
- Parker, D., Kerwath, S.E., Næsje, T.F., Arendse, C.J., Keulder-Stenevik, F.J., Hutchings, K. , **Clark, B.M.**, Winker, H, Cowley, P.D. and CG Attwood. 2017. When plenty is not enough: an assessment of the white stumpnose (*Rhabdosargus globiceps*) fishery of Saldanha Bay, South Africa. *African Journal of Marine Science* 2017, 39(2): 153–166.
- Hutchings K., Rees A., Pulfrich A., Clark B. (2025). Effects of diamond mining on sandy beaches in southern Namibia – the use of *Tylos granulatus* (Isopoda: Oniscidea) as an indicator species. *African Journal of Marine Science*, 47(3), 281–294. <https://doi.org/10.2989/1814232X.2025.2562031>
- Solanofernández, S., Attwood, C.G., Chalmers, R. **Clark, B.M.**, Cowley, P.D., Fairweather, T., Fennessy, S.T., Götz, A., Harrison, T.D., Kerwath, S.E., Lamberth, S.J., Mann, B.Q., Smale M.J. & L. Swart. 2012. Assessment of the effectiveness of South Africa's marine protected areas at representing ichthyofaunal communities. *Environmental Conservation* 39 (03): 259-270

Books/Book Chapters

- Turpie, J., **Clark, B.M.**, Knox, D., Martin, P., Pemberton, C. & C Savy. 2004. Contributions to Information Requirements for the Implementation of Resource Directed Measures for Estuaries. Volume 1. Improving the biodiversity importance rating of South African estuaries. JB Adams (Ed.). Report to the Water Research Commission by the Consortium for Estuarine Research and Management. WRC Report No. 1247/1/04.
- De Villiers CC, Brownlie S, **Clark B.M.**, Day EG, Driver A, Euston-Brown DIW, Helme NA, Holmes PM, Job N, Rebelo AB (2005) Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape. Fynbos Forum and Botanical Society of South Africa, Kirstenbosch. ISBN 0-620-35258-2
- Harris, J.M., Branch, G.M., **Clark, B.M.** & S.C. Sibiya. 2007. Redressing Access Inequities and Implementing Formal Management Systems for Marine and Estuarine Subsistence Fisheries in South Africa. In: T.R. McClanahan and J.C. Castilla (eds.) *Fisheries Management: Progress towards Sustainability*. Blackwell Press, pp. 112-138.
- Niang, I., Nyong, A., **Clark, B.M.**, Desanker, P., Din, N., Githeko, A., Jalludin, M., Osman, B. (2007) Vulnerability, Impacts and Adaptation to Climate Change. In: Otter, L., Olago, D.O. and Niang, I. (eds) *Global Change Processes and Impacts in Africa: A Synthesis*. START/East African Educational Publishers, Nairobi, pp. 226-249.

Thesis

- Clark, B.M. 1997. Dynamics and utilization of surf zone habitats by fish in the south-western Cape, South Africa. PhD Thesis, University of Cape Town, 216 pp.



herewith certifies that

Barry Malcolm Clark

Registration Number: 400021/05

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)
Zoological Science (Professional Natural Scientist)

Effective **1 March 2005**

Expires **31 March 2027**



President of Council

Chief Executive Officer



To verify this certificate scan this code

CURRICULUM VITAE

AIDEN BICCARD

BORN: 3 April 1985, Cape Town, South Africa

AGE: 40 years

ACADEMIC QUALIFICATIONS:

MSc. Marine Zoology, 2012, University of Cape Town

BSc. (Hons) Marine Ecology, 2007, University of Cape Town

BSc. Botany and Zoology, 2006, University of Cape Town

OTHER QUALIFICATIONS:

Medically in date scientific/commercial class IV diver, class IV diving supervisor, category C small craft skipper with dive endorsement, VHF short-range radio operator, advanced level 3 first aid, basic offshore survival induction emergency training (BOSIET) including safety induction, Heli Safety & Escape (HUET & CA-EBS), sea survival & first aid, firefighting and self-rescue (OPITO Approved).

COUNTRY EXPERIENCE: South Africa, Namibia, Mozambique, Republic of Congo, Seychelles, Sierra Leone, Somaliland, Suriname.

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Good)

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EMPLOYMENT HISTORY: 2012-present: Senior Associate, Anchor Environmental Consultants
2007-2012: Part-time Research Assistant/Demonstrator, University of Cape Town & Anchor Environmental

SUMMARY PROFILE

Aiden has more than 14 years of research and consulting experience in ecological and biodiversity surveys of marine, estuarine, and freshwater benthic habitats, with expertise in invertebrate taxonomy and systematics, specialist marine impact assessments, biofouling, hydrocarbon and antifoulant contamination, trace metal pollution, and physico-chemical surveys. At Anchor, he leads a team specialising in benthic marine studies for a range of local and international clients. He is the author of six peer-reviewed scientific publications and numerous specialist reports in his capacity as a benthic invertebrate biologist. Aiden has conducted biodiversity field surveys and assessments across South Africa, Namibia, the Republic of Congo, Sierra Leone, Somaliland, and Mozambique. He also has more than 19 years of experience as a Class IV scientific diver/supervisor and small craft skipper.

MEMBERSHIP OF PROFESSIONAL BODIES/ORGANISATIONS:

- African Network of Deep-water Researchers (2023 -)
- Member of The South African Society of Systematic Biology (2008-)
- Member of The Golden Key Honour Society (2007-)

SELECT PROJECT EXPERIENCE

Date	Country	Client	Task
2025-2026	Namibia	Namdeb	Namdeb Coastal Monitoring Programme Intertidal (rocky shore, sandy beach) surveys – project management, survey design, survey logistics, field work, identification of infauna, data analysis and reporting.
2025	South Africa	Beltan Park/Transhex	2025 Benthic Monitoring Campaign Project leader – project management, survey design, survey logistics, identification of benthic invertebrate macrofauna, analysis of underwater video footage, statistical analyses and writing of report.
2025-2026	South Africa	City of Cape Town	End of Pipe Environmental Assessment and Monitoring Programme for the City's designated wastewater Marine Outfalls. Survey logistics, collection of bio-monitoring samples (fish, mussels and lobsters). Scientific diver/supervisor and small craft skipper.
2014-present	Namibia	De Beers Marine Namibia	De Beers Marine Namibia Environmental Monitoring Programme in the Atlantic 1 Mining License Area: Annual Benthic Sampling Campaign Project Leader – Survey techniques include the use of a Van Veen grab, sediment and water quality instruments, manned submersible surveys, drop camera and benthic tow camera systems. Identify benthic invertebrate macrofauna, analysis of underwater video footage, statistical analyses and writing of report.
2021-present	Namibia	Anglo American/ NatureMetrics	DNA-based sampling (eDNA & metabarcoding) analyses for marine benthic fauna and sediment fauna at the Atlantic 1 marine mining site operated by Debmarine Namibia (DBMN). Project Leader – Sampling techniques include the use of a Van Veen grab and various sediment and water quality instruments; collection and preservation of water and sediment eDNA samples; collection, preservation, and identification of voucher specimens for metabarcoding.

Date	Country	Client	Task
2024	South Africa	WSP Group Africa	Boegoebaai Strategic Environmental Assessment – Marine Ecology Specialist report Identification of invertebrate infauna, statistical analyses and reporting.
2022	South Africa	Transnet National Ports Authority	Baseline survey marine fauna, flora and antifouling contaminants Port of Durban. Invertebrate specialist - collection, preservation and identification of invertebrates. Data analysis and report writing.
2021-present	Somaliland	WSP/ DP World	Coral relocation feasibility study as part of the upgrade of Berbera Port, Somaliland (Phase 1) Marine biologist and scientific diver.
2015, 2016, 2021, 2023	Namibia	NAMDEB	NAMDEB's Offshore Environmental Monitoring Programme in the Midwater Mining License Area: Annual Benthic Sampling campaign Project leader - Conceptualisation of study involving site selection and experimental design. Lead a team of 9 assistants to collect and preserve grab and sediment samples aboard a survey vessel for 1 month at sea. Identify benthic invertebrate macrofauna. Analyse data and prepare report.
2022-2025	South Africa	Anglo Shipping	Saldanha Bay DNA-Based Monitoring: Biodiversity and Detection of Non-Native Species. Invertebrate specialist, scientific diver and supervisor, sample collection, preservation, identification of fouling biota, data analysis and reporting.
2021-2022	South Africa	Trans Atlantic Diamonds	Marine Specialist Impact Assessment for Exploration and Prospecting Activities In Concession 7C, 11C, 12B, 14A and 14C, South Africa Marine Specialist – Conducting Marine Ecological Impact Assessments. Compiling reports
2021	South Africa	WWF-South Africa	Environmental Specialist Benthic Monitoring programme for the Saldanha Bay Aquaculture Development Zone. Invertebrate specialist - collection, preservation and identification of invertebrates.
2020-present	South Africa	Department of Environment Forestry and Fisheries (DEFF)	Environmental Specialist Monitoring of the Saldanha Bay Aquaculture Development Zone. Invertebrate specialist, scientific diver.
2019-present	South Africa	South African National Parks	Subtidal surveys of commercially important and indicator invertebrate and fish species within the Table Mountain Marine Protected Area. Scientific diver and supervisor.

Date	Country	Client	Task
2014-present	Namibia	Pisces Environmental	Sandy beach macrofauna and sediment quality monitoring programme for the Elizabeth Bay and Southern Coastal Mining License Areas, Namibia. Intertidal rocky shore, sandy beach and subtidal field surveys – data collection, collect and preserve invertebrate samples.
2018	The Biodiversity Company, Sintoukola Potash	Republic of Congo	Oceanographic and benthic surveys and ecotoxicity trials to assess potential impacts of proposed potash processing discharge, jetty construction and transshipment of product. Invertebrate specialist - collection, preservation and identification of invertebrates.
2012-present	South Africa	Saldanha Bay Water Quality Forum Trust (SBWQMFT)	Annual State of the Bay Monitoring programme (Saldanha and St. Helena Bay). Project Leader and invertebrate specialist - collection, preservation and identification of invertebrates. Rocky shore intertidal surveys. Initiating new data collection and survey programmes. Statistical analyses and writing of report.
2018	South Africa	Council for Geoscience /Department of Mineral Resources	Desktop study of the potential impacts of marine and coastal mining on marine ecosystems and marine biota in South Africa Project Leader and Principal Author.
2018	South Africa	Mainport Africa Shipping	Assessment of Biofouling Community of the NM Cherry Blossom. Project Leader – Supervision of team for project execution. Identify benthic invertebrate macrofauna, statistical analyses and writing of report.
2012-2022	South Africa	Umhlathuze Water	Environmental monitoring of the Richards Bay Pipelines. Senior consultant. Invertebrate specialist.
2016-2017	South Africa	Department of Water and Sanitation	Classification of and resource quality objectives for the water resources of the Berg and Breede water management areas. Senior consultant responsible for status quo descriptions of estuaries in the two study areas and invertebrate specialist for ecological reserve determination studies on nine estuaries.

Date	Country	Client	Task
2016	Namibia	De Beers Marine Namibia/University of Namibia	The use of underwater video footage as a tool in the assessment of mining related impacts on the hard-bottom benthic environment in Southern Namibia Student supervisor for a Masters Project at the University of Namibia – experimental design and development of a method to assess video footage collected aboard the manned submersible, JAGO.
2016	Namibia	De Beers Marine Namibia	Screen monitoring on De Beers Marine Namibia mining vessels in the Atlantic 1 Mining Licence Area: a pilot study. Project Leader – Experimental design and conceptualisation. Development and implementation of screen monitoring protocol of biota aboard mining vessels.
2016	South Africa	Tongaat Hulett Developments	Marine ecology impact assessment for a proposed beach enhancement initiative at Tinley Manor. Intertidal Sandy beach field surveys – collect and preserve invertebrate samples, photographic survey of intertidal and subtidal habitat.
2015	South Africa	Department of Water and Sanitation	Determination of the Ecological Reserve for the Klein Estuary Invertebrate Specialist – collect, preserve and identify invertebrate specimens and assess health of the estuary based on results. Present findings at a workshop.
2015	Mozambique	Bergstan South Africa Consulting and Development Engineers	Environmental scoping study for proposed upgrades to the cruise liner landing facilities at Portuguese Island, Mozambique Project Leader - photographic survey of intertidal and subtidal habitat, data analysis, report write-up.
2015	Namibia	Pisces Environmental Services	Gecko Namibia Vision Industrial Park Development. Conduct baseline field survey of ichthyofauna using beach seine net.
2014-2016	South Africa	Transnet National Ports Authority/Nemai Consulting	Baseline Environmental Monitoring of Sand Banks in the Port of Durban Field survey assistant for the implementation of a water, sediment quality and biological monitoring programme in the Port of Durban.
2014	South Africa	SRK Consulting	Marine Ecology Specialist Study and Impact Assessment for Upgrades to Seawater Intake and Transfer Infrastructure at the Tronox Namakwa Sands Mine Project Leader – photographic survey of rocky shore habitat, data analysis, report write-up.

Date	Country	Client	Task
Bergstam	South Africa	Coastal & Environmental Services	Zirco Roode Heuwel Mine, Northern Cape, South Africa. Marine Specialist Study and Impact Assessment Project Leader - transect and quadrat sampling of rocky shore habitat, data analysis, report write-up.
2014-present	South Africa	Port Nolloth Sea Farms Ranching (PTY) LTD.	Baseline survey and monitoring plan for abalone ranching concession area NC3 Subtidal ecological surveys, scientific diver and supervisor.
2013	South Africa	Cape Nature, Department of Environmental Affairs	Assessment of impacts of an oil spill on sandy beach and rocky intertidal communities in the Goukamma MPA. Invertebrate specialist – collect, preserve and identify invertebrates, train interns at DAFF on identification techniques.
2013	South Africa	Transnet National Ports Authority	TNPA Alien Invasive Species Survey (Coega) Collection, preservation and identification of invertebrates.
2013, 2015-2016	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Diving Surveys of the Eastern Cape Abalone Resource. Subtidal abalone counts (transects)
2012	South Africa	A. R. Brink and Associates	Identification and Age Estimation of Fouling Cirripedia Collected from M. V. "DD Vogue" Project leader. Sample collection and preservation, identification of fouling biota, data analysis and reporting.
2012	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Algoa Bay fin fish mariculture (DAFF) Deployment, recovery and servicing of ADCP's and thermistor strings. Single-beam echo bathymetry survey. Grab sample collection of benthic macrofauna. Preservation and identification of invertebrate fauna.
2012	South Africa	Ethekwini Municipality	Baseline Survey and EIA for Umhlanga Rocks tidal pool. Transect and quadrat sampling of rocky shore habitat.
2012	South Africa	Henwood & Nxumalo Consulting Engineers	Environmental Impact Assessment of Mzinto Bridge Repair. Project Leader - collection, preservation and identification of invertebrates. Statistical analyses and writing of report.
2012	South Africa	Nemai Consulting	Specialist study to assess marine ecological impacts of offshore sand winning associated with the deepening, lengthening and widening of berth 203 to 205, container terminal, Port of Durban. Research and analysis of data, report writing.

Date	Country	Client	Task
2012	South Africa	Cape Action Plan for People & the Environment/ Cape Nature/Marine & Coastal Management	Gouritz Estuary Management Plan Review. Review and evaluate proposed EMP according to the National Estuary Management Protocol. Present findings at a workshop.
2012	Namibia	Pisces Environmental	Annual Rocky intertidal and sandy beach biota of Namibia's Pocket Beaches (NAMDEB Diamond Company, Namibia). Field work, statistical analyses and report writing.
2012	Namibia	Pisces Environmental	Scientific Diver and Supervisor for Bogenfels subtidal reef survey (NAMDEB Diamond Company, Namibia). Field work (identify and quantify subtidal reef species).
2012	South Africa	Cape Action Plan for People & the Environment/ Cape Nature/Marine & Coastal Management	Rapid determination of the Environmental Water Requirements for the Uilkraals Estuary. Identify invertebrate specimens and assess health of the estuary based on results. Present findings at a workshop.
Feb 2012	South Africa	Various companies	Marine specialist report and impact assessment for the reverse osmosis plant at Plettenberg Bay. Fish counts on SCUBA. Collection, preservation and identification of invertebrates. Statistical analyses and writing of report.

PUBLICATION RECORD

- Amoré Malan, Aiden Biccard, Jessica Dawson, Robyn Payne, Kevin Schmidt, Kirti N. Gihwala, Ken Hutchings, Deon Louw, Josef Shikeva, Blessing Kamwi, Lapaka Kaimbi, Julien Vumazonke, Megameno Mutaleni, Thomas Shannon, Sarah Chordekar & Vere Ross-Gillespie. (2025). Diversity, distribution and knowledge gaps of Polychaeta on the continental shelf of southern Namibia. *African Zoology*, 60(1–2), 163–178. <https://doi.org/10.1080/15627020.2024.2349648>
- Sedick S, Clarke D, Biccard A & K Gihwala. (2023). A new species of Ninoe (Annelida: Lumbrineridae) from the continental shelf off southern Namibia. *Journal of the Marine Biological Association of the United Kingdom*, 103, E25. doi:10.1017/S0025315423000152.
- Pfaff MC, Biccard A, Mvula PE, Olbers J, Mushanganyisi K, Macdonald A, Samaai T. (2022). Giants and titans: first records of the invasive acorn barnacles *Megabalanus tintinnabulum* (Linnaeus, 1758) and *Megabalanus coccopoma* (Darwin, 1854) on intertidal rocky shores of South Africa. *BioInvasions Records*. 11(3): 721–737, <https://doi.org/10.3391/bir.2022.11.3.14>
- Biccard, A. and Griffiths, C.L. (2016). Additions to the barnacle (Crustacea: Cirripedia) fauna of South Africa. *African Zoology* 51, 99-116.

- Whitehead O, Biccard A & Griffiths CL. (2011). South African pelagic goose barnacles: substratum preferences and influence of plastic debris on abundance and distribution. *Crustaceana* 84 (5-6), 635-649.
- Biccard A & Midgley JJ. (2009). Rodent pollination in *Protea nana*. *South African Journal of Botany* 75, 720– 725.

THESES

- Biccard, A. 2012. Taxonomy, Systematics and Biogeography of South African Thoracic Cirripedia. MSc. Thesis, University of Cape Town, 160 pp.

CONSULTING RESEARCH REPORTS

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UNIVERSITY OF CAPE TOWN

we certify that

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Doctor of Philosophy

on 14 December 2005

for a thesis entitled:

"Taxonomy, biology and management of South African Sciaenid
fish of the genus *Umbrina*"

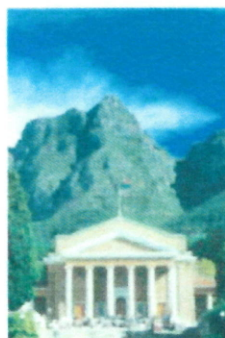
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Vice-Chancellor





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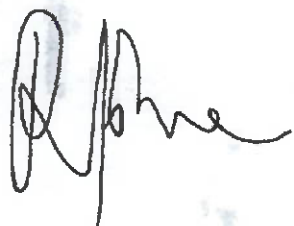
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South-Western Cape, South Africa**

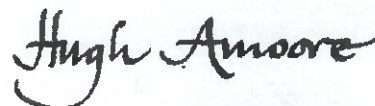
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UNIVERSITY OF BERGEN

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Lily Bovim

born on 3 October 1992 in Porto Vecchio (France)

the Academic Degree of

International Master of Marine Biological Resources — Main Subject Management of Living Marine Resources

obtained magna cum laude
(met grote onderscheiding)

The holder of this degree can use the title of Master of Science (MSc). This degree corresponds to level 7 of the Flemish Qualifications Structure, as laid down in the Decree of 30 April 2009 concerning the Qualifications Structure, and to level 7 of the European Qualifications Framework for Lifelong Learning.

This joint academic training programme is organised on an interuniversity level by: Universiteit Gent (*Ghent University*, Belgium), Instituut Technolochta Na Gaillimhe-Maigh Eo (*Galway-Mayo Institute of Technology*, Ireland), Sorbonne Université (France), Universidad de Oviedo (*University of Oviedo*, Spain), Universidad del País Vasco / Euskal Herriko Unibertsitatea UPV/EHU (*University of the Basque Country*, Spain), Universidade do Algarve (*University of Algarve*, Portugal), Universitet i Bergen (*University of Bergen*, Norway), Università Politecnica delle Marche (*Italy*) and Université de Brest (*Université de Bretagne Occidentale*) (France).

The diploma is given and this programme is accredited in accordance with the Higher Education Code dated 11 October 2013, ratified by the Decree dated 20 December 2013. The joint awarding of the diploma by the institutes involved is made to take place in due compliance with article II.172§3 of said code.

The curriculum of this programme amounts to 120 credits.

Issued in Ghent, 11 September 2020

Del. Rik

Prof. Dr. Rik Van de Walle,
Rector Universiteit Gent

Dr. Orla Flynn

President Instituut Technolochta Na Gaillimhe-Maigh Eo

Prof. Dr. Jean Chambaz,

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Prof. Dr. Santiago García Granda,

Rector Universidad de Oviedo

on behalf of His Majesty Felipe VI, King of Spain

Paulo Águas

Prof. Dr. Paulo Águas,

Rector Universidade do Algarve

Prof. Dr. Gian Luigi Agnori,

Rector Università Politecnica delle Marche

Mr. Matthieu Gallou

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Rector University of Bergen

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on behalf of His Majesty Felipe VI, King of Spain
which was examined by me and that, from my observation the original has not been altered in any manner
Handwritten Signature

SUID-AFRIKAANSE POLISENTER
COMMUNITY SERVICE CENTRE
MUTZEMBERG
09 OCT 2024
SOUTH AFRICAN POLICE SERVICE

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We certify that

Aiden Biccard

was admitted to the degree of

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specialising in Zoology*

on 12 December 2012

Vice-Chancellor



Registrar

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4.06.2024

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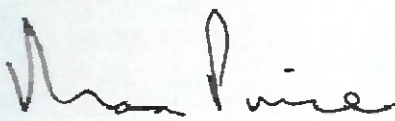
*Master of Science
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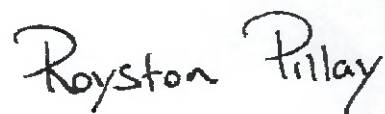
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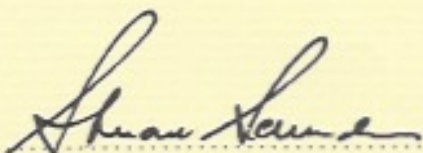


UNIVERSITY OF CAPE TOWN

with which is incorporated the South African College

Degree of Master of Arts

We hereby certify that JOHN GRIBBLE
was admitted to the Degree of Master of Arts in ARCHAEOLOGY
ON 29 JUNE 1990.



Vice-Chancellor



Registrar

BASIC ASSESSMENT PROCESS FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 11C BY TRANS ATLANTIC DIAMONDS (PTY) LTD

Trans Atlantic Diamonds (Pty) Ltd
Office 1603 Portside
4 Bree Street
Cape Town, Western Cape, 8001

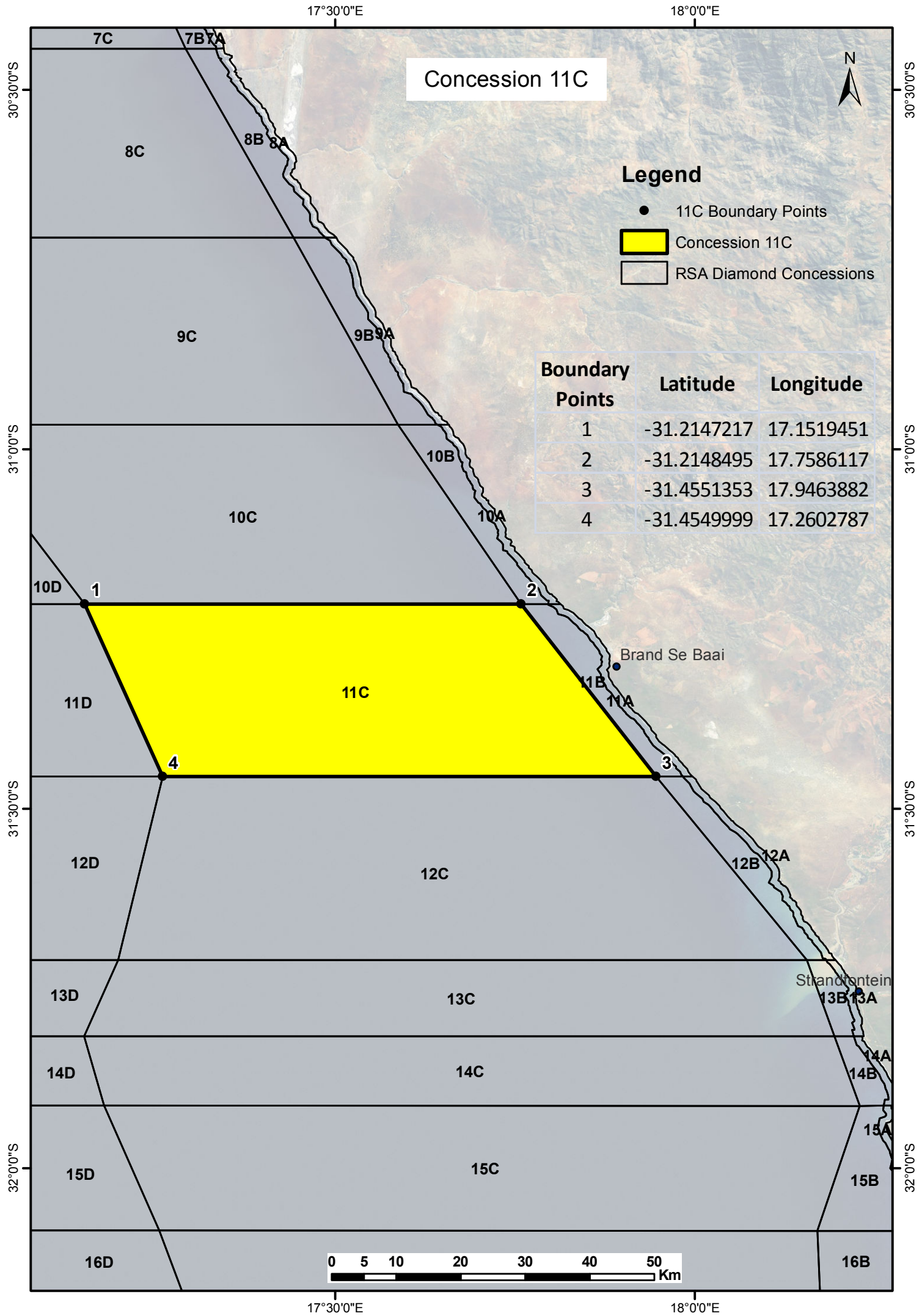


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Appendix 2: Site map with co-ordinates

Anchor Environmental Consultants
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www.anchorenvironmental.co.za





BASIC ASSESSMENT PROCESS FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 11C BY TRANS ATLANTIC DIAMONDS (PTY) LTD

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Appendix 3: Motivation for no other alternatives

Anchor Environmental Consultants
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www.anchorenvironmental.co.za



1 MOTIVATION FOR NO OTHER ALTERNATIVES

Trans Atlantic Diamonds (Pty) Ltd has applied for a right to prospect for diamonds in Sea Area Concession 11C in terms of the Mineral and Petroleum Resources Development Act, 2002, subject to environmental Authorisation. The concession holder does not have the right to prospect in any other areas. No alternative sites were therefore considered in this Basic Assessment Process. In addition, the concession area is targeted as it is known to contain kimberlite pipes which is a source of diamonds and other mineral deposits.

Kimberlite pipes are believed to have formed by high-pressure and deep-rooted volcanic eruptions. They are igneous intrusions or “pipes” projecting through the Earth’s crust and a major source of diamonds and other minerals such as rutile, zircon, garnets, ilmenite and magnetite (Gurney et al. 1991; Penney et al. 2007). These pipes transport the diamonds and minerals from the upper mantle to the surface of the Earth. These deposits were then further transported by means of erosion, wind, rain and rivers and deposited primarily in the sea in gravel terraces along riverbanks and on the coast. The Orange and Olifants rivers are believed to be the major westward transport mechanisms responsible for the deposition of diamondiferous sediments along west coast of South Africa and southern Namibia (Gurney et al. 1991; Penney et al. 2007). With the influence of currents, swell and tidal action, diamonds gradually accumulated on gravel beaches along the coast (Penney et al. 2007). Today, these deposits extend from the coast down to 150 m depth (approximately 50–60 km offshore) where they are found in gullies and potholes which have been covered with sediment over time. It is this marine diamondiferous gravel which is of interest to the modern marine diamond mining industry (Penney et al. 2007).

With the Benguela region being rich in diamond, mineral and other deposits, the former Department of Minerals and Energy (now the Department of Mineral Resources and Energy — DMRE) established designated mineral sea concession areas in 1994, extending from Saldanha Bay to the Orange River mouth on the west coast of South Africa. Prospecting and mining activities are only permitted by individuals that are in possession of a mining or prospecting right, and only within specially designated areas that allow the industry, the trade of commodities, the associated activities and potential impacts, environmental management and the responsible extraction of minerals, to be monitored. Companies can apply for prospecting and/ or mining rights within concession areas for which rights are available. As this is a competitive industry, few concession areas are available at any given time. Although several alternative concession areas were considered by the applicant, the prospecting and mining rights for many of these were already held by other companies.

As the intention of the proposed prospecting activity is to determine the presence of diamondiferous, gemstone, mineral and metal deposits, and to ensure that they are present in quantities that will be economically viable to mine, it is important that a site known to be rich in resources, is selected. As such, few location alternatives exist. Results from prospecting and mining operations conducted within the neighbouring concession areas have indicated that the area is rich in mineral deposits. The study area is therefore expected to have similar resources. In addition, the preferred site contains palaeo-beach deposits which are known from prospecting and mining in other concession areas, to contain diamondiferous gravels.

It is important to note that the exact location of the core and drill sites will only be confirmed after the completion of the seismic surveys. Buffers will be applied around reef areas and areas of conservation concern. The final site layout plan is thus subject to change.

**BASIC ASSESSMENT PROCESS FOR THE PROPOSED
PROSPECTING IN SEA CONCESSION AREA 11C BY TRANS
ATLANTIC DIAMONDS (PTY) LTD**

Trans Atlantic Diamonds (Pty) Ltd
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TRANS ATLANTIC
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Appendix 4:
Marine Specialist Study

Anchor Environmental Consultants
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MARINE SPECIALIST IMPACT ASSESSMENT FOR PROSPECTING ACTIVITIES IN SOUTH AFRICAN SEA AREA 11C

BASIC ASSESSMENT REPORT FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 11C BY
TRANS ATLANTIC DIAMONDS (PTY) LTD

EA Application Ref. No.: WC30/5/1/1/2/10522 PR



April 2026

MARINE SPECIALIST IMPACT ASSESSMENT FOR PROSPECTING ACTIVITIES IN SOUTH AFRICAN SEA AREA 11C

2026

Report prepared for:

Trans Atlantic Diamonds (Pty) Ltd

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Cape Town, Western Cape, 8001



TRANS ATLANTIC
DIAMONDS

by:

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Authors: Adam Rees, Kenneth Hutchings, Lily Bovim, Aiden Biccard, Kevin Schmidt and Barry Clark

Citation: Rees A, Hutchings K, Bovim LA, Biccard A, Schmidt K & Clark B. 2026. Marine Specialist Impact Assessment for Prospecting Activities in South African Sea Area 11C. Specialist Report no. 2348/7 prepared by Anchor Environmental (Pty) Ltd for Trans Atlantic Diamonds (Pty) Ltd. 68 pp.

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EXECUTIVE SUMMARY

Preface

This report was first published in 2022 under Environmental Authorisation (EA) Application Ref. No.: WC30/5/1/1/2/10384 PR. As the PR was not renewed within the prescribed timeline, a resubmission application was submitted to the Department of Mineral and Petroleum Resources (DMPR) in December 2025. This required a new Basic Assessment (BA) Process and circulation of updated reports (where relevant) during a new Public Participation Process (PPP). Sections of this draft report were then updated in March 2026 to reflect revised specialist information and other contextual details. These revisions did not alter the impact assessment, study findings, or overall conclusions. The March 2026 update preceded the PPP (held between 19 March to 23:59 on 20 April 2026), which occurred as part of the BA process under which this study falls. Comments received from Interested and Affected Parties (I&APs) during this period were then addressed, and used to inform necessary revisions to this report (where relevant), with this report thus being the final version to be submitted to the authorities for decision-making.

A note on document interpretation: To facilitate easy interpretation of this updated document—and to indicate where changes have been made in this final report since the March 2026 draft report—all significant alterations/updates have been highlighted in blue.

Introduction

Trans Atlantic Diamonds (Pty) Ltd (TAD) was granted EA and Prospecting Rights (PR) in 2022 for the prospecting of diamonds, gemstones, heavy and industrial minerals, and ferrous, base and precious metals within offshore Sea Concession Area 11C (EA Application Ref. No.: WC30/5/1/1/2/10384 PR). In terms of the NEMA Environmental Impact Assessment (EIA) Regulations (2014), the potential environmental impacts of the proposed prospecting activities must be assessed through a BA process, which includes specialist studies evaluating impacts on various environmental receptors (e.g. marine ecology and fisheries).

Anchor Environmental Consultants (Pty) Ltd was appointed to undertake a Marine and Fisheries Specialist Study for Trans Atlantic Diamonds (Pty) Ltd in 2021–2022 as part of the original Prospecting Right application for Concession Area 11C, and again to update the study, where relevant, for the current application. This final report has been revised taking into account comments received during the public participation process.

Project Description

Sea Concession area 11C is located approximately 4 to 5km offshore of the Western Cape Coast, about 40 km north of Strandfontein (Figure 1). The concession covers an area of approximately 164 023 ha with its furthest boundary at the 200 m isobath.

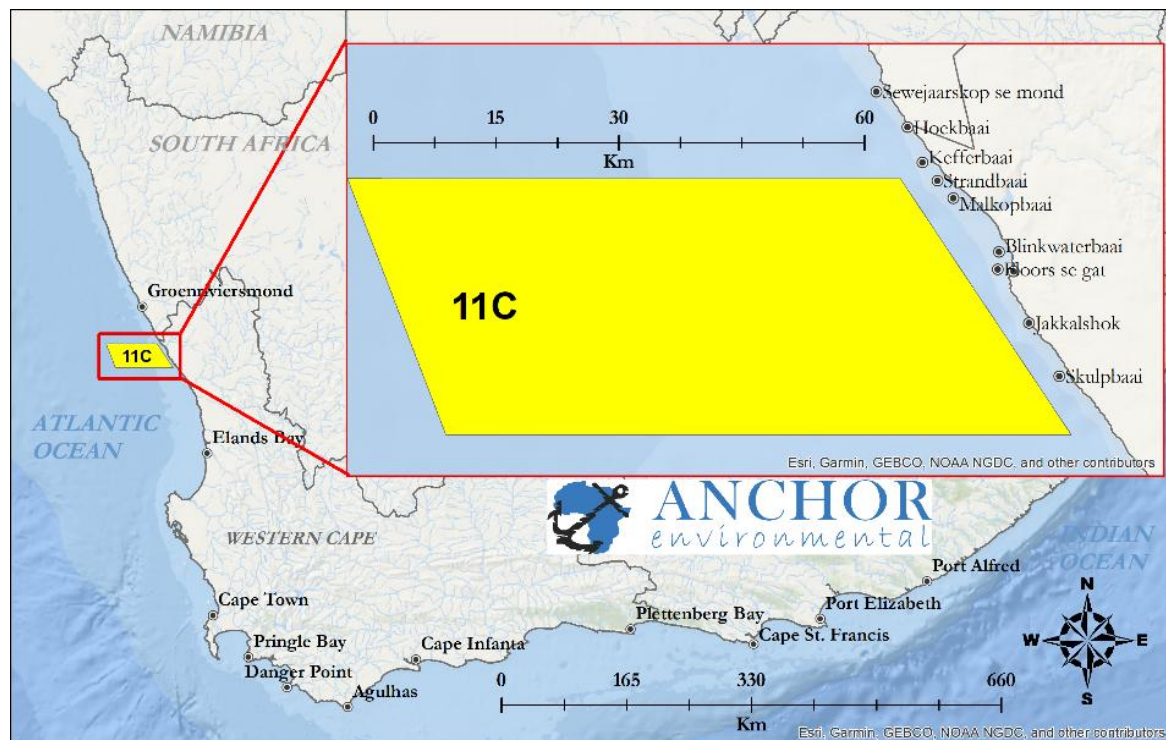


Figure 1. The location of Concession Area 11C along the West Coast.

Proposed activities include geophysical exploration and sampling/prospecting to detect the presence of palaeo-beach deposits at different submerged sea levels that occur in Concession Area 11C, which are known from other concessions to contain diamondiferous gravels.

Acoustic surveying will be conducted using a dedicated survey vessel with a hull-mounted MBES (high frequency range) and Topas sub-bottom profiler (SBP) system (mid-frequency range) collecting high-resolution acoustic data. **Geophysical surveying will be undertaken along survey lines spaced 100 m to 1000 m apart across select sections throughout the concession area.** Sampling will be undertaken in targeted areas identified through the analysis of the acoustic survey data. Four potential methods of collecting geophysical samples from the seabed are being considered. A Van Veen grab with a sampling capacity of approximately 50 kg will be used to collect baseline environmental data on sediment and benthic macrofauna at 20-50 sites. Geotechnical samples to assist in understanding the sea floor geology and resource evaluation will be collected at 100-200 sites using either vibracoring, gravity coring or sonic coring. In addition to the above prospective targets will be analysed by a uniquely designed drill tool that can dredge gravel from the seabed. Pending the final tool design, the drill bit footprint will be between 3 and 5 m² with an expected average hole depth of 3 m. Sample volumes are anticipated to be in the range of 9 to 15 m³ per sample. An estimated total of 300 samples spaced at roughly 300 m apart from north to south will be required. Material from drill sampling will be processed onboard and tailings will be discarded overboard, thereby causing sediment plumes, in this instance as a near-shore deposit.

Report content, Impact Assessment and Mitigation Measures

A description of the affected environment is provided. Habitat and biota of conservation importance were identified and mapped in relation to the proposed survey area. The likelihood

of occurrence of affected marine fauna within the proposed survey area was ascertained from available literature. Important user groups such as fisheries are described and mapped in relation to the proposed survey area. Potential impacts from the proposed exploration and prospecting activities were identified. Impacts were assessed and, where possible, mitigation measures have been identified to avoid/minimise/reduce any impacts.

Assessment of potential impacts associated with the proposed activities range from medium to insignificant but with effective mitigation these are all reduced to very low, low or insignificant (see Summary Table below).

The potential impact of most concern that was assessed as MEDIUM negative significance prior to mitigation was seismic (acoustic) disturbance to marine mammals. It is known that migrating humpback and southern right whales are frequently encountered on the west coast of southern Africa and encounters with odontocetes such as dusky dolphins and Heaviside's dolphin (listed as Near Threatened on the IUCN Red List) are likely throughout the year. Furthermore, humpback calves are vulnerable during the southern migration which takes place during the months of September and October. Of the proposed seismic survey activities, the Topas sub-bottom profiler system which uses shallow (35-45 kHz) and medium penetration (1-10 kHz) "Chirp" seismic pulses to map the sediment horizon could present a risk to dusky and Heaviside's dolphins. These species are regarded as mid-frequency cetaceans that could be at risk during the proposed seismic survey. Effective implementation of mitigation measures should ensure that potential impacts on marine mammals arising from the proposed seismic survey activities in Concession Area 11C would be reduced to LOW significance.

Summary table of potential marine ecological and fisheries impacts associated with offshore diamond exploration activities (seismic survey and sampling/prospecting) in South African Sea Area Concession Area 11C.

Impact	Mitigation	Consequence	Probability	Significance	Status	Confidence
Seismic disturbance to plankton	No mitigation	Very Low 3	Possible	INSIGNIFICANT	-ve	Medium
Seismic disturbance to invertebrates	No mitigation	Very low	Possible	INSIGNIFICANT	-ve	Medium
Seismic disturbance to fish	No mitigation	Very low	Possible	INSIGNIFICANT	-ve	Medium
Seismic disturbance to marine mammals	No mitigation	Medium	Probable	MEDIUM	-ve	Medium
	With mitigation	Medium	Improbable	LOW	-ve	Medium
Seismic disturbance to seabirds	No mitigation	Low	Probable	LOW	-ve	Medium
	With mitigation	Low	Improbable	VERY LOW	-ve	Medium
Seismic disturbance to turtles	No mitigation	Very low	Improbable	INSIGNIFICANT	-ve	Medium
Impact of drilling on marine fauna	No mitigation	Very low	Possible	INSIGNIFICANT	-ve	Medium
	No mitigation	Low	Possible	VERY LOW	-ve	High

Impact	Mitigation	Consequence	Probability	Significance	Status	Confidence
Marine megafauna collisions with survey vessels	With mitigation	Very low	Improbable	INSIGNIFICANT	-ve	High
Offshore based seabed sampling and tailings disposal	No mitigation	Medium	Definite	MEDIUM	-ve	High
	With mitigation	Low	Definite	LOW	-ve	High
Fine sediment plumes	No mitigation	Very low	Definite	VERY LOW	-ve	High
Artificial light at night from vessels	No mitigation	Low	Probable	LOW	-ve	High
	With mitigation	Low	Possible	VERY LOW	-ve	High
Waste discharges during vessel operations	No mitigation	Very low	Probable	VERY LOW	-ve	High
	With mitigation	Very low	Improbable	INSIGNIFICANT	-ve	High
Impact on fisheries	No mitigation (see best practice recommendations)	Very Low	Possible	INSIGNIFICANT	-ve	High
Cumulative impacts of 'medium' significance	No mitigation	High	Probable	HIGH	-ve	Low
	With mitigation	High	Possible	MEDIUM	-ve	Low
Cumulative impacts of 'insignificant' significance	No mitigation	Low	Possible	VERY LOW	+ve	Low

Temporary exclusion of fishing vessels from the concession area during seismic survey and sampling/prospecting activities is also of potential concern. However, there are very low levels of historical fishing catch and effort reported by the potentially affected small pelagic, tuna pole and longline sectors in the 11C concession area. Furthermore, the remote, offshore location of the 11C concession area along with the INSIGNIFICANT rating for potential seismic impacts on fish that may be migrating through the concession area, means that impacts on local small-scale fisherman due to prospecting in this concession area are improbable. Overall, the potential impacts on fisheries are assessed to be INSIGNIFICANT.

Offshore reef habitat is expected to be encountered in Concession Area 11C. These offshore rocky reefs are colonised by a range of epifauna including bryozoans, encrusting and upright sponges, solitary and colonial ascidians, sea anemones and cold-water coral colonies – the latter being slow-growing and taking many years to become established. These reefs are considered sensitive habitat and may be directly impacted should prospecting indicate economically viable resources and the project proceeds to production phase. However, at the prospecting phase potential direct impacts on reefs due to core and grab sampling are rated LOW negative significance and indirect impacts by smothering from tailings disposal as VERY LOW negative significance.

Mitigation measures recommended to reduce the severity of the potential impacts associated with the proposed prospecting in Concession Area 11C are summarised below.

Essential mitigation measures:

- Designated onboard Marine Mammal and Seabird Observers (MMSOs) to ensure compliance with mitigation measures during geophysical surveying, in line with the JNCC guidelines.
- MMSOs to conduct pre-survey visual scans of at least 30 minutes for the presence of cetaceans, feeding seabirds and marine turtles around the survey vessel prior to the initiation of any acoustic impulses
- “Soft starts” should be carried out for equipment with source levels greater than 210 dB re 1 μ Pa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the vicinity. Where this is not possible, the equipment should be turned on and off over a 20-minute period to act as a warning signal and allow cetaceans to move away from the sound source.
- Terminate the survey if any marine mammals, seabirds or turtles show affected behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area.
- Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November) and ensure that migration paths are not blocked by sonar operations.
- Ensure that Passive Acoustic Monitoring (PAM) for detection of cetaceans is incorporated into any survey programme.
- Record incidences of encounters with marine life (mammals, seabirds, turtles, seals, fish) their behaviour and response to seismic survey activity. Ensure that MMSOs compile a survey close-out report incorporating all recorded data to the relevant DFFE authorities.
- Vessel transit speed to not exceed 12 knots (22 km/hr), except within 25 km of the coast where it should be kept to less than 10 knots (18 km/hr) as well as when sensitive marine fauna are present in the vicinity.
- Reduce the lighting to a minimum compatible with safe operations whenever and wherever possible to reduce nocturnal faunal attraction.
- Position light sources, if possible and consistent with safe working practices, in places where emissions to the surrounding environment can be minimised i.e., aim lighting downward rather than out to sea.
- Plan procedures for how to care for downed seabirds and ensure that personnel are adequately trained in this regard.
- Monitor the presence of seabirds and identify mortalities, even when birds do not land on the vessel, especially in foggy conditions and at night.
- Report ringed/banded birds to the appropriate ringing/banding scheme (details are provided on the ring).
- Inform & empower all staff about sensitive marine species & suitable disposal of waste;
- Ensure compliance with relevant MARPOL standards;

- A Shipboard Oil Pollution Emergency Plan (SOPEP) must be prepared for all vessels and should be in place at all times during operations;
- Deck drainage should be routed to a separate drainage system (oily water catchment system) for treatment to ensure compliance with MARPOL (15 ppm);
- All hydraulic systems should be adequately maintained and hydraulic hoses should be frequently inspected; and
- Spill management training and awareness should be provided to crew members of the need for thorough cleaning-up of any spillages immediately after they occur in order to minimise the volume of contaminants washing off decks.

Best Practice Mitigation (Recommended):

- Planning and management of potential discharges to ensure that tailings are not discarded onto potentially sensitive habitats.
- MMSOs /PAM operators to undertake similar methods as stated above for seismic surveys, i.e. to undertake pre-drilling visual scans. Once drilling can go ahead, soft starts must be employed.
- The quietest drilling method possible must be employed.
- Drilling must be kept to a minimum.
- When planning where to undertake seabed sampling, sites outside of CBA: Natural areas, EBSAs and otherwise previously identified sensitive habitats must be prioritised. If these cannot be avoided then areas identified by geophysical surveys as potentially less sensitive should first be assessed by camera/ROV before sediment sampling takes place. Sensitive areas should be considered as a last resort.
- Offshore reefs within Concession Area 11C should be visually assessed (by means of drop camera deployments or remotely operated underwater vehicle) during the baseline environmental survey with regular repeat surveys following mining operations in the area.
- Information gathered during all seabed sampling, reef identification and seabed video/camera assessments must be made available to the South African government (DFFE) and SANBI to inform future Marine Spatial Planning and confirmation of CBA status.
- Develop a waste management plan using waste hierarchy;
- All process areas should be bunded to ensure drainage water flows into the closed drainage system;
- Drip trays should be used to collect run-off from equipment that is not contained within bunded areas and the contents routed to the closed drainage system;
- Low-toxicity biodegradable detergents should be used in the cleaning of all deck spillages;
- Prior to survey commencement, key stakeholders (Potentially affected Fishing Industry Associations, organs of state and neighbouring concession holders) should be consulted and informed of the proposed survey activity and the likely implications thereof.

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GLOSSARY

Amphipod/a: Crustaceans with no carapace and a laterally compressed body

Anthropogenic: Environmental pollution originating from human activity

Baseline: Information gathered at the beginning of a study which describes the environment prior to development of a project and against which predicted changes (impacts) are measured.

Benthic/benthos: The ecological region at the lowest level of a body of water such as an ocean, lake, or stream, including the sediment surface and some sub-surface layers. Pertaining to the environment inhabited by organisms living on or in the ocean bottom

Biodiversity: The variability among living organisms from all terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems.

Biomass: The mass of living biological organisms in a given area or ecosystem.

Biota: Living organisms within a habitat or region

Bryozoan: A sedentary aquatic invertebrate of the phylum Bryozoa, which comprises the moss animals.

Chlorophyll a: A green pigment, present in all green plants (including algae) and cyanobacteria, which is responsible for the absorption of light to provide energy for photosynthesis.

Community composition: The number of species in that community and their relative numbers.

Community: In ecology, a community is a group or association of populations of two or more different species occupying the same geographical area and in a particular time.

Crustacea/n: Generally differ from other arthropods in having two pairs of appendages (antennules and antennae) in front of the mouth and paired appendages near the mouth that function as jaws.

Cumulative impacts: Direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors.

Diatoms: A type of phytoplankton group that form a silica-based cell wall.

Dinoflagellate: A type of flagellate phytoplankton. Some produce toxins that can accumulate in shellfish, resulting in poisoning when eaten.

Ecological function: The potential of an ecosystem to deliver a service that is itself dependent on ecological processes and structures.

Ecology: The relations of organisms to one another and to their physical surroundings.

Environment: The external circumstances, conditions and objects that affect the existence of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.

Faunal community: A naturally occurring group of native animals that interact in a unique habitat.

Filter feeding: (Of an aquatic animal) feeding by filtering out plankton or nutrients suspended in the water.

Geomorphology/ical: Relating to the physical features of the surface of the earth and their relation to its geological structures.

Impact: A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.

Important Bird and Biodiversity Area: An area identified using an internationally agreed set of criteria as being globally important for the conservation of bird populations.

Invertebrate: An animal without a backbone (e.g. a starfish, crab, or worm)

Isopod/a: An order of freshwater, marine, or terrestrial crustaceans of the order or suborder Isopoda, with seven pairs of legs and a dorsoventrally flattened body.

Macrofauna: Animals larger than 0.5 mm.

Macrophyte: An aquatic plant large enough to be seen by the naked eye.

Mean Sea Level: An average level of the surface of the oceans from which heights such as elevation may be measured. MSL is a type of vertical datum (a standardised geodetic datum).

Megafauna: Large marine species such as sharks, rays, marine mammals and turtles. These animals are key components of marine ecosystems but, as they are long-lived and have low reproductive rates, their populations are usually the first to be reduced by human pressures.

Mitigation measures: Design or management measures that are intended to minimise or enhance an impact, depending on the desired effect. These measures are ideally incorporated into a design at an early stage.

Mollusc/a: Invertebrate with a soft unsegmented body and often a shell, secreted by the mantle.

Operational phase: The stage of the works following the Construction Phase, during which the development will function or be used as anticipated in the Environmental Authorisation.

Physico-chemical: Dependent on the joint action of both physical and chemical processes.

Phytoplankton: Ocean dwelling microalgae that contain chlorophyll and require sunlight in order to live and grow.

Plankton: Organisms drifting in oceans, seas, and bodies of fresh water. The word zooplankton is derived from the Greek zoon, meaning "animal", and planktos, meaning "wanderer" or "drifter". Typically comprised of phytoplankton and zooplankton, as well as the eggs, larvae and juveniles of larger animals.

Polychaete/a: Also known as the bristle worms. A paraphyletic class of annelid worms, generally marine. Each body segment has a pair of fleshy protrusions called parapodia that bear many bristles, called chaetae, which are made of chitin.

Specialist study: A study into a particular aspect of the environment, undertaken by an expert in that discipline.

Species richness: The number of different species represented in an ecological community. It is simply a count of species and does not take into account the abundance of species.

Species: A category of biological classification ranking immediately below the genus, grouping related organisms. A species is identified by a two-part name; the name of the genus followed by a Latin or Latinised un-capitalised noun.

ABBREVIATIONS AND ACRONYMS

Anchor	Anchor Environmental Consultants (Pty) Ltd.
BCS	Benguela Current System
CBD	Convention on Biological Diversity
CPUE	Catch per unit effort
DFFE	Department of Forestry, Fisheries and the Environment (formerly DEFF and DAFF)
DIN	Dissolved Inorganic Nitrogen
DMR	Department of Mineral Resources
DO	Dissolved Oxygen
EBSA	Ecologically or Biologically Significant Area
FLO	Fisheries Liaison Officer
IBA	Important Bird and Biodiversity Area
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature
LMP	Linefish Management Protocol
MARPOL	The International Convention for the Prevention of Pollution from Ships
MBES	Multi Beam Echo Sounder
MMI	Marine Mammal Institute
MMO	Marine Mammal Observer
MMSO	Marine Mammal and Seabird Observer
MPA	Marine Protected Area
MSL	Mean Sea Level
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act No. 107 of 1998, as amended
OMP	Operational Management Plan
PAM	Passive Acoustic Monitoring
PNE	Protected Natural Environment
PTS	Permanent threshold shift
ROV	Remotely Operated Vehicle
RQO	Resource Quality Objectives
SADCO	Southern African Data Centre for Oceanography
SAMLMA	South African Marine Linefish Management Association
SAMSA	South African Maritime Safety Authority
SANBI	South African National Biodiversity Institute
SAPFIA	South African Pelagic Fishing Industry Association
SBP	Sub-bottom profiler
SOPEP	Shipboard Oil Pollution Emergency Plan
TAC	Total allowable catch
TAD	Trans Atlantic Diamonds (Pty) Ltd
TAE	Total Allowable Effort
TSS	Total Suspended Solids
TTS	Temporary threshold shift
VHF	Very High Frequency

I INTRODUCTION

I.1 BACKGROUND

Trans Atlantic Diamonds (Pty) Ltd (TAD) was originally granted Environmental Authorisation (EA) and Prospecting Rights (PR) in 2022 for the prospecting of diamonds, gemstones, heavy and industrial minerals, and ferrous, base and precious metals within offshore Sea Concession Area 11C (EA Application Ref. No.: WC30/5/1/1/2/10384 PR).

Concession Area 11C (approximately 164 023 ha in extent) is located offshore along the Western Cape coast, extending from just south of Hoekbaai to just north of Baai Vals, approximately 40 km north of Strandfontein (Figure 1.1). The inshore boundary lies about 4–5 km from the coast, while the outer boundary extends to the 200 m isobath.

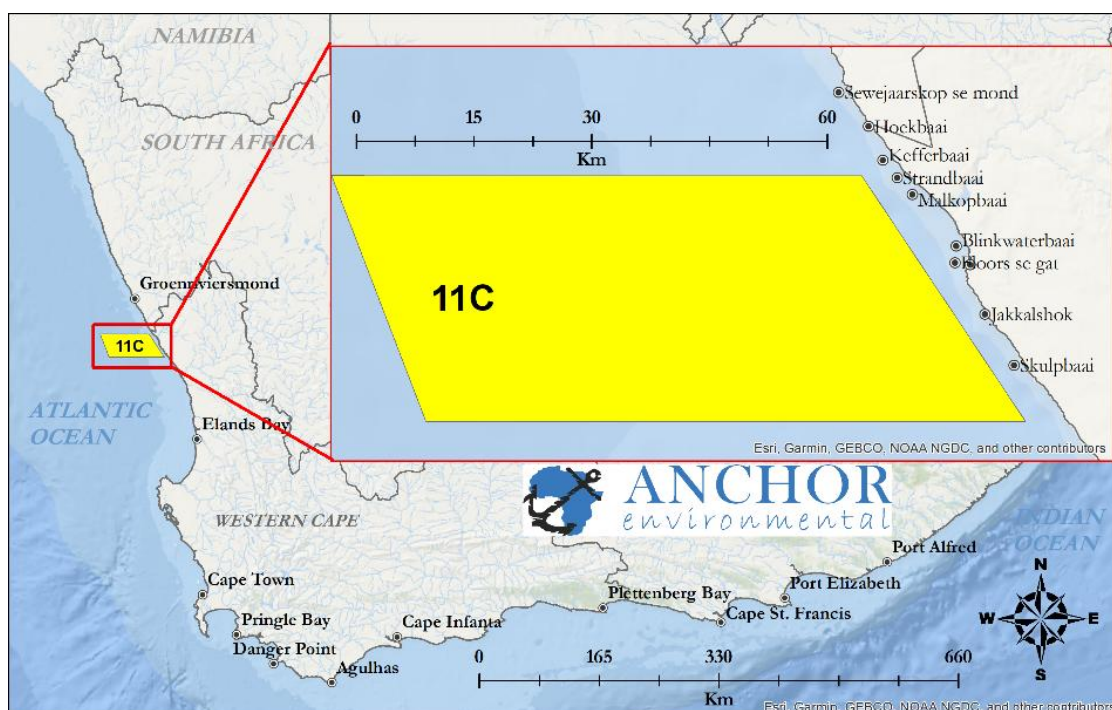


Figure 1.1. The location of Concession Area 11C along the West Coast.

As the PR was not renewed within the prescribed timeframe, the EA and PR lapsed and TAD was required to reapply for EA and PR. A new application was subsequently submitted in December 2025 (Ref. No. WC30/5/1/1/2/10522 PR) to the Department of Mineral and Petroleum Resources (DMPR) in terms of the National Environmental Management Act (NEMA: Act No. 107 of 1998) and the Mineral and Petroleum Resources Development Act (MPRDA; Act No. 28 of 2002). In terms of the NEMA Environmental Impact Assessment (EIA) Regulations (2014), the potential environmental impacts of the proposed prospecting activities must be assessed through a Basic Assessment (BA) process, which includes specialist studies evaluating impacts on various environmental receptors (e.g. marine ecology and fisheries).

Anchor Environmental Consultants (Pty) Ltd (Anchor) was appointed as the Environmental Assessment Practitioner (EAP) to undertake the required Basic Assessment (BA) process and to support TAD with the original application in 2021/2022, and again for the re-application in 2026. Anchor was further appointed to undertake a Marine and Fisheries Specialist Study for Trans Atlantic Diamonds (Pty) Ltd in 2022 (Hutchings et al. 2022) as part of the original Prospecting Right application for Concession Area 11C, and again to update the study, where relevant, for the current application.

This final Marine Specialist Impact Assessment report has been revised taking into account comments received during the public participation process. In addition, this iteration of the report includes updates to the description of the affected environment, including sections on biogeography reflecting more recent ecosystem classifications, updates to species IUCN Red List status that have occurred since the last report, updates due to the new National Biodiversity Assessment 2025, new maps of Marine Protected Areas, Ecological and Biologically Significant Areas, and Critical Biodiversity Areas. The sections on the local fisheries have also been updated to reflect the most recent available data—first in March 2026, and subsequently in April 2026 (following the public participation process).

I.2 TERMS OF REFERENCE

This Marine Specialist Study was required to identify and assess potential impacts that the proposed prospecting activities could have on the marine environment and other user groups. The Terms of Reference included requirements for the following:

- A project description adequate for the purposes of the marine impact assessment study;
- A description of the marine ecology within and surrounding the affected area;
- The identification and description of potentially sensitive habitats and species receptors of impacts (e.g. endangered, threatened and protected species, important feeding, breeding or migration routes, sensitive habitats, etc.);
- The identification of other user groups and potential user conflict based on area of overlap and regional importance of the concession area (including fisheries, commercial and recreational vessel traffic, other marine mining activities);
- The identification of potential direct, indirect and cumulative impacts resulting from the proposed prospecting activities;
- An assessment of identified impacts using an objective, and consistent methodology that meets the National South African legislative requirements (National Environmental Management Act No. 107 of 1998, as amended); and
- The identification of mitigation measures to avoid/minimise/reduce impacts and enhance benefits.

1.3 DIAMOND MINING IN SOUTH AFRICA

Diamond-mining concession areas in South Africa are grouped into three categories: Land, Surf-Zone and Marine (offshore) Concession Areas (Figure 1.2) (Clark et al. 1999, Penney et al. 2007). The Land and Surf-Zone concessions areas are considered as “onshore mining” operations with mines located between the Orange River mouth and slightly south of the Olifants River in South Africa. Marine Concession Areas are those allocated offshore and extend southwards from the border of Namibia to an area just south of Saldanha Bay (Clark et al. 1999). These concession areas are further divided into four sub-areas (Figure 1.2 and Figure 1.3): the A concession extends 31.5 m west of the low-water mark to 1 000 m west of the high water mark, the B concession extends from this boundary to 5 000 m west of the high water mark offshore from the western boundary of A, the C concession extends westward of this point to the 200 m isobaths, and the D concession extends offshore to the 500 m isobath. Diamond mining concession areas in South Africa were mapped according to their licence (Figure 1.3). The exploration, prospecting and mining rights allocations are indicated in the inset map in Figure 1.3.

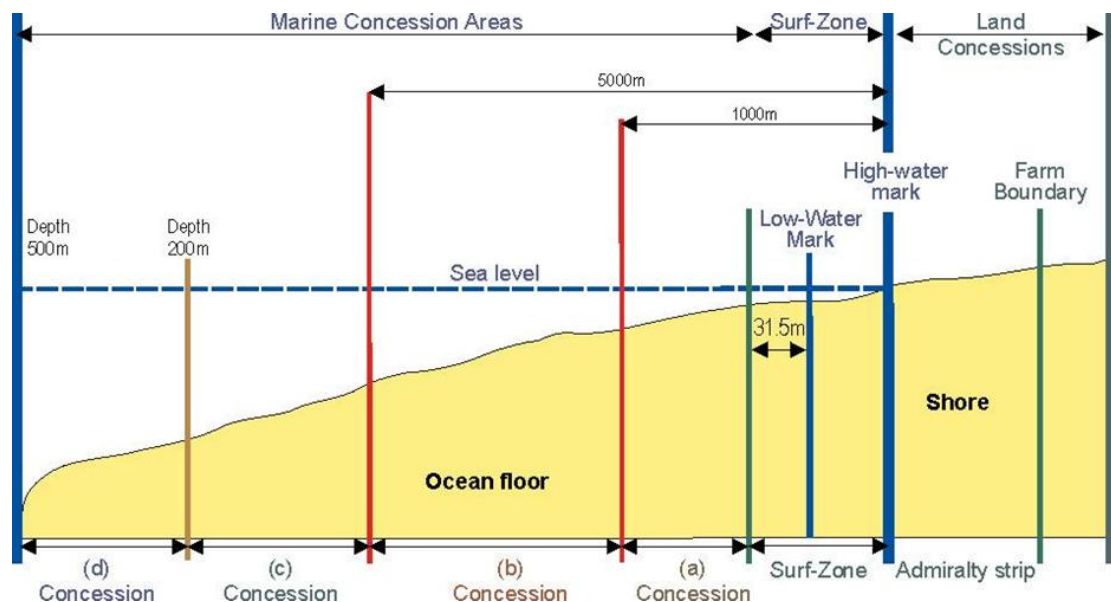


Figure 1.2. Diagram of the onshore and offshore boundaries of the South African marine diamond mining concession areas (from Penney et al. (2007))

A range of different techniques are used to access diamond resources in the marine environment. Typical onshore operators in the coastal environment use cofferdam and seawall mining techniques. Other methods for accessing resource in shallow subtidal gullies and small bays include, depending on the depth of the resource and access to the shoreline, shore and boat-based diving operations. Lastly, diamond mining operations also occur in the offshore environment where tools such as crawlers and drilling rigs are deployed from vessels to extract diamond-rich gravel from the seafloor.

I.4 DESCRIPTION OF THE PROPOSED ACTIVITY

I.4.1 CONCESSION AREA 11C

TAD is applying for a Prospecting Right to undertake geophysical surveying and sampling to target potentially diamondiferous and gemstone deposits in addition to other heavy minerals, industrial minerals, precious metals and ferrous and base metals that may exist within Sea Area 11C, in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA). Years of erosion and natural forces (wind, rain, water currents) wash gemstones and other valuable minerals from their primary deposits in kimberlite pipes to beaches where they are typically deposited. TAD intends to undertake geophysical exploration (seismic/ acoustic survey) and sampling to detect the presence of paleo-beach deposits, which are known from other concessions to contain diamondiferous gravels and precious metals, at different submerged sea levels.

The application area is Sea Area 11C (i.e. Concession Area 11C) and is an area of sea covering 164 023 ha, offshore of the Western Cape coast. It is situated approximately 20 km west of Brand se Baai just south of Hoekbaai to just north of Baai Vals (Figure 1.3). Water depth across the concession area ranges from approximately 92 m to 228 m (Figure 1.4). The proposed prospecting programme will be completed within five years and includes a combination of non-invasive and invasive activities. The non-invasive activities are mostly related to geophysical exploration, data acquisition and analysis. The invasive activities are those related to sampling (collection of drill, core and grab samples).

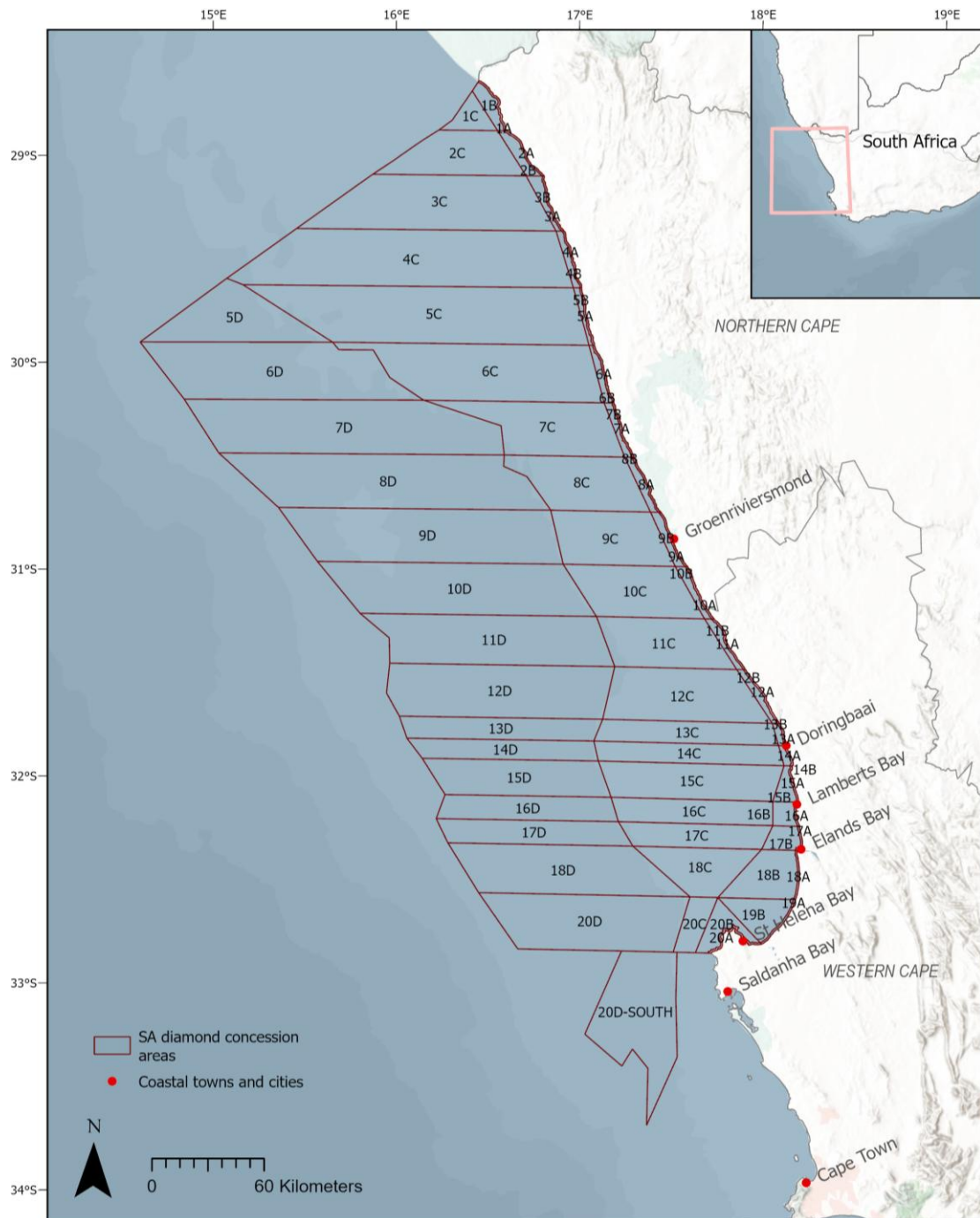


Figure 1.3. The offshore diamond mining lease areas in South African waters. The coastal shelf waters have been divided into 20 contiguous, parallel strips which have been further subdivided into the onshore and offshore concession areas (A, B, C, D).

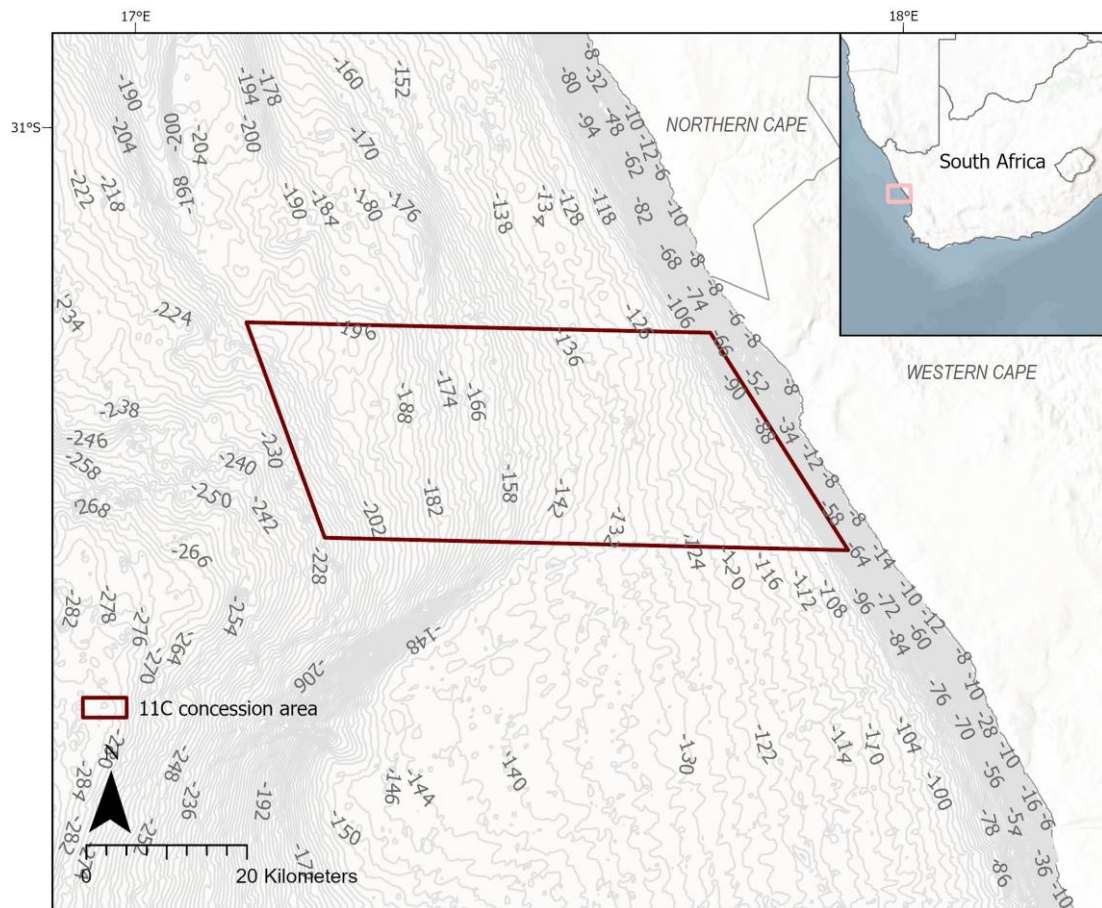


Figure 1.4. Sea Concession Area 11C off the Western Cape Coast with bathymetry (at 2 m intervals).

I.4.2 GEOPHYSICAL/SEISMIC (ACOUSTIC) EXPLORATION

Geophysical surveying will be conducted using a dedicated survey vessel with a hull-mounted multibeam echo sounder (MBES) and Topas sub-bottom profiler system designed to collect high-resolution acoustic data. The use of this geophysical survey equipment allows the operator to produce a digital terrain model of the seafloor. The MBES provides depth sounding information on either side of the vessel's track across a swath width of approximately two times the water depth, while the Topas sub-bottom profiler generates profiles up to 60 m beneath the seafloor, thereby giving a cross-section view of the sediment layers. The source sound level of the MBES is variable but will be a maximum of 221dB re 1 μ Pa @ 1m, with a frequency range of between 200 and 400 kHz. The sub-bottom profiler (Topas system) uses shallow (35 to 45 kHz) and medium penetration (1 to 10 kHz) "Chirp" seismic pulses. This equipment has a variable power output and can therefore have the power ramped up in accordance with survey requirements and be contained within acceptable environmental noise levels. As a result, it is also capable of "soft starts". The use of a magnetometer to detect magnetic signatures will also be required.

Low frequency seismic sources travel the greatest distance in the marine environment. Conversely, high frequency sources have greater attenuation over distance. Due to the higher frequency emissions of the MBES equipment, noise levels tend to dissipate over a relatively short distance, whereas the mid-frequency Topas chirp system will generate

noise that will travel a greater distance. The acoustic footprint of the intended survey equipment is much lower than that of airgun arrays. It should be noted that a decibel is a logarithmic scale for noise where each unit of increase represents a tenfold increase in the quantity being measured.

This survey vessel will not be required to tow any cables. Geophysical surveying will be undertaken along survey lines spaced 100 m to 1000 m apart across select sections throughout the concession area. The geophysical survey is anticipated to be undertaken over a broad operational window of up to two months to accommodate mobilisation, weather delays, sea-state constraints, and other logistical requirements, although the active survey period itself is expected to be shorter. A suitable vessel can typically survey approximately 120 km/day in an offshore area such as the 11C-concession area. The bathymetry of Concession Area 11C will be modelled using processed seismic survey data before sampling can take place – it is estimated that this would take approximately one month.

I.4.3 SAMPLING ACTIVITIES

Sampling will be undertaken in targeted areas identified through the analysis of the acoustic survey data. Four potential methods of collecting geophysical samples from the seabed are being considered. A Van Veen grab with a sampling capacity of approximately 50 kg will be used to collect baseline environmental data on sediment and benthic macrofauna at 20-50 sites. Geotechnical samples to assist in understanding the sea floor geology and resource evaluation will be collected at 100-200 sites using either vibracoring, gravity coring or sonic coring. The latter is an advanced form of drilling that employs high-frequency, resonant energy generated inside the Sonic head to advance a core barrel or casing into subsurface formations, i.e. can penetrate some subsurface rock, whilst gravity and vibracoring can only sample unconsolidated material. The diameter of core samples will be approximately 10 cm, the corers will penetrate to depths of 3–8 m and the material brought to the surface for analysis. The volume per core is calculated at 0.24 m³. The total volume for the 200 cores is calculated at 4.71 m³. The 200 cores will cover a total surface area of 1.57 m², although the core might impact a surface area slightly larger than this. The core samples do not require onboard processing (i.e. no sediment spill in the ocean) as all material collected will remain intact within core tubes which are to be analysed on land. These core samples will be collected from a purpose-built survey vessel. It is estimated that core samples would be required at a sampling rate of approximately ten cores per day which would amount to a total of ten days work. Sampling work will be restricted between the western boundary of the concession and not shallower than 20 m water depth.

In addition to the above prospective targets will be analysed by a uniquely designed drill tool that can dredge gravel from the seabed. Material will be processed onboard by a processing plant and tailings will be discarded overboard, thereby causing sediment plumes, in this instance as a near-shore deposit. The discard material is reported to consist mostly of sand that has a minimal suspension time. Pending the final tool design, the drill bit footprint will be between 3 and 5 m² with an expected average hole depth of 3 m. Sample volumes are anticipated to be in the range of 9 to 15 m³ per sample. An estimated total of 300 samples spaced at roughly 300 m apart from north to south will be required during Phase 2 (reconnaissance sampling). A sampling rate of ten samples per day would equate to a period of approximately, one month (this does not consider

weather delays). It is expected that phase 3 (resource development phase) may require a greater density of samples (arranged in a 25 m to 50 m sampling grid).

The geophysical survey will allow the identification and mapping of rock formations within the concession area. Based on these data, an appropriate drilling method will be identified. This review will allow the applicant to identify target prospecting sites within the concession area. It can also enable the applicant to identify potential challenges and means to address these challenges to minimize environmental impacts and costs. This would facilitate an efficient and effective prospecting programme.

Should the prospecting right be approved, it will allow TAD to determine if diamond mining within Concession Area 11C is economically viable. It is understood that the Prospecting Right will not provide the required environmental authorisation for mining activities to be undertaken. As such, any future intention to undertake mining within the application area would require a further application, investigation and public consultation process.

2 DESCRIPTION OF THE AFFECTED ENVIRONMENT

2.1 REGIONAL OCEANOGRAPHY

The Benguela system is influenced predominantly by the wind-driven upwelling of deep nutrient rich water close to the coast. Wind is the primary driver of life in the system, strongly influencing both water temperature and inorganic nutrient levels, and in turn, primary production. The prevailing south-easterly winds displace surface water offshore during the summer, and cause cold, nutrient rich water to rise from deeper water masses to replace this surface water. These upwelling events are the trigger for minimum temperatures and maximum nutrient levels (Branch & Griffiths 1988, Duncombe Rae 2005). The oceanic primary producers, phytoplankton, bloom when upwelled inorganic nutrients become available for photosynthesis in the presence of sunlight. These are consumed by zooplankton, which are in turn consumed by small pelagic fish species such as anchovy and sardine. The Benguela is one of the world's most productive systems, supporting rich fishing grounds and attracting large colonies of sea birds and seals (Branch & Branch 2018).

The West Coast is subject to semi-diurnal tides, with each successive high (and low) tide separated by 12 hours. Spring tides occur once a fortnight during full and new moons. Tidal activity greatly influences the biological cycles (feeding, breeding and movement) of intertidal marine organisms, and has an influence on when people visit the coastline to partake in various activities such as bathing and the harvesting of marine resources. The tidal variation on the West Coast usually ranges between 0.28 m (relative to the chart datum) at mean low water springs and 1.91 m at mean high water springs, with the highest and lowest astronomical tide being 2.25 m and 0.056 m, respectively.

The west coast of South Africa typically experiences high wave energy and is dominated by south-westerly swells with a long fetch and a period of 10 to 15 seconds (Branch & Griffiths 1988). Southerly and south-westerly waves frequently exceed 2 m (Figure 2.1 and Figure 2.2). The predominant SW swell direction in this area results in a northward-flowing littoral current that runs parallel to the coast (MacDonald & Rozendaal 1995). The average water temperature during the summer months is cool due to upwelling (approximately 11°C) and slightly warmer during downwelling events, which are caused by westerly winds or occasional Benguela Niños when unseasonal westerly winds result in a breakdown of the upwelling front with movement of warm oceanic water towards the coast (Laird & Clark 2018).

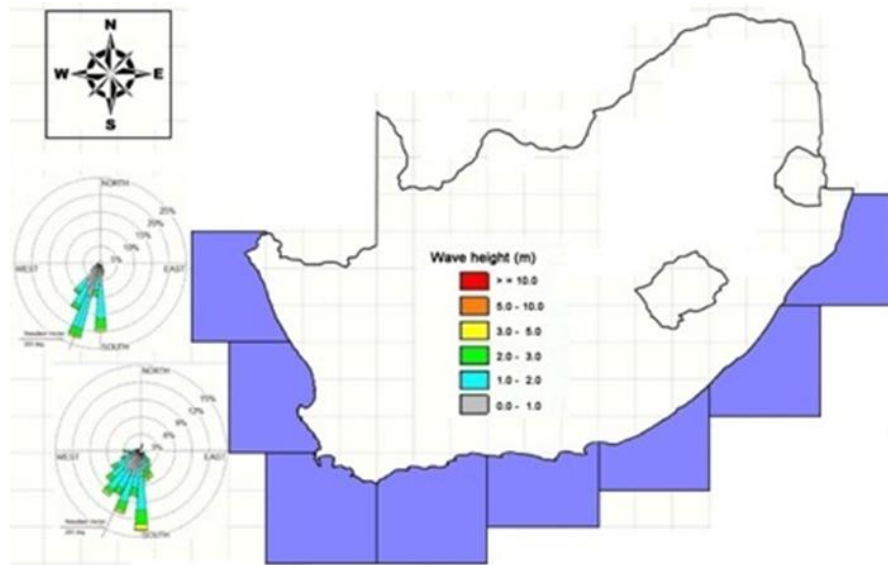


Figure 2.1. Wave roses showing the frequency of significant wave heights and direction on the West Coast (Source: SADC Voluntary Observing Ships data).

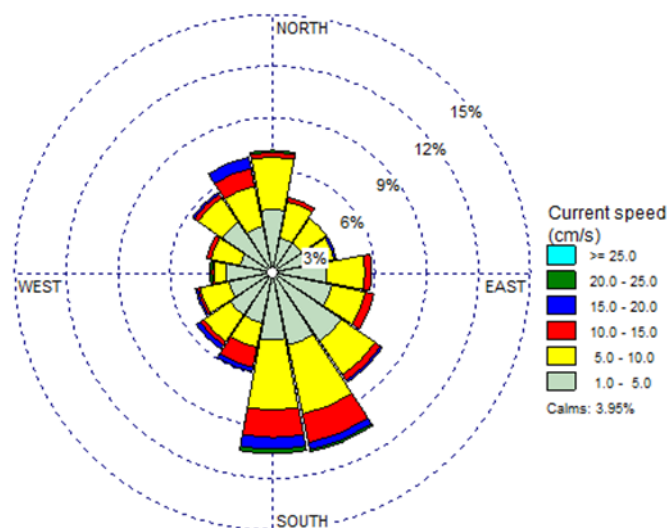


Figure 2.2. Current rose showing current direction and strength data at -12 m water depth approximately 15km north of the Olifants River Mouth (inshore and south of Concession Area 11C). (Source: Laird and Clark (2018)).

2.2 BIOGEOGRAPHY

The South African National Biodiversity Institute (SANBI) has delineated bathyregions for South Africa's biogeography, constituting the six main ecoregions divided by depth (Sink et al. 2019b). Concession Area 11C is positioned in the Southern Benguela Shelf bathyregion, which mainly follows the cool temperate West Coast (Figure 2.3).

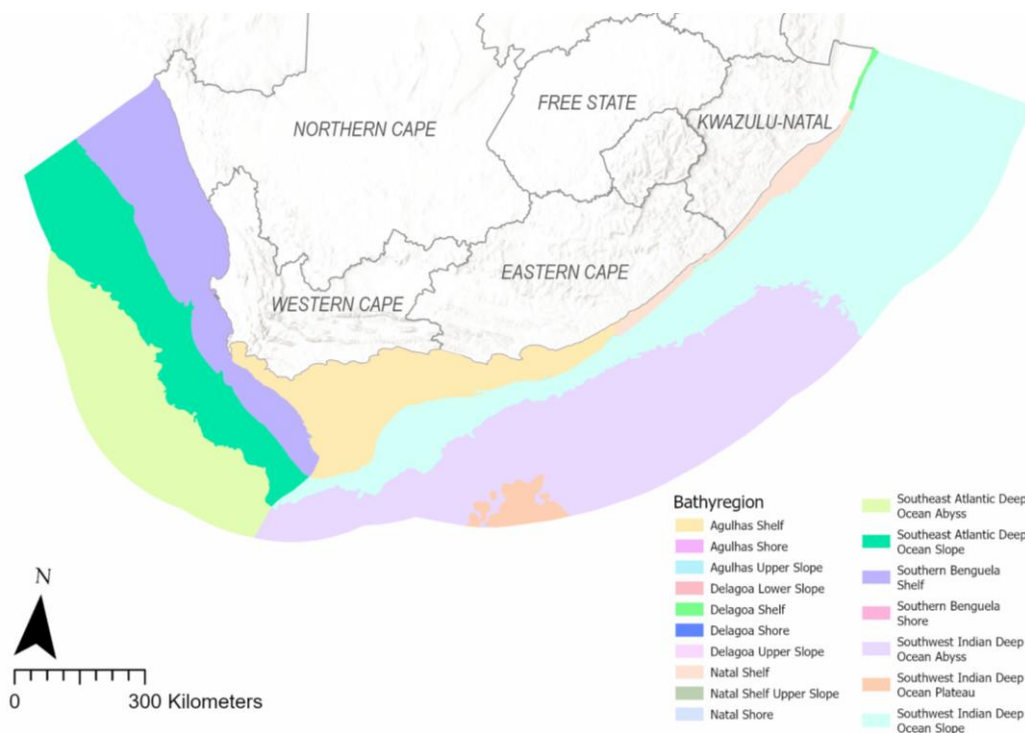


Figure 2.3. Marine bathyregions of South Africa's EEZ with incorporating biogeographic and depth divisions in the South African marine environment as defined by Sink et al. (2019b).

2.3 ECOLOGY

As discussed above, wind-driven coastal upwelling is the predominant physical driver that shapes the high levels of biological productivity in the southern Benguela, providing nutrients for primary producers, and food for diverse fauna, such as pelagic (pilchards, anchovy) and demersal (hakes, kingklip) fish stocks, near shore fisheries (linefish, rock lobster), mammals (seals and whales) and seabirds (penguins, gannets, cormorants etc.). There are three broad marine habitats within or adjacent to the 11C Concession Area. These include sandy benthic habitat, rocky reefs and the water column or pelagic habitat.

2.3.1 SUBTIDAL SANDY BENTHIC HABITAT

Fauna and flora that inhabit the surfaces of subtidal sand are called benthic epifauna, while those that burrow or dig into the soft sediments are called benthic infauna (Castro & Huber 1997). The distribution of infauna and the depth at which organisms can live in the substrate is largely dependent on sediment particle size. More porous, larger grained substrates allow for greater water circulation through the sediment, thereby replenishing the oxygen that is used up during the decomposition processes.

Much of the benthic infauna on the west coast of South Africa are deposit feeders (e.g. worms), which either ingest sediments and extract organic matter trapped between the grains, or actively collect organic matter and detritus (Castro & Huber 1997). Suspension feeders eat drifting detritus and plankton from the water column (e.g. seapens and some species of crabs), while filter feeders actively pump and filter water to extract suspended particles (e.g. bivalves and some species of amphipods and polychaetes). Predators in soft bottom habitats either burrow through sediments or catch their prey on the surface

(Castro & Huber 1997). Most demersal fish in soft bottom habitats are predators that scoop up prey (e.g. rays and skates), while flat fish (e.g. monk fish and sole) lie camouflaged on the bottom. Predators such as crabs, hermit crabs, lobsters and octopuses, which inhabit rocky areas, may move to sandy benthos to feed (Castro & Huber 1997). Similarly, reef-associated fish also rely on sandy substrate for food. Macrofauna living within benthic substrata play an important role in the reworking of sediments. These organisms assist in promoting the exchange of oxygen and nutrients within the substrate by enhancing sediment porosity. Macrofaunal communities also provide an important food source for fish and other invertebrate species.

Benthic macrofauna are the biotic component most frequently monitored to detect changes in the health of a marine environment as they are short-lived, and their community composition responds rapidly to environmental change (Warwick 1993). They also tend to be directly affected by pollution, are easy to sample quantitatively, and are scientifically well-studied compared to other sediment-dwelling components. Anthropogenic physical disturbance will negatively affect benthic macrofauna and is likely to result in the proliferation of opportunistic pioneer species following a disturbance event. Harmer et al. (2013) showed that polychaetes are generally most abundant, followed by amphipods and gastropods. The soft sediment infauna of the Namaqua inner shelf ecozone of the west coast of South Africa is moderately well studied. Benthic sampling undertaken by Anchor in concessions 1B, 1C and 2C (similar depth range and biogeographical zone as Concession Area 11C) yielded a benthic macrofaunal community consisting of 45 species with an average biomass of 86 g/m² (1B), 32 g/m² (1C) and 39 g/m² (2C) respectively (Mostert et al. 2016, Biccard et al. 2020a). This is much lower than the diversity and biomass of macrofaunal communities found in the shallower, sheltered and retentive bays along the west coast (diversity: >150 species; biomass: St. Helena Bay = 847 g/m², Saldanha = 971 g/m²) (Clark et al. 2020, Biccard et al. 2021). Available evidence suggests that the macrofaunal communities of Concession Area 11C are more similar to those found in the offshore, open coast areas such as 1C and 2C than the sheltered, productive west coast bays, but this will be confirmed during the proposed baseline sampling.

2.3.2 OFFSHORE ROCKY REEFS

The offshore environment is divided into six areas: the inner and outer shelf, the shelf edge, the upper and lower bathyal zones, and the abyssal zone. According to the National Biodiversity Assessment, offshore benthic habitat types include six broad ecosystem groups: rocky shelf, rocky shelf edge, seamounts and unconsolidated shelf, unconsolidated shelf edge and deep-sea sediments (Sink et al. 2012). Concession Area 11C lies within what is mostly classified as sandy inner shelf habitat interspersed with rocky outcrops (Figure 2.4). The sandy inner shelf habitat type has the greatest extent within our EEZ, with muddy, gravel and mixed sediment habitat types constituting smaller areas (Sink et al. 2012). These offshore rocky reefs are colonised by a range of epifauna including bryozoans, encrusting and upright sponges, solitary and colonial ascidians, sea anemones and cold-water coral colonies – the latter being slow-growing and taking many years to become established (Biccard et al. 2021). Studies undertaking assessments of prospecting and mining-related impacts on these habitats in this region are relatively new and the time taken for disturbed epifaunal communities inhabiting offshore rocky reefs to recover has not yet been determined (Biccard et al. 2021).

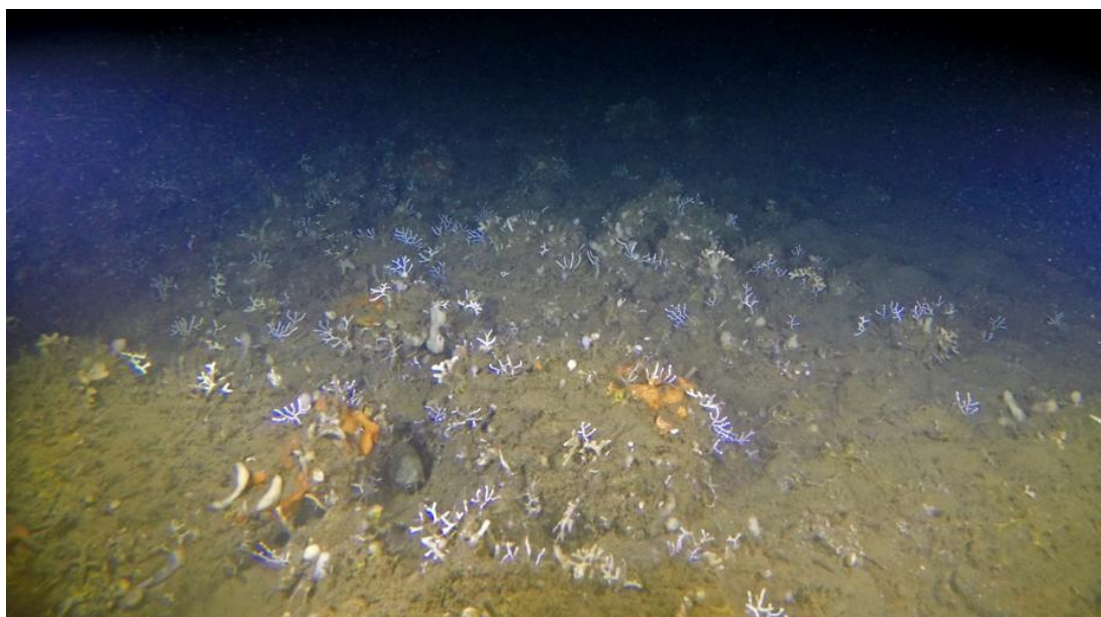


Figure 2.4. A typical hard-bottom inner shelf benthic habitat off the west coast of South Africa consisting of both epifauna and infauna. Source: Anchor Environmental.

These offshore reefs within Concession Area 11C should be visually assessed (by means of drop camera deployments or remotely operated underwater vehicle) during the baseline environmental survey with regular repeat surveys following mining operations in the area – offshore reefs may not be directly impacted (mined) but are at risk of being indirectly impacted by tailings disposal.

2.3.3 PELAGIC HABITAT

This habitat type constitutes the largest of all habitats and is loosely defined as the water column of the open ocean, which can be further divided into regions by depth. Pelagic communities are largely defined by the physical properties of the water column. Main physical drivers include temperature, turbidity, dissolved oxygen, nutrient levels and light. These parameters vary with depth and play a large role in shaping the structure of pelagic communities. The major oceanic currents on the east and west coast of South Africa differ in terms of these parameters, and as such, harbour different pelagic communities. Where the Agulhas and Benguela current meet, off the southern coast of South Africa, these different communities merge and interact over several hundred kilometres resulting in rich pelagic biodiversity. In contrast to demersal and benthic biota that are associated with the seabed, pelagic species live and feed in the open water column. Pelagic communities are divided into plankton and fish, and their main predators, seabirds, marine mammals (seals, dolphins and whales) and turtles.

PLANKTONIC COMMUNITIES

The ecology of the open water pelagic habitat within Concession Area 11C is typical of the Benguela upwelling region and the Namaqua subregion of the Southern Benguela Shelf (Sink et al. 2019a). Pulsed inputs of nutrients (nitrates, phosphates and silicates) due to wind driven upwelling result in high primary productivity with phytoplankton communities dominated by dinoflagellates and diatoms. Phytoplankton are consumed by a variety of zooplankton that typically consist of crustacean copepods, euphausiids,

mysids and a myriad of eggs and larvae from almost all marine phyla. For example, ichthyoplankton in the southern Benguela are composed mainly of small pelagic anchovy and sardine fish eggs and larvae, with some hakes and mackerel (Shannon and Pillar 1986). Zooplankton are in turn the food source for large numbers of small pelagic fish, particularly sardine *Sardinops sagax*, anchovy *Engraulis encrasicolus*, red eye round herring *Etrumeus whiteheadi* and maasbanker *Trachurus capensis*. These small pelagic fish exert a controlling influence on the abundance of both their zooplankton prey and their predators that include commercially important fish species such as snoek *Thyrsites atun*, yellowtail *Seriola lalandi* and hake *Merluccius* sp. (Cury et al. 2000, Shannon et al. 2020).

SEABIRDS

Fourteen species of seabirds breed in southern Africa; Cape Gannet, African Penguin, four species of Cormorant, White Pelican, three Gull and four Tern species (Table 2.1). Species listed on the IUCN Red List include the Critically Endangered African Penguin, and Endangered Cape Cormorant, Bank Cormorant, and Cape Gannet. Breeding areas are distributed around the coast with islands being particularly important. The number of successfully breeding birds at each breeding site varies with the abundance of food. Most of the breeding seabird species forage for small pelagic fish at sea with most birds being found relatively close inshore (within 30 km of the coast). Of the diving birds that occur along the coast, only the Cape gannet *Morus capensis* regularly feeds from the inshore environment as far as 100 km offshore and African Penguins have also been recorded as far as 60 km offshore. Most of the species listed here are likely to be encountered in Concession Area 11C (the inner margin is located only 5 km offshore - Figure 1.4 and Table 2.1).

Table 2.1. Breeding seabirds present on the west coast of South Africa (adapted from Pulfrich 2021).

Common name	Species name	IUCN Status Red List (IUCN 2025, Lee et al. 2025)
African Penguin	<i>Spheniscus demersus</i>	Critically Endangered
Great Cormorant	<i>Phalacrocorax carbo</i>	Least Concern
Cape Cormorant	<i>Phalacrocorax capensis</i>	Endangered
Bank Cormorant	<i>Phalacrocorax neglectus</i>	Endangered
Crowned Cormorant	<i>Phalacrocorax coronatus</i>	Near Threatened
White Pelican	<i>Pelecanus onocrotalus</i>	Least Concern
Cape Gannet	<i>Morus capensis</i>	Endangered (locally Vulnerable)
Kelp Gull	<i>Larus dominicanus</i>	Least Concern
Grey-headed Gull	<i>Larus cirrocephalus</i>	Least Concern
Hartlaub's Gull	<i>Larus hartlaubii</i>	Least Concern
Caspian Tern	<i>Hydroprogne caspia</i>	Least Concern (locally Vulnerable)
Swift Tern	<i>Sterna bergii</i>	Least Concern
Roseate Tern	<i>Sterna dougallii</i>	Least Concern (locally Vulnerable)
Damara Tern	<i>Sterna balaenarum</i>	Near Threatened (locally Endangered)

Pelagic seabirds such as Albatross, Petrels and Shearwaters are also likely to be encountered in the offshore waters of Concession Area 11C. A large number of these seabirds are supported by the small pelagic fish stocks of the Benguela system. The area

between Cape Point and the Orange River is said to support 38% and 33% of the overall population of pelagic seabirds in winter and summer, respectively (Baker & Arnott 2021). Pelagic seabirds classified as being common in the southern Benguela are listed in Table 2.2. Species listed as endangered include the Black-browed Albatross and Atlantic Yellow-nosed Albatross. Most of the species in the region reach highest densities offshore of the shelf break (200 – 500 m depth) (Baker & Arnott 2021), mostly offshore of Concession Area 11C.

Table 2.2. Pelagic seabirds common to the southern Benguela region (Crawford et al. 1991).

Common Name	Species name	IUCN Red List Status (IUCN 2025, Lee et al. 2025)
Shy Albatross	<i>Thalassarche cauta</i>	Near Threatened
Black Browed Albatross	<i>Thalassarche melanophrys</i>	Endangered
Atlantic Yellow Nosed Albatross	<i>Thalassarche chlororhynchos</i>	Endangered
Giant Petrel Sp.	<i>Macronectes halli/giganteus</i>	Least Concern (locally Near Threatened)
Pintado Petrel	<i>Daption capense</i>	Least Concern
Great-Winged Petrel	<i>Pterodroma macroptera</i>	Least Concern (locally Near Threatened)
Soft Plumaged Petrel	<i>Pterodroma mollis</i>	Least Concern (locally Near Threatened)
Prion spp.	<i>Pachyptila</i> spp.	all Least Concern
White Chinned Petrel	<i>Procellaria aequinoctialis</i>	Vulnerable
Cory's Shearwater	<i>Calonectris diomedea</i>	Least Concern
Great Shearwater	<i>Puffinus gravis</i>	Least Concern
Sooty Shearwater	<i>Ardenna grisea</i>	Near Threatened
European Storm Petrel	<i>Hydrobates pelagicus</i>	Least Concern
Leach's Storm Petrel	<i>Hydrobates leucorhous</i>	Vulnerable
Wilson's Storm Petrel	<i>Oceanites oceanicus</i>	Least Concern
Blackbellied Storm Petrel	<i>Fregetta tropica</i>	Least Concern (locally Near Threatened)
Skua spp.	<i>Catharacta/Stercorarius</i> spp.	all Least Concern
Sabine's Gull	<i>Larus sabini</i>	Least Concern

MARINE MAMMALS

The marine mammal fauna occurring off the southern African coast includes several species of baleen whales, toothed whales, beaked whales, dolphins and one resident seal species. Based on the available literature thirty-six marine mammals were identified as potentially occurring in the proposed survey area (Table 2.3); each of these have been placed into marine mammal hearing groups as per Southall et al. (2019). Various research papers and reports were used to ascertain the relative likelihood of occurrence within the proposed survey area – Table 2.3 (Lane & Carter 1999, Penney et al. 2007, Child et al. 2016, Biccard et al. 2018, Baker & Arnott 2021, Pulfrich 2021). Conservation status from the IUCN (2025) Red List is provided. Of the species listed, the blue whale is considered 'Critically Endangered', sei whales are 'Endangered', and humpback and sperm whales are considered 'Vulnerable' (IUCN Red List Categories). Altogether four species are listed as "Data Deficient" underlining how little is known about cetaceans, their distribution and population trends. Current information on the distribution,

population sizes and trends of most cetacean species occurring on the west coast of southern Africa is lacking (Pulfrich 2021). Our knowledge on the smaller cetaceans that occupy deeper waters is particularly poor and it is recommended that caution be applied when considering possible encounters with cetaceans in the area of interest (Pulfrich 2021). The most abundant baleen whales in the Benguela are humpback whales and southern right whales (Figure 2.5). During the last decade, the prevalence of both species on the west coast of South Africa outside of the usual June-November whale season has increased with feeding behaviour observed in upwelling zones off Kommetjie, Saldanha and St Helena Bay (Barendse et al. 2011, Mate et al. 2011). Increasing numbers of summer records of both species from the southern half of Namibia suggest that animals may also be feeding in the Lüderitz upwelling cell (NDP unpublished data) and will therefore occur in or pass through the area of interest (Pulfrich 2021).

Table 2.3. Marine mammals thought to occur within the proposed survey area. Each species listed has been placed into a marine mammal hearing group as defined by Southall et al. (2019). The relative abundance and likelihood of occurrence within the proposed survey area during the survey period in late summer is indicated for each species. Conservation status from the IUCN (2025) Red List is indicated.

Marine Mammal hearing group (Southall et al. 2019)	Species	Shelf/Offshore	Likely encounter frequency in 11C (& seasonality)	IUCN Conservation status
Low frequency cetaceans (Baleen whales) Generalised hearing range: 7 Hz to 35 kHz	<i>Balaenoptera bonaerensis</i> (Antarctic minke whale)	Shelf and offshore	Monthly (winter)	Near Threatened
	<i>B. acutorostrata</i> (Dwarf minke whale)	Shelf and offshore	Occasional (year-round)	Least Concern
	<i>B. physalus</i> (Fin whale)	Shelf and offshore	Occasional (rarely in summer)	Vulnerable
	<i>B. musculus</i> (Blue whale)	offshore	Unlikely (seasonality unknown)	Critically Endangered
	<i>B. borealis</i> (Sei whale)	Shelf and offshore	Occasional (winter)	Endangered
	<i>B. brydei</i> (offshore Bryde's whale)	Shelf and offshore	Occasional (summer)	Not Assessed
	<i>B. edeni</i> (subsp) (inshore Bryde's whale)	Shelf and offshore	Occasional (year-round)	Vulnerable
	<i>Eubalaena australis</i> (Southern right whale)	Shelf	Daily (year-round, higher in early spring and summer)	Least Concern
	<i>Megaptera novaeangliae</i> (Humpback whale)	Shelf and offshore	Daily (year-round, higher in summer)	Vulnerable
High frequency cetaceans (Dolphins, toothed whales, beaked whales) Generalised hearing range: 150 Hz to 160 kHz	<i>Lagenorhynchus obscurus</i> (Dusky dolphin)	Shelf (0-800 m)	Daily (year-round)	Data Deficient
	<i>Cephalorhynchus heavisidii</i> (Heaviside's dolphin)	Shelf (0-200 m)	Daily (year-round)	Near Threatened
	<i>Tursiops truncatus</i> (Common bottlenose dolphin)	Shelf and offshore	Monthly (year-round)	Least Concern
	<i>Delphinus delphis</i> (Common short beaked dolphin)	Shelf and offshore	Monthly (year-round)	Least Concern

Marine Mammal hearing group (Southall et al. 2019)	Species	Shelf/Offshore	Likely encounter frequency in 11C (& seasonality)	IUCN Conservation status
	<i>Lissodelphis peronii</i> (Southern right whale dolphin)	Shelf and offshore	Occasional (year-round)	Least Concern
	<i>Stenella coeruleoalba</i> (striped dolphin)	Offshore	Unlikely (unknown)	Least Concern
	<i>S. attenuata</i> (Pantropical spotted dolphin)	Shelf edge and offshore	Unlikely (year-round)	Least Concern
	<i>Globicephala melas</i> (Long-finned pilot whale)	Shelf edge and offshore	Monthly (year-round)	Least Concern
	<i>G. macrorhynchus</i> (Short-finned pilot whale)	Unknown	Unlikely (unknown)	Least Concern
	<i>Steno bredanensis</i> (Rough-toothed dolphin)	Unknown	Unlikely (unknown)	Least Concern
	<i>Orcinus orca</i> (Killer whale)	Shelf and offshore	Occasional (year-round)	Data Deficient
	<i>Pseudorca crassidens</i> (False killer whale)	Shelf and offshore	Monthly (year-round)	Near Threatened
	<i>Feresa attenuata</i> (Pygmy killer whale)	Offshore	Occasional (unknown)	Least Concern
	<i>Grampus griseus</i> (Risso's dolphin)	Shelf edge and offshore	Occasional (unknown)	Least Concern
	<i>Kogia breviceps</i> (Pygmy sperm whale)	Shelf edge and offshore	Occasional (year-round)	Least Concern
	<i>K. sima</i> (Dwarf sperm whale)	Shelf edge	Unlikely (unknown)	Least Concern
	<i>Physeter macrocephalus</i> (Sperm whale)	Shelf edge and offshore	Occasional (year-round)	Vulnerable
	<i>Ziphius cavirostris</i> (Cuvier's beaked whale)	Offshore	Occasional (year-round)	Data Deficient
	<i>Berardius arnuxii</i> (Arnoux's beaked whale)	Offshore	Occasional (year-round)	Data Deficient
	<i>Hyperoodon planifrons</i> (Southern bottlenose beaked whale)	Offshore	Occasional (year-round)	Least Concern
	<i>Mesoplodon layardii</i> (Layard's beaked whale)	Offshore	Occasional (year-round)	Least Concern
	<i>M. mirus</i> (True's beaked whale)	Offshore	Unlikely (year-round)	Least Concern
	<i>M. grayi</i> (Gray's beaked whale)	Offshore	Occasional (year-round)	Least Concern
	<i>M. densirostris</i> (Blainville's beaked whale)	Offshore	Unlikely (year-round)	Least Concern
Phocid carnivores in water (PCW)	<i>Mirounga leonina</i> (Southern elephant seal)	Shelf and offshore	Unlikely (unknown)	Least Concern
	<i>Hydrurga leptonyx</i> (Leopard seal)	Shelf and offshore	Unlikely (unknown)	Least Concern
Other marine carnivores in water (OCW)	<i>Arctocephalus pusillus pusillus</i> (Cape fur seal)	Shelf	Daily (year-round)	Least Concern

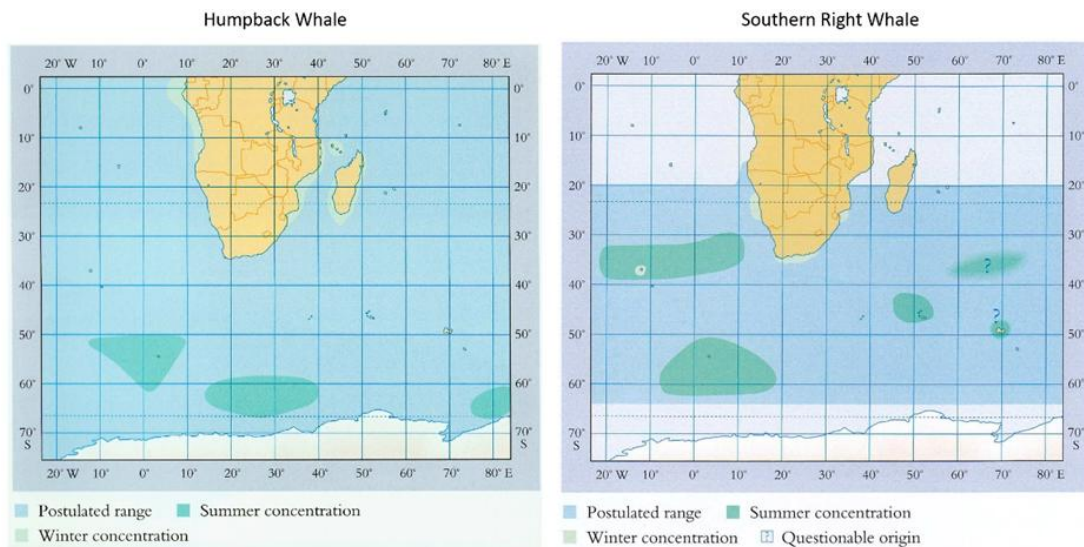


Figure 2.5. Migration routes are inferred from the seasonal distribution of humpback (left) and southern right (right) whales off the coast of southern Africa. Source: Best (2007).

2.4 SENSITIVITY AND SIGNIFICANCE

2.4.1 ECOSYSTEM THREAT STATUS

The 2025 National Biodiversity Assessment (NBA) for marine benthic and coastal habitat threat status layer is shown in Figure 2.6 together with Concession Area 11C. This Ecosystem Threat Status developed by SANBI is an indicator of how threatened ecosystems are, specifically the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function or composition (Sink et al. 2025b). Ecosystem types are categorised as “Critically Endangered”, “Endangered”, “Vulnerable”, “Near Threatened” or “Least Concern”, based on the proportion of the original extent of each ecosystem type that remains in good ecological condition relative to a series of biodiversity thresholds. According to the latest available data from the 2025 NBA, the entire area covered by Concession Area 11C is classified as “Least Concern” (Figure 2.6).

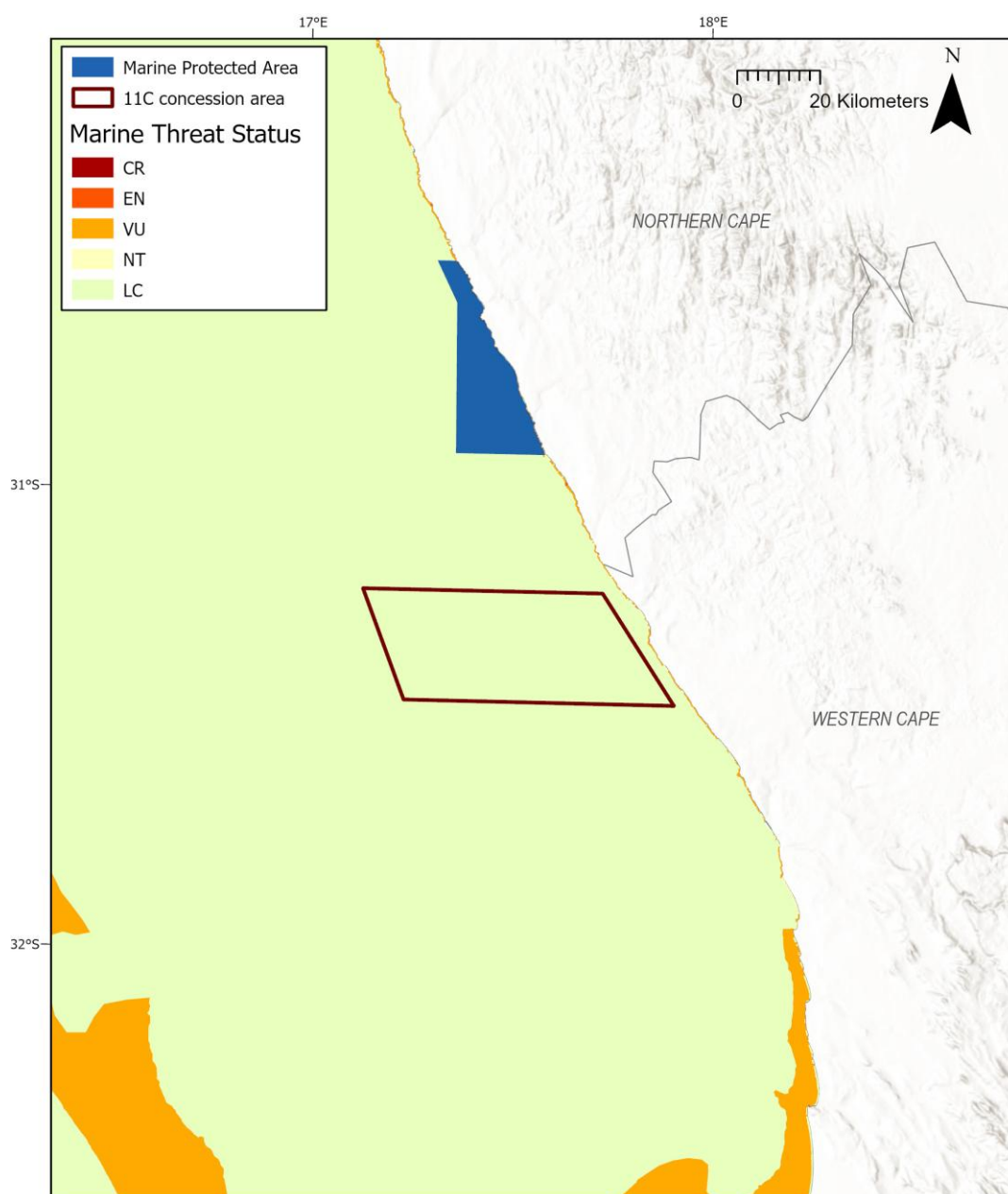


Figure 2.6. Marine Ecosystem Threat Status 2023, Marine Protected Area and location of Concession Area 11C. CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern. Source: <https://bgis.sanbi.org/>.

2.4.2 MARINE PROTECTED AREAS / ECOLOGICALLY AND BIOLOGICALLY SIGNIFICANT AREAS

In terms of conservation status and protected area status, the 11C concession block is not part of a National Marine Protected Area (MPA). The nearest MPA to Concession Area 11C is the Namaqua National Park MPA, located around 32km north of the northern boundary of Concession Area 11C (Figure 2.7). This 500 km² MPA was gazetted on 3 May 2019 and provides protection to habitats in the Namaqua bioregion, including several critically endangered coastal ecosystem types. The area is a known nursery area for Cape hakes, one of South Africa's most valuable fisheries resources.

38% of the area of Concession Area 11C overlaps with the Namaqua Coastal Area Ecological and Biologically Significant Area (EBSA) (Figure 2.7) (MARISMA EBSA

Workstream 2023). EBSAs are defined by the Convention on Biological Diversity (CBD) as “geographically or oceanographically discrete areas that provide important services to one or more species/populations of an ecosystem or to the ecosystem as a whole, compared to other surrounding areas or areas of similar ecological characteristics, or otherwise meet the [EBSA] criteria”. The Namaqua Coastal Area EBSA is located from the estuary of the Spoeg River to the estuary of the Sout River in the Namaqua bioregion of South Africa (Sink et al. 2012), and from the dune base to approximately 33-36 km offshore. It consists of Namaqua coastal, inner, mid and outer shelf ecosystem types (Sink et al. 2025a). The associated pelagic environment is characterized by upwelling, giving rise to very cold waters with very high productivity/chlorophyll levels (Lagabrielle 2009, Roberson et al. 2017). Altogether, the area includes three estuaries (Van Niekerk & Turpie 2012). A large proportion of the area is characterized by habitat that is in relatively good (natural/pristine) condition due to much lower levels of anthropogenic pressures relative to other coastal areas in the Northern Cape Province. The terrestrial habitat adjacent to the part of the EBSA that stretches between the Groen and Spoeg estuaries is within the Namaqua National Park and is, therefore, also protected (MARISMA EBSA Workstream 2023).

In summary, the area is highly relevant in terms of the following EBSA criteria: “productivity”, “importance for threatened, endangered or declining species and/or habitats” and “naturalness”. Since original description, an offshore extension of 7-20 km, has been proposed so that the EBSA now extends 36 km offshore at its widest point. The alongshore extent remains the same as before between the Spoeg and Sout estuaries. The extension was based on better alignment with the features comprising the EBSA, and their condition and threat status, based on the best available information (e.g., Sink et al. 2012, 2019, Majiedt et al. 2013, Holness et al. 2014). This was also based on recent research (Karenzi 2014) that has allowed better ecosystem mapping in the area, thus affording more accuracy in the proposal of a new EBSA boundary rather than following an old (proposed) MPA boundary that was not adopted. New fine-scale mapping of the coast (Harris et al. 2019) also allowed a more accurate coastal boundary to be delineated (MARISMA EBSA Workstream 2023).

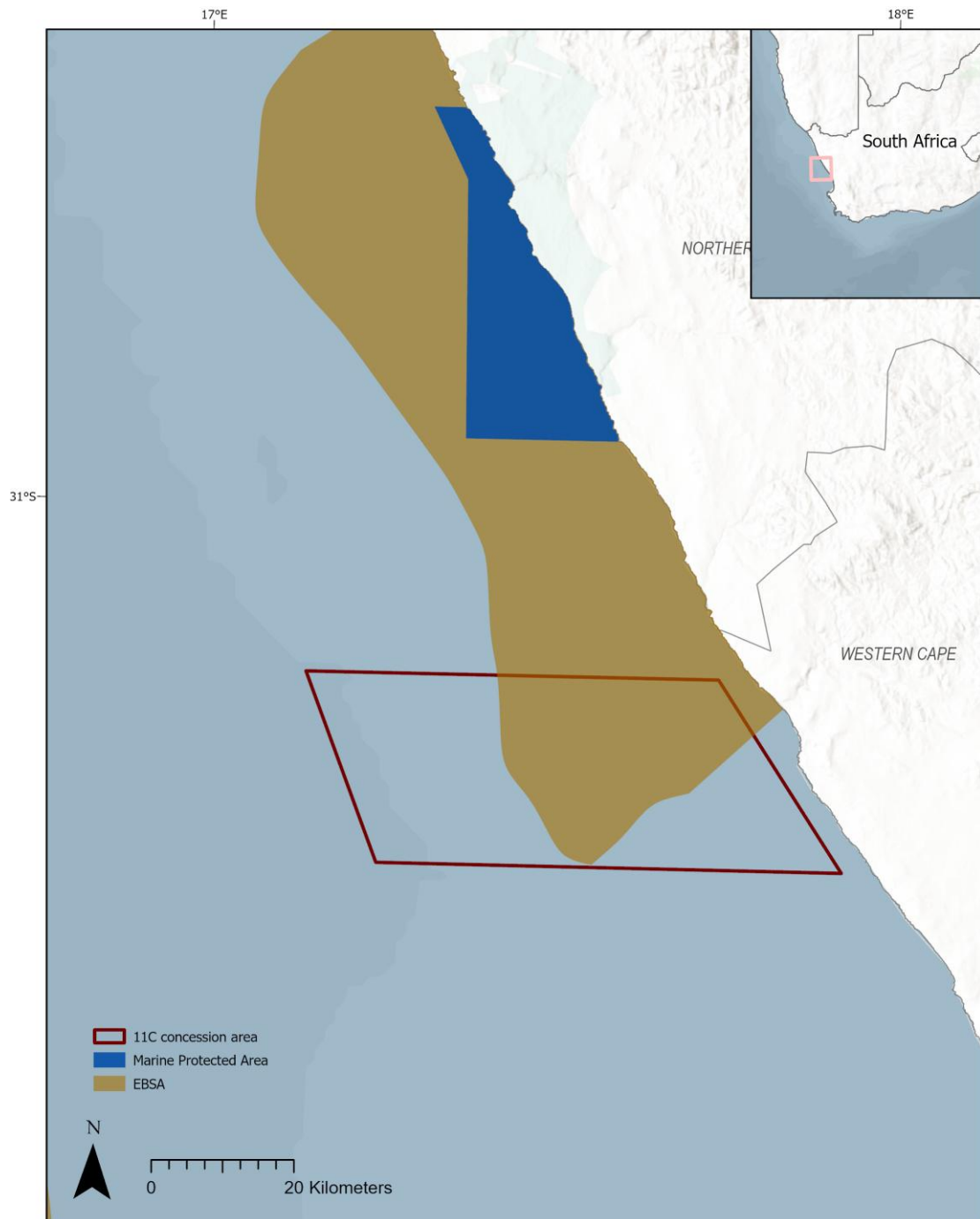


Figure 2.7. Marine Protected Areas (dark blue) and the proposed Namaqua Coastal Area EBSA and location of Concession Area 11C. Source: <https://bgis.sanbi.org/>.

2.4.3 CRITICAL BIODIVERSITY AREA

A Critical Biodiversity Area (CBA) assessment presents a spatial plan for the natural environment, designed to inform planning and decision-making in support of sustainable development, and CBA maps are developed using the principles of systematic biodiversity planning (SANBI 2017, Proposed Approach to Spatial Development and Management for South Africa's Marine Planning Areas 2019, and the Draft marine sector plan for the Biodiversity Sector 2023).

There are two categories of CBA, namely 'CBA Natural' areas and 'CBA Restore' areas. CBA Natural sites have natural/near-natural ecological condition, with the management objective of maintaining the sites in that natural/near-natural state. CBA Restore sites have moderately modified or poorer ecological condition, with the management objective to improve ecological condition and, in the long term, restore these sites to a natural/near-natural state, or as close to that state as possible. As a minimum in CBA Restore sites, further deterioration in ecological condition must be avoided, and options for future restoration must be maintained. The Ecological Support Areas (ESAs) include all portions of EBSAs that are not already within MPAs or CBAs, and a 5 km buffer area around all MPAs (where these areas are not already CBAs or ESAs). Within ESAs, negative impacts of human activities on key biodiversity features are managed and minimised to maintain the features in at least a functional, semi-natural state and/or to allow the area to improve in ecological condition.

Concession Area 11C overlaps with both CBA Natural (45% of 11C area) and ESA (14% of 11C area) areas (Figure 2.8). Mining: prospecting (non-destructive) e.g., acoustic surveys, geotechnical sampling, are restricted within all CBA delineations. Activities with restricted compatibility require a detailed assessment to determine whether the recommendation is that they should be permitted (general), permitted subject to additional regulations (consent), or prohibited, depending on a variety of factors. Management recommendations and regulations for these activities need to take into account the context in which the activities take place or are proposed to take place. It is also critical to take cumulative impacts into account, which may have implications for the intensity, extent or even the presence of activities, especially new or expanding activities in a biodiversity priority area (Harris et al. 2022).

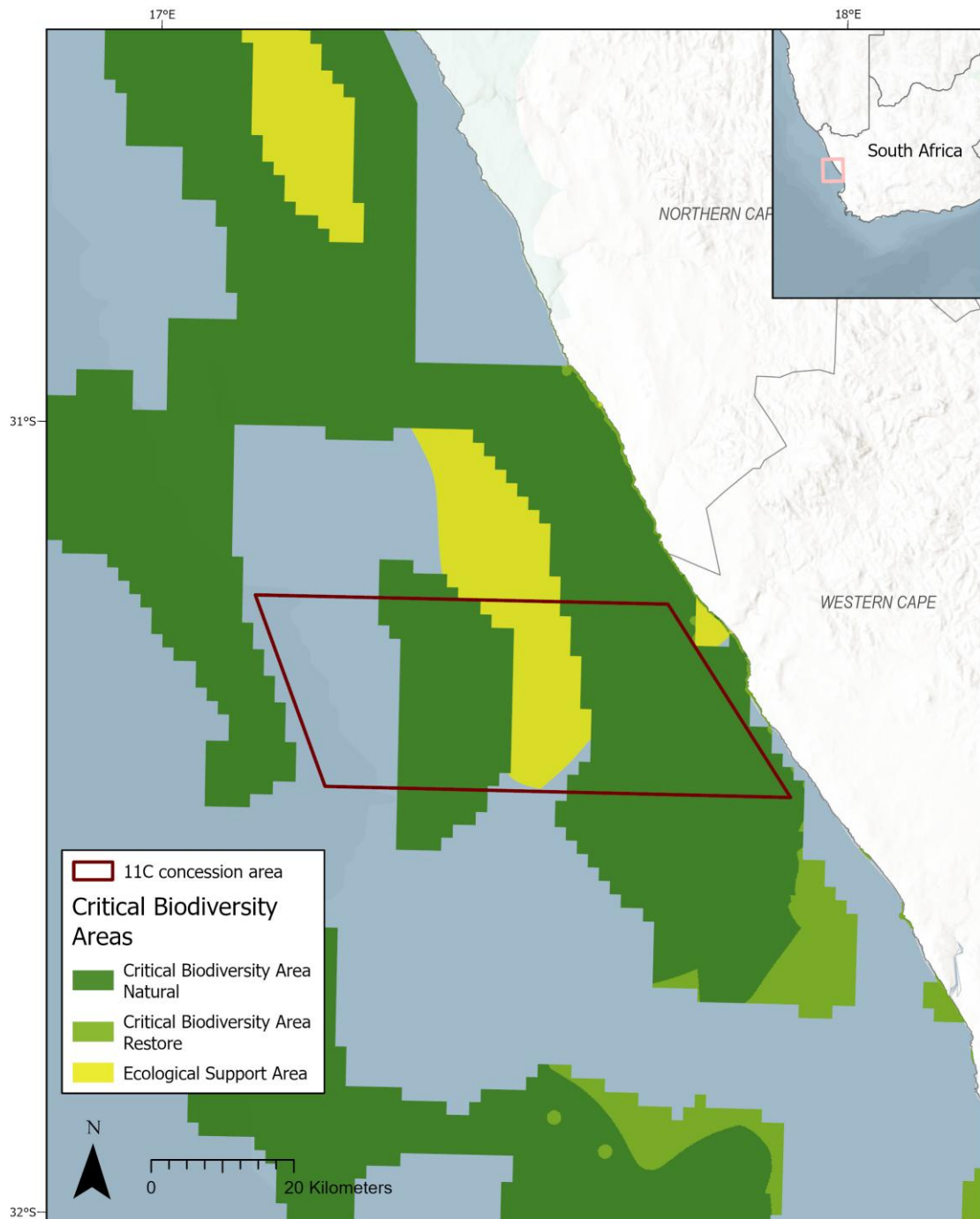


Figure 2.8 Critical Biodiversity Areas within the vicinity of the 11C concession area.

2.5 USER GROUPS

The main users of the sea space in Concession Area 11C are the commercial shipping and fishing industries. The wave exposed and linear nature of the coast and lack of nearby ports suitable for large vessels means that most merchant shipping would travel offshore of the concession area along the continental shelf edge. Most shipping crossing the Concession area would be fishing vessels and other prospecting or mining vessels. The potential spatial overlap of commercial fisheries with the Concession Area 11C was investigated based on published reports (specifically Norman et al. (2018)) and an analysis of spatially referenced commercial catch return data obtained from the

Department of Forestry, Fisheries and the Environment. The large commercial fishing sectors that are active along the west coast (the demersal trawl, demersal hake longline and large pelagic longline fishing sectors) all operate well offshore of the 11C Concession Area, whilst the West Coast Rock Lobster fishery operates inshore, in water shallower than the concession area (Norman et al. 2018, DFFE 2025). Possible spatial overlap with the small pelagic, traditional linefish and tuna pole fisheries was, however, identified. These three fisheries are considered in more detail below.

Lastly, Doring Bay Abalone (Pty) Ltd. (DBA) has been undertaking onshore mariculture of abalone *Haliotis midae* at Doring Bay since 2014. Phase 1 of the abalone ranching application process (Government Gazette 21 April 2011, No. 352 & 353) involved onshore ranching and in 2019, DBA submitted an application for Phase 2 of the application process to establish an abalone ranching pilot project in the marine environment in the vicinity of Doringbaai extending from a point just south of Doringbaai to a point near Strandfontein 7 km to the north. DBA employs over 50 staff from the local community of Doringbaai and the sustainability of this project is critical to the survival of the community of Doringbaai and surrounding areas. However, concession 11C is more than 60 km north of Doring Bay and the proposed prospecting activities in 11C are not anticipated to impact this ranching in any way.

2.5.1 SMALL PELAGIC PURSE SEINE

The South African small pelagic fishery developed in the 1940s with sardines *Sardinops sagax* primarily targeted along the West Coast. Catches peaked in the early 1960s at around 400 000 tonnes but collapsed thereafter, thought to be a direct result of overfishing. The industry switched to smaller nets and began targeting anchovy *Engraulis encrasicolus*, which dominated the catches from about 1964 to the mid-1990s when recovery of the sardine stock was achieved under a stock rebuilding management strategy. The average annual combined (sardine, anchovy, and other species) small pelagic catch over the preceding six decades has been in the region of 330 000 tonnes, caught by a fleet of around 75 purpose-built purse seine boats (Biccard et al. 2020b) which operate on the west, south and east coasts. The fishery also targets red eye *Etrumeus whiteheadi* to a lesser degree, which along with anchovy, is processed into fish meal. Anchovy, sardine and round herring generally account for more than 90% of the total pelagic purse seine catch. The sardine catch is mostly canned with some marketed as fresh fillets or frozen for bait or human consumption. The fishery utilizes wooden, fibreglass or steel hulled purse-seine vessels and most of the large processing factories are located on the west and southwest coast (between St Helena Bay and Gansbaai) where purse seine fishing was historically concentrated.

The small pelagic fishery has the largest catch volume for any of the South African fishery sectors and has the second largest annual catch value, estimated to be worth R5.5 billion in 2021 (DFFE 2021, Japp & Wilkinson 2021). Approximately 5 800 people are employed by the small pelagic sector, with the majority employed full-time. The sea-going workers earn the highest salaries in the fishing industry (DFFE 2021). The small pelagic fishery is managed using an Operational Management Plan (OMP) that involves a trade-off between maximizing overall sardine and anchovy catches, whilst minimizing the risk of resource collapse. This trade-off is required as juvenile anchovy (which form the bulk of the anchovy catch) and juvenile sardine shoal together for much of the year. Allowance is therefore made for a sardine total allowable by-catch (TAB) of juvenile sardine in both

the early and late anchovy allocations as well as a fixed TAB for adult sardine in the round herring directed fishery. The OMP is tuned to minimize risk of resource collapse which is defined as the probability of adult biomass falling below defined historical levels at least once during the simulation model projection period of 20 years. Stock status of anchovy and round herring are currently considered optimal, whilst sardine stocks are considered depleted.

The small pelagic purse-seine fishery operates mostly in nearshore waters (within 10 km of the coast). The 11C Concession Area just borders the identified priority fishing areas for anchovy and with the sardine directed fishing ground (Figure 2.9) (Norman et al. 2018, Sink et al. 2019a).

Concession Area 11C itself, does not constitute an area where a substantial proportion of the average annual purse seine catch is made. Furthermore, the target species are pelagic, and their distribution is variable with a substantial eastwards shift in biomass documented since the late 1990s, so the fishery is unlikely to be significantly negatively affected by small temporary closures/exclusion zones around survey vessels and geotechnical survey sites.

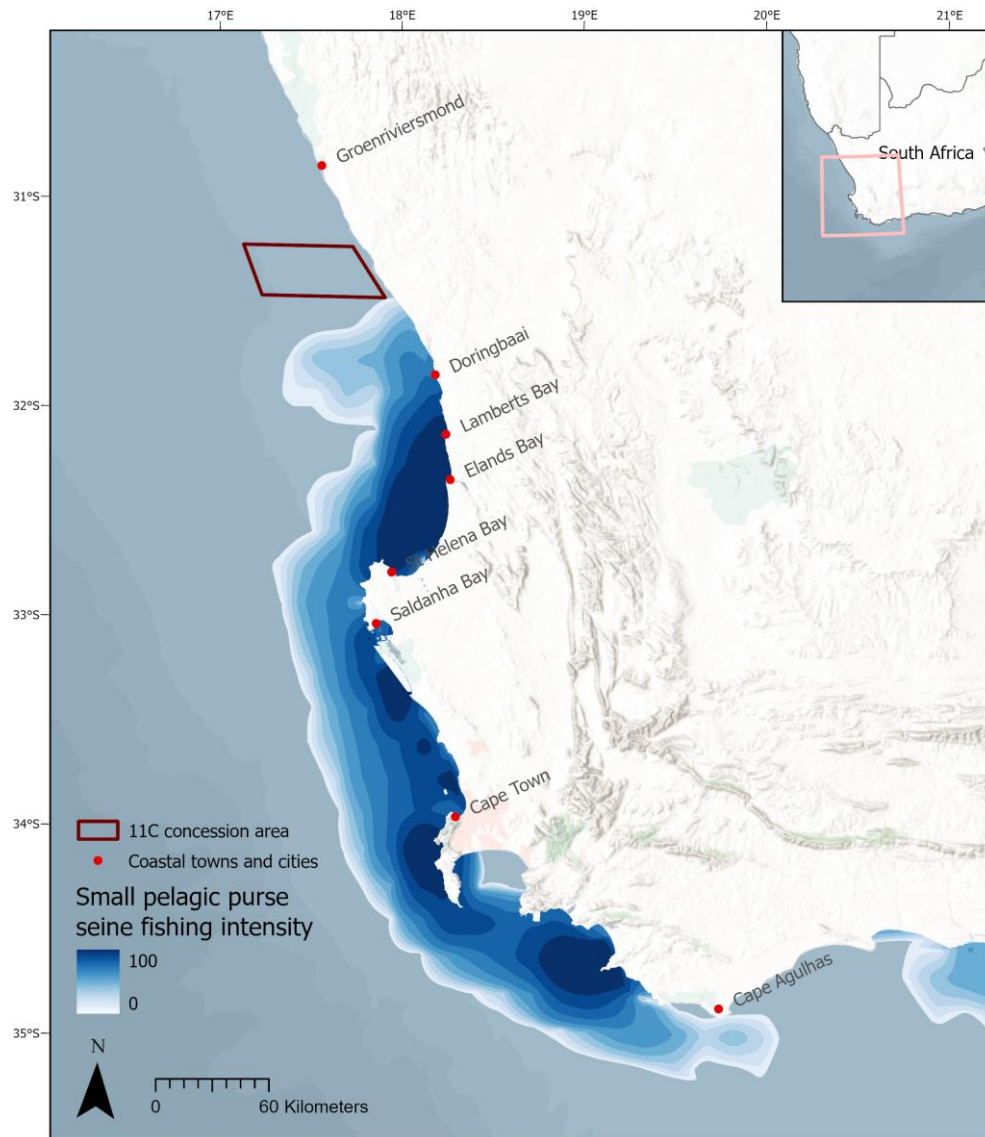


Figure 2.9. Spatial distribution of small pelagic purse seine catch (2000-2016) fishing intensity (Source: (Sink et al. 2019a).

2.5.2 TUNA POLE AND LINE

The South African tuna pole and line (TPL) sector targets albacore/longfin tuna *Thunnus alalunga*, yellowfin tuna *T. albacares*, bigeye tuna *T. obesus*, southern bluefin tuna *T. maccoyii*, and skipjack tuna *Katsuwonus pelamis* seasonally between November and May (DFFE 2025). Due to the seasonality of the TPL fishery, fishers also have access to snoek *Thysites atun* and yellowtail *Seriola lalandi* that are also important targets of the traditional linefishery. The tuna pole fleet consists of approximately 100 vessels ranging from small outboard powered skiboats (7-9 m Length) to inboard diesel-powered deck boats (6-25m length). In the most recent right allocation process 132 fishing rights were allocated for 140 vessels, valid until 2037 (DFFE 2025). The reported albacore tuna catch, which makes up the bulk of the TPL fishery, was 2 471 tonnes in 2018, with a wholesale value of R124 million, or 1.2% of the total South African commercial fisheries value, and was a similar 2 339.6 tonnes in 2023, making a up a substantial portion of the total tuna pole and line catch of 4 432 tonnes that year (Japp & Wilkinson 2021, DFFE 2025). This

fishery represents an important socio-economic sector, providing approximately 2 500 jobs and contributing significantly to local, sustainable economic value.

The commercial tuna pole fishing grounds lie between Cape Agulhas and the Orange River, but the fleet operates predominantly out of Cape Town and Hout Bay harbours and most fishing effort takes place within 100 nautical miles of these ports (particularly in the Cape Canyon area and Dassen Gat west of Yzerfontein). Some effort does take place further up the west coast, although this is mostly offshore of, or to the south of Concession Area 11C (Figure 2.10). Impacts on the TPL fleet due to the proposed prospecting activities within 11C are therefore expected to be insignificant.

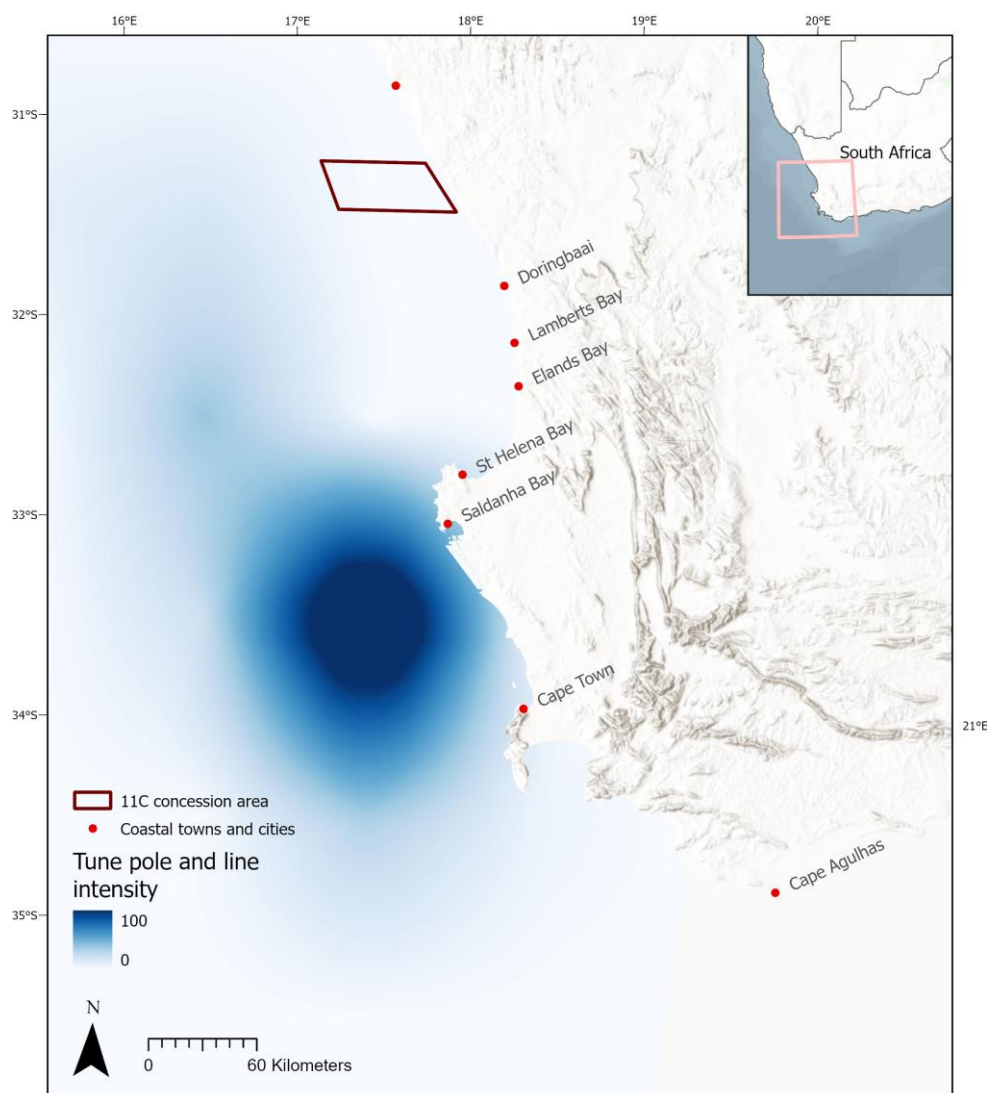


Figure 2.10. Mean tuna pole and line fishing effort intensity on the west coast of South Africa, and in relation to Concession Area 11C (Source: (Sink et al. 2019a)).

2.5.3 TRADITIONAL LINEFISH

Linefishing (or “traditional linefishing” as it is known) in South Africa is defined as the capture of fish with hook and line but typically excludes the use of longlines. Together, the three sectors of the linefishery (commercial, recreational, and small-scale) catch approximately 200 of South Africa’s 2 200 marine fish species (DFFE 2025). Linefish is a

collective term used to refer to multiple unrelated bony and cartilaginous fish species (marine and estuarine) (Mann 2013), which make up approximately 10% of South Africa's marine fish diversity (Attwood et al. 2013). Linefish species are typically predatory in nature and include several apex predators such as sharks, groupers, tunas, and large seabreams.

The commercial linefishing sector is exclusively boat-based. From 2006 a maximum allocation of 455 boats has been maintained; however, the number of boats allocated per zone has varied. Linefishing takes place year-round with a highly mobile fleet of powered boats targeting different species in areas of aggregations at different times along most of South Africa's 2 800 km coast. The traditional linefishery in South Africa uses traditional handline or rod-and-reel methods to catch their target species, most of which are reef-associated with a small number classed as pelagic. With a past effort reduction to some 455 boats in the sector, most now comprise 7 – 10 m “skiboats” with planing hulls and twin outboard engines (150 – 450 hp). About 15% of the vessels still in the commercial linefishery are traditional decked, displacement hull wooden and fiberglass boats. Commercial linefish boats carry 4-12 crew with an average of seven per vessel.

The traditional line fishery is the country's third most important fishery in terms of tonnage landed and economic value, with the wholesale value of catch being reported as R109.8 million in 2016 (CapMarine 2018). Linefishing is a low-earning, labour-intensive industry that has the highest participation of all South African Commercial Fisheries and is important from a livelihood point of view. Employing an estimated 27% of all fishers, it has the lowest average employment income of all South African fisheries. Although the commercial linefishery has the largest fleet, it contributes only 6% of the total estimated value of all South African marine fisheries (DEFF 2020).

Linefishers operate in shallow water (generally <100 m depth) and would potentially be negatively impacted by coastal and nearshore seismic exploration, prospecting and mining operations (particularly recreational, small scale and subsistence shore fishing). Concession Area 11 C is, however, relatively far offshore in water that is mostly deeper than 100 m, and far from suitable launch sites. A spatial analysis of the reported commercial linefish catch data does not show any activity in reporting blocks that overlap with Concession Area 11C (Figure 2.11) and exploration activities in this concession are expected to have negligible impacts on the traditional linefish sector. The temporary and spatially limited nature of seismic prospecting activities is also assessed to have insignificant impacts on fish (see section 3.1.1). Therefore, the inshore/offshore movements of nomadic species such as snoek and yellowtail, that are important to the linefish sector, are not expected to be significantly negatively impacted.

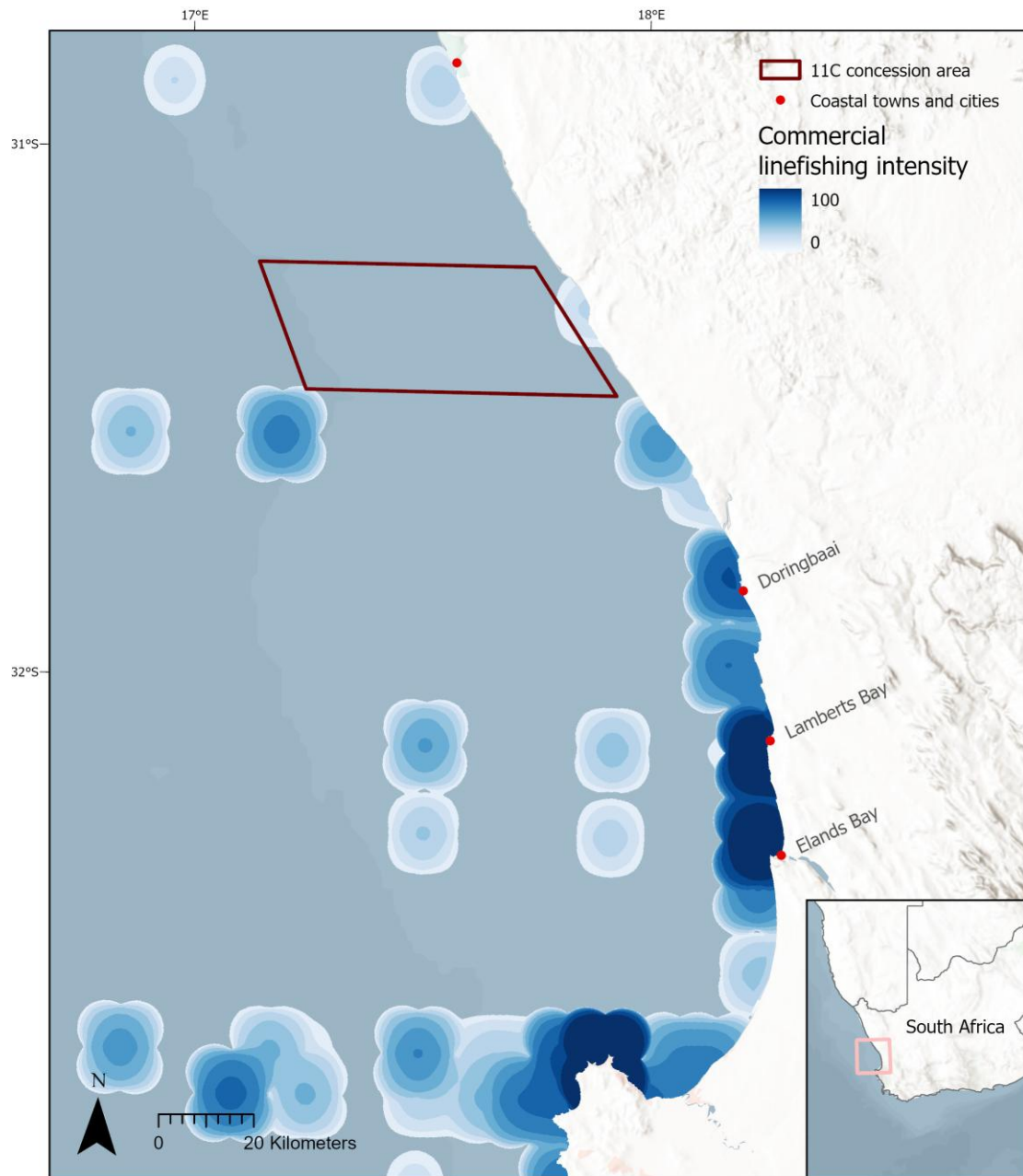


Figure 2.11. Average commercial linefishing intensity along a section of the west coast of South Africa and in relation to Concession Area 11C (Data source: (Sink et al. 2019a))

3 IMPACT ASSESSMENT

Potential impacts were identified for exploration and prospecting in marine diamond mining Concession Area 11C. Potential impacts were assessed in terms of their nature, extent, duration, intensity, probability of occurrence, potential for mitigation, cumulative effects and overall significance (Appendix 1).

3.1 IDENTIFICATION OF IMPACTS

Potential impacts to the marine environment as a result of exploration and prospecting are identified based on available literature, previous EIA and monitoring reports (Lane & Carter 1999, Penney et al. 2007, Pulfrich 2016, 2017, 2021, Biccard et al. 2018, Baker & Arnott 2021) and the specialist's own knowledge. It is assumed that a vessel with dynamic positioning will be used for all survey and sampling activities and potential impacts of anchoring on the seabed are therefore not assessed. Should this not be the case the potential impacts of anchoring must be assessed, and appropriate mitigation included in a revised EMPr. Identified potential impacts include:

- Seismic disturbance to marine fauna;
- Marine megafauna collisions with survey vessels;
- Direct impact of seabed excavation and tailings disposal during drill sampling on benthic habitats e.g. soft sediments and/or reefs and associated infaunal and epifaunal communities;
- Impact of drilling noise on marine fauna;
- Impact of artificial light at night from vessels;
- Impact on surrounding benthos and water column via fine sediment plume;
- Waste discharges during vessel operations; and
- Impacts on fisheries (and livelihoods of those who depend on these fisheries) due to exclusion zones around survey vessels and direct potential impacts on target species and supporting ecosystems.

3.1.1 SEISMIC DISTURBANCE TO MARINE FAUNA

It has become increasingly evident that noise from human activities in and around underwater environments can have an impact on marine species. The extent to which intense underwater sound might cause an adverse impact on a species is dependent upon the incident sound level, sound frequency, duration of exposure and/or repetition rate of the sound wave (Hastings & Popper 2005). As a result, scientific interest in the hearing abilities of aquatic animal species, which may be affected by noise, has increased. These studies are primarily based on evidence from high level sources of underwater noise such as blasting or impact piling, as these sources are likely to have the greatest environmental impact.

Sounds generated by vessels in addition to the noise from seismic surveys have been related to negative impacts on marine animals (Koper & Plön 2012). These negative impacts include direct effects, such as physical injury (i.e. auditory and non-auditory), stress, perceptual interference, behavioural changes, chronic responses, and indirect effects on predator species as a consequence of a change in prey distribution or abundance due to direct effects of sound on the prey (NRC 2003, Koper & Plön 2012). The impacts associated with seismic surveys are not yet fully understood and further research is ongoing.

During prospecting, sounds and vibrations emanating from sampling tools only last a few days but can be intense. Exposure to intense sounds for even short periods of time can lead to permanent hearing damage. Concerns over these disturbing effects have been raised in international literature (Richardson et al. 1986, 1990, 1995, Finley et al. 1990, Gordon et al. 1992, Richardson & Malme 1993, Bauer et al. 1993, Maybaum 1993, McCauley 1994, Bain & Dahlheim 1994, Janik & Thompson 1996, Richardson & Würsig 1997, Gisiner 1998, Würsig et al. 1998, Lesage et al. 1999, Terhune & Verboom 1999, McCauley et al. 2000, Miller et al. 2000, Au & Green 2000, Nowacek et al. 2001b a, 2004, Erbe 2002, Leung Ng & Leung 2003). However, the potential effects of diamond prospecting and mining in southern Namibia on marine mammals have been reported to be minimal (Findlay 1996).

It should be noted that natural sound sources are also emitted frequently from the ocean to a point where “sea noise” and biological sound sources (baleen whale calls, dolphin echolocation, shrimp snapping etc.) may even overshadow anthropogenic noise (Au 1993, Richardson et al. 1995, Penney et al. 2007, Pulfrich 2017).

Adverse impacts of underwater sound can be broadly summarised into three categories:

- Physical traumatic injury and fatality;
- Auditory injury (either permanent threshold shift (PTS) or temporary threshold shift (TTS); and
- Disturbance.

PLANKTON

Zooplankton and fish larvae and eggs (ichthyoplankton) cannot actively avoid the pressure from seismic survey equipment and can be killed within a distance of less than 2 m with non-lethal injuries possible within 5 m (Vereide et al. 2025). Given the rapid attenuation of acoustic energy with distance, the proportion of the water column (plankton habitat) affected at biologically meaningful thresholds is very small. Consequently, population-level effects are generally considered negligible (Merkel et al. 2012). This is supported by regional assessments, such as that conducted for the Disko West Area, Greenland, which concluded that 3D seismic surveys were unlikely to have measurable impacts on fish recruitment at a stock level (Mosbech et al. 2007). The abundance and distribution of zooplankton are highly variable, reflecting seasonal production cycles and hydrodynamic processes such as upwelling. Consequently, ichthyoplankton densities in offshore environments (i.e. the project area) are typically low and spatially dispersed. Furthermore, most regional fish species spawn in a temporally staggered manner, generally outside the survey period, with spawning peaks occurring in winter or spring (e.g. horse mackerel in winter; sardine in early spring and autumn; hake

in late winter to early spring; kingklip in August to September) (Punt & Japp 1994, Barange et al. 1998, Grote et al. 2012). There is therefore limited temporal overlap with the planned geophysical survey, which is scheduled for late summer. In addition, ichthyoplankton in the Benguela system are not restricted to near-surface waters. Eggs and larvae are frequently distributed throughout the upper water column and are often advected offshore below the surface mixed layer. Studies suggest that eggs and larvae drift slowly through the assessment area at depths of 13 – 40 m, further reducing potential exposure to peak sound levels near the surface (Gibbons & Hutchings 1996). This combination of vertical and horizontal dispersion further reduces the likelihood of sustained exposure to concentrated acoustic energy or peak pressure levels.

While there is limited site-specific information on zooplankton and ichthyoplankton densities in the assessment area, available evidence suggests that densities are unlikely to be substantially higher than those reported in comparable offshore systems (Merkel et al. 2012). Importantly, recruitment in Benguela fish populations is driven primarily by large-scale environmental variability (e.g. upwelling intensity, transport processes, and food availability), rather than localised mortality events (Ekau et al. 2001). Due to the potential impacts being over the short term, relatively localised and the temporal overlap between spawning of key fish species and therefore reduced interaction with potential elevated densities of ichthyoplankton, it is therefore most likely that impacts of the proposed geophysical survey on planktonic communities are **INSIGNIFICANT** (Table 3.1).

Table 3.1. Seismic disturbance to plankton.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Short-term 1	Very Low 3	Possible	INSIGNIFICANT	-ve	Medium
Best Practice: No essential or potential mitigation measures identified								

INVERTEBRATES

Invertebrates mostly do not possess hearing organs, but many do have tactile organs or hairs that are sensitive to underwater sound pressure (Mason 2017). Some invertebrates have highly sophisticated statocysts, which resemble the ears of fishes. While there is very little published information available about the effects of seismic noise on marine invertebrates, it has been postulated that benthic invertebrates can only hear seismic survey sounds at very close range. This implies that only surveys conducted in very shallow water will have any detrimental effects on benthic invertebrates. Studies investigating the impacts of airguns (which is more powerful than the acoustic equipment suggested in this study) on zooplankton, found that there were no discernible negative effects on the zooplankton communities (Richardson et al. 2017, Fields et al. 2019). The impacts of the acoustic survey (as proposed for this study) on zooplankton is therefore anticipated to be negligible. The overall impact of seismic disturbance to marine invertebrates in Concession Area 11C is assessed to be **INSIGNIFICANT** (Table 3.2). No mitigation is considered necessary.

Table 3.2. Seismic disturbance to invertebrates.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Short-term 1	Very Low 3	Possible	INSIGNIFICANT	-ve	Medium
Best Practice: No essential or potential mitigation measures identified								

FISH

The impacts of seismic survey noise on spawning behaviour of fish have not been quantified to date, but it is predicted that if fish are exposed to powerful external forces on their migration paths or spawning grounds, they may be disturbed or even cease spawning altogether, possibly affecting recruitment to fish stocks. The Multibeam Echo Sounder (MBES) to be used in this study is a high-frequency system (frequencies in excess of 10 kHz) and it is known that fish are unable to perceive the high frequencies that characterise these sources (Popper et al. 2014, Barham & Mason 2021). The Topas chirp SBP falls within the mid-frequency range from Popper et al. (2014) (1 kHz to 10 kHz) which is also mostly inaudible to fish (Mason 2017). Some species, particularly those that possess swim bladders, can suffer serious injury, but the majority of fish are highly mobile and are able to avoid seismic noise at levels that can cause injury (Mason 2017). Popper and Schilt (2008) conclude that as the vast majority of fish exposed to seismic sounds will in all likelihood be some distance from the source, where the sound level has attenuated considerably; only a very small number of animals in a large population will ever be directly killed or damaged by sounds from seismic sources. Possible injury or mortality in pelagic species could occur on initiation of a sound source at full power in the immediate vicinity of fish, or where reproductive or feeding behaviour may override a flight response to seismic survey sounds. The overall impact of the use of the seismic survey equipment on fish is thus assessed to be of INSIGNIFICANT risk and no mitigation is considered necessary (Table 3.3).

Table 3.3. Seismic disturbance to fish.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Short-term 1	Very Low 3	Possible	INSIGNIFICANT	-ve	Medium
Best Practice: No essential or potential mitigation measures identified								

MARINE MAMMALS

All marine mammals, through adaptation to the marine environment, have developed broader hearing ranges than are common to land mammals. These broader hearing ranges make them susceptible to acoustic trauma from geophysical survey activity. Such injuries are either temporary (temporary threshold shift – TTS) or permanent (permanent threshold shift – PTS). Injuries are likely to result in a reduction in foraging efficiency, reproductive potential, social cohesion and ability to detect predators (Weilgart 2007). The prevalence of geophysical survey data acquisition has increased across the globe in recent years, and this has prompted scientists to establish noise exposure criteria to

predict the onset of auditory effects in marine mammals in order to avoid or mitigate for such impacts (Southall et al. 2019).

To date, extensive seismic surveys have been conducted on the continental shelf on the west and south coasts of South Africa (Branch & Branch 2018). The scientific community have voiced their concern over the potential impacts associated with these seismic surveys on various groups of marine fauna. It is known that migrating whales are frequently encountered on the west coast of southern Africa during the summer months (due to feeding activity) and encounters with odontocetes such as dusky dolphins, Heaviside's dolphins and pilot whales are possible throughout the year. Furthermore, humpback whale calves are vulnerable during the southern migration which takes place during the months of September and October. The timing of seismic survey activity in Concession Area 11C should be confined to seasons when cetaceans are scarce to ensure minimal disturbance (Gründlingh et al. 2006) .

There is little information available on the levels of noise that would potentially result in physiological injury to cetaceans, and no permanent threshold shifts (PTS) have been recorded (Mason 2017). Available information suggests that the animal would need to be in close proximity to operating seismic equipment to suffer severe physiological injury (Koper & Plön 2012). As whales are highly mobile, it is assumed that they would avoid sound sources before such injury occurs. Observations show that responses to seismic activity varies between species with smaller odontocetes displaying the strongest avoidance response, while the responses of medium and large odontocetes (killer whales and pilot whales) were less marked (Mason 2017). Baleen whales showed fewer responses to seismic survey activity than small odontocetes, but all baleen whales showed changes in behavioural responses. McCauley et al. (2000) found no obvious evidence that humpback whales were displaced by seismic surveys and no apparent gross changes in the whale's migratory path could be linked to seismic survey activities, although localised avoidance of survey vessel has been noted. Such avoidance is generally considered of minimal impact in relation to the distances of migrations of the majority of whale species.

Of the proposed seismic survey activities, the Topas sub-bottom profiler system which uses shallow (35-45 kHz) and medium penetration (1-10 kHz) "Chirp" seismic pulses to map the sediment horizon could present a risk to dolphins that are known to occur in the area (mainly dusky and Heaviside's dolphins). Heaviside's dolphins are listed as Near Threatened on the IUCN Red List, are known to occur in the area, and fall into the category of mid-frequency cetaceans that could be at risk during the proposed seismic survey. Dusky dolphins (listed as "Least Concern" on the IUCN Red List) are also known to occur in the area and could also be at risk.

A noise modelling study (using marine mammal noise exposure criteria from Southall et al. (2019)) that was undertaken in Greenland in 50-250 m water depth for a similar MBES and Chirp sub-bottom profiler geophysical survey system predicted worst case scenario impact ranges for HF and LF cetacean hearing groups of less than 100 m for both PTS and TTS (Barham & Mason 2021). That said, it is recommended that a Marine Mammal and Seabird Observer (MMSO) be on duty during the proposed seismic survey activities and as a precaution, the listed mitigation measures are followed. A passive acoustic monitoring (PAM) system should also be used during survey activity to detect cetaceans that could be at risk. Implementation of these mitigation measures should ensure that

PTS and TTS impacts arising from the proposed seismic survey activities in Concession Area 11C would be unlikely.

A breeding colony of Cape fur seals (*Arctocephalus pusillus pusillus*) exists on Elephant Rock, inshore of Concession Area 11C, approximately 10 km north of the Olifants River Mouth. Seals are highly mobile animals with a general foraging area covering the continental shelf up to 120 m (approximately 220 km) offshore. It is likely that seals will be encountered during seismic exploration and sampling/prospecting activities in Concession Area 11C. In general, seals display considerable tolerance to underwater noise (Richardson et al. 1995). This has been confirmed by a study in Arctic Canada in which ringed seals *Phoca hispida* showed only limited avoidance of seismic operations (Lee et al. 2005). In another study, ringed seals were shown to habituate to industrial noise (Blackwell et al. 2004). It is likely that seals would only suffer significant injury if they were diving directly below the vessel in close proximity to the seismic source. The likelihood of this occurring is considered very low.

Based on the above, impacts to marine mammals was assessed to be of MEDIUM risk and with the implementation of mitigation (see below) this is reduced to LOW risk (Table 3.4).

Table 3.4. Seismic disturbance to marine mammals.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	High 3	Short-term 1	Medium 6	Probable	MEDIUM	-ve	Medium
Essential mitigation measures: • A designated onboard Marine Mammal and Seabird Observer (MMSO) to ensure compliance with mitigation measures during geophysical surveying. • MMSO to conduct pre-survey visual scans of at least 30 minutes for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses • “Soft starts” should be carried out for equipment with source levels greater than 210 dB re 1 µPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the vicinity. Where this is not possible, the equipment should be turned on and off over a 20-minute period to act as a warning signal and allow cetaceans to move away from the sound source. • Terminate the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area. • Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November) and ensure that migration paths are not blocked by sonar operations. • Passive Acoustic Monitoring (PAM) must be incorporated into any survey programme and used to detect cetaceans, particularly during periods of low visibility.								
With mitigation	Regional 2	High 3	Short term 1	Medium 6	Improbable	LOW	-ve	Medium

SEABIRDS

As with other vertebrates, the assessment of indirect effects of seismic surveys on diving seabirds is limited by the complexity of trophic pathways in the marine environment (Mason 2017). Impacts of seismic pulses to marine birds (diving or resting on water surface) include physiological injury, behavioural avoidance of seismic survey areas and indirect impacts due to effects on prey. The African penguin (*Spheniscus demersus*),

which is flightless and occurs along the West Coast, is particularly susceptible to impacts from underwater noise. Due to the continuous nature of the intermittent seismic survey pulses, African penguins and other diving birds would be expected to hear the sound sources at distances where levels would not induce mortality or injury and likely avoid the approaching sound source (Mason 2017). This is supported by the findings of Pichegru et al. (2017) who have shown that feeding areas within 50 km of seismic surveys are completely avoided by African penguins.

Most of the impacts identified depend on the diet of the bird species concerned and the effect of seismic surveys on the diet species. For example, plunge-diving birds forage on small shoaling fish prey species relatively close to the shore (Mason 2017). Of the diving birds that occur along the coast, only the Cape gannet *Morus capensis* regularly feeds from the inshore environment as far as 100 km offshore. Other seabirds found close inshore that may be impacted along the inner margin of Concession Area 11C include the cape cormorant, various terns and gull species. Pelagic seabirds such as albatross, petrels and shearwaters are likely to be encountered in the offshore waters of 11C and may also be impacted. The overall impact is assessed to be of LOW risk and with the implementation of mitigation (see below) is reduced to VERY LOW (Table 3.5).

Table 3.5. Seismic disturbance to seabirds.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	High 3	Short-term 1	Low 5	Probable	LOW	-ve	Medium
Essential mitigation measures: • A designated onboard Marine Mammal and Seabird Observer (MMSO) to ensure compliance with mitigation measures during geophysical surveying • MMSO to conduct pre-survey visual scans of at least 30 minutes for the presence of feeding seabirds in the survey area • If spotted wait until all marine life (seabirds, seals, cetaceans and turtles) have cleared an area of 500 m radius of the centre of the seismic source before resuming with seismic survey (initiate soft start procedure when resuming seismic survey). • Terminate the survey, if any seabirds show affected behaviour within 500 m of the survey vessel or equipment, until they have vacated the area. • Record incidences of encounters with marine life (seabirds, turtles, seals, fish) their behaviour and response to seismic survey activity. • Suspend operations if any obvious mortalities or injuries to marine life are observed.								
With mitigation	Local 1	High 3	Short term 1	Low 5	Improbable	VERY LOW	-ve	Medium

TURTLES

The overlap of turtle hearing sensitivity with the higher frequencies produced by seismic survey equipment suggests that turtles may be considerably affected by seismic noise. Recent evidence suggests that turtles only detect seismic survey equipment at close range (<10 m, possibly linked to visual rather than auditory cues) or are not sufficiently mobile to move away from approaching survey vessels (particularly if basking). Initiation of a sound source at full power in the immediate vicinity of a swimming or basking turtle could therefore result in physiological injury. Injured turtles are less mobile than other large marine fauna, and are vulnerable to both boat strikes and entanglement with

seismic towed equipment. Turtles are mostly restricted to offshore pelagic waters off the west coast of South Africa and are likely to be encountered in Concession Area 11C. However, most incidents involve foraging turtles or turtles diving in an escape response becoming trapped by towed survey equipment which is not in the scope of works for the proposed seismic survey in Concession Area 11C. The overall impact is therefore assessed to be INSIGNIFICANT. Despite the low probability of impacts on turtles during the short survey duration, their inability to timeously avoid an approaching survey vessel warrants a precautionary approach and recommended mitigation includes delayed start-ups and a 500m buffer (Table 3.6).

Table 3.6. Seismic disturbance to turtles.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Short-term 1	Very Low 3	Improbable	INSIGNIFICANT	-ve	Medium
Recommended mitigation measures:								
• A designated onboard Marine Mammal, Turtle and Seabird Observer (MMSO) to ensure compliance with mitigation measures during geophysical surveying • MMSO to conduct pre-survey visual scans of at least 30 minutes for the presence of feeding turtles in the survey area • If spotted wait until all marine life (seabirds, seals, cetaceans and turtles) have cleared an area of 500 m radius of the centre of the seismic source before resuming with seismic survey (initiate soft start procedure when resuming seismic survey). • Terminate the survey, if any turtles show affected behaviour within 500 m of the survey vessel or equipment, until they have vacated the area. • Use delayed starts for operations. • Record incidences of encounters with marine life (seabirds, turtles, seals, fish) their behaviour and response to seismic survey activity. • Suspend operations if any obvious mortalities or injuries to marine life are observed								

ESSENTIAL MITIGATION MEASURES

Current mitigation measures for impacts to marine fauna include spatial and temporal restrictions (i.e. activity restricted to specific areas or a time of year), source-based mitigation (i.e. sound containment and improvement of current equipment used), and operational mitigation where a certain protocol is followed to avoid mortalities and/or injuries to marine animals when they are encountered during survey operations. These existing mitigation measures are highly valuable for a country such as South Africa, which has a rich coastal biodiversity and is an important habitat for threatened marine species, while experiencing a rapid increase in coastal industrial developments (Koper and Plön 2012).

The Joint Nature Conservation Committee (JNCC) guidelines are considered the best practice for mitigation of impacts from geophysical surveys on marine fauna within southern Africa, and must be implemented during this project. The following mitigation measures are aligned with the JNCC (2017) guidelines, as well as those identified by Mason (2017) and Koper and Plön (2012), and their implementation is expected to reduce the severity of the aforementioned impacts:

- Consult and implement the JNCC (2017) guidelines before and during geophysical surveys. This list of mitigation measures does not exhaustively list those within the guidelines.
- Employ on board at least two independent, appropriately qualified observer(s) / MMSO(s) with experience in seabird, turtle and marine mammal identification and observation techniques to carry out daylight observations. These observers must always be on duty during daylight seismic surveys, throughout the year.
- MMSOs are to monitor the 500 m mitigation zone before and during surveys.
- The pre-survey visual/PAM scans must be 30 minutes in water <200 m deep and 60 minutes in water >200 m deep. The vast majority of the 11C concession area is <200m deep. PAM may also be required on all pre-shooting searches in deeper waters (i.e. to complement visual surveys) to increase the potential to detect species with long dive times.
- If spotted, wait until all marine life (seabirds, seals, cetaceans and turtles) have cleared an area of 500 m radius of the centre of the seismic source before resuming or beginning with the seismic survey. Beginning or resuming of survey must employ soft start. There must be a minimum of 20-minute delay from the start of the last detection within the mitigation zone and beginning of soft start.
- If marine mammals or turtles are detected within the mitigation zone during the seismic survey, either during soft start or at full power, there is no requirement to halt.
- Implement “soft starts” of at least 20 minutes duration when the SBP is deployed. Where practical, ramp up power in a uniform manner. However, it is acknowledged that not all sub-bottom profiler equipment allows for this.
- JNCC do not advise that mitigation is required for multi-beam surveys in waters shallower than 200 m. In deeper waters, it is recommended to follow the standard approach as is laid out for impacts of airguns.
- If surveys are to be undertaken at night, it is recommended that the vessel is fitted with Passive Acoustic Monitoring (PAM) technology and employs at least two PAM operators to fulfil health and safety requirements. Utilise PAM technology when surveying at night or during adverse weather conditions and thick fog (commonly encountered on the west coast of South Africa), throughout the year.
- MMSOs must record and communicate marine life (seabirds, turtles, seals, fish) incidences and responses to seismic survey activity, including data on position, distance from the vessel, swimming speed and direction and obvious changes in behaviour (e.g. startle responses or changes in surfacing/diving frequencies, breathing patterns) along with seismic noise levels.
- Suspend operations if any mortalities or injuries to marine life are observed.
- Avoid geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude

waters (beginning of June to end of November) and ensure that migration paths are not blocked by seismic/sonar operations.

- Record seabird incidences and behaviour, including any attraction of predatory seabirds and incidents of feeding behaviour around the survey vessel.
- Ensure that MMSOs compile a survey close-out report incorporating all recorded data to the relevant DFFE authorities.
- Make marine animal incidence data and seismic source output data from surveys available on request to the Marine Mammal Institute (MMI), DFFE and DMPR.

3.1.2 IMPACTS OF DRILLING NOISE ON MARINE FAUNA

Geotechnical samples to assist in understanding the sea floor geology and resource evaluation will be collected at 100-200 sites using either vibracoring, gravity coring or sonic coring. The latter is an advanced form of drilling that employs high-frequency, resonant energy generated inside the Sonic head to advance a core barrel or casing into subsurface formations, i.e. can penetrate some subsurface rock, whilst gravity and vibracoring can only sample unconsolidated material. The diameter of core samples will be approximately 10 cm, the corers will penetrate to depths of 3–8 m, and the volume per core is calculated at 0.24 m³. The total volume for the 200 cores is calculated at 4.71 m³. It is estimated that core samples would be required at a sampling rate of approximately ten cores per day which would amount to a total of ten days work. Sampling work will be restricted between the western boundary of the concession and not shallower than 20 m water depth.

Sonic coring/drilling is known to produce non-impulsive noise of a source level of 189 dB SPL, across 50-16 000 Hz (MMRPS 2015) (another study stated 50-200 Hz, (Sun et al. 2017)). Noise modelling of a survey conducted in the Irish Sea found that exceedance of TTS for VHF cetaceans was up to 600 m, and less than 240 m distance for other hearing groups (MMRPS 2015). Sonic drilling is also known to have a high drilling speed and have lower environmental impact (Sun et al. 2017).

All three drilling types produce non-impulsive sound, which is known to be less injurious to marine fauna than impulsive sound (Lenchine 2023). In general, studies have found that drilling is less likely to induce hearing damage in marine mammals than hammering noises (Huang et al. 2023). This study, which took place 3 km from the coast of Xiamen, China, found that only VHF cetaceans stood a mild chance of TTS at 18-40 m from the source of drilling noise and were unlikely to experience TTS due to vibrating noise at the same distance (Huang et al. 2023).. Furthermore, due to the small (10 cm) core diameter of these sampling methods, relatively low levels of energy would be required to undertake this drilling, and noise levels are not expected to be intense.

As the sediment sampling is estimated to take a total of ten days, it is assessed to be as “short-term”. A study 3 km from the coast of Xiamen, China found that intensity of vibrating (such as vibropiling) and drilling noise was low and close to background noise levels (Huang et al. 2023). This motivates that the intensity should be rated as “medium” (to be precautionary). The extent will be local. The likelihood of impacts occurring is “possible”, resulting in an “insignificant impact”. However, to apply precaution, mitigation measures are recommended.

Table 3.7. Impacts of drilling noise on marine fauna.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Medium 2	Short-term 1	Very Low 4	Possible	INSIGNIFICANT	-ve	Medium
Recommended mitigation measures:								
- MMSOs /PAM operators to undertake similar methods as stated above for seismic surveys, i.e. to undertake pre-drilling visual scans. Once drilling can go ahead, soft starts must be employed. - The quietest drilling method possible must be employed. - Drilling must be kept to a minimum.								

3.1.3 MARINE MEGAFaUNA COLLISIONS WITH SURVEY VESSELS

There is a low risk of survey vessel collisions with marine megafauna such as whales and turtles that are susceptible to “ship strikes”. Any increase in vessel traffic through habitat used by these animals can increase the risk of collision whilst the deployment of towed survey gear carries a risk of entanglement. The main causes of cetacean (mainly southern right and humpback whales) entanglement in South Africa involve static fishing gears particularly west coast and south coast rock lobster traps and long lines (Meyer et al. 2011). The potential for collision between cetaceans and other megafauna and the survey vessel, or entanglement in the deployed sampling equipment is directly proportional to the vessel speed and the abundance and behaviour and cetaceans in the area during the surveys. The 11C concession area is part of the natural range of several species of marine mammals including large whales such as humpback and southern right whales, but it is not considered an important aggregation site or migration route (see 2.3.3). The number of marine fauna expected to be encountered during the limited time that the survey vessel is active is therefore expected to be very low and the intensity of the impact is considered high for the individual affected animal and medium for the population as a whole. The potential impact of marine megafauna collision with the survey vessel or entanglement in sampling equipment is therefore assessed to be of VERY LOW significance and with the implementation of mitigation measures is reduced to INSIGNIFICANT (Table 3.8).

Table 3.8. Marine megafauna collisions with survey vessels.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Medium 2	Short-term 1	Low 5	Possible	VERY LOW	-ve	High
Essential mitigation measures:								
- A designated onboard Marine Mammal and Seabird Observer (MMSO) and vessel operator to keep watch for marine megafauna in the path of the vessel during all daylight vessel operations, including geophysical surveying. - If surveys are to be undertaken at night, it is recommended that the vessel is fitted with Passive Acoustic Monitoring (PAM) technology and employs at least two PAM operators. Utilise PAM technology when surveying at night or during adverse weather conditions and thick fog (commonly encountered on the west coast of South Africa), throughout the year. - Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November) and ensure that migration paths are not blocked by sonar operations.								

Vessel transit speed to not exceed 12 knots (22 km/hr), except within 25 km of the coast where it should be kept to less than 10 knots (18 km/hr) as well as when sensitive marine fauna are present in the vicinity.								
With mitigation	Regional 2	Low 1	Short term 1	Very Low 4	Improbable	INSIGNIFICANT	-ve	High

3.1.4 SEABED SAMPLING AND TAILINGS DISPOSAL

Approximately 100-200 sites will be sampled in Concession Area 11C using either vibracoring, gravity coring or sonic coring techniques. The diameter of core samples will be approximately 10 cm, the corers will penetrate to depths of 3–8 m and the material brought to the surface for analysis. The volume per core is calculated at 0.24 m³. The total volume for the 200 cores is calculated at 4.71 m³. The 200 cores will cover a total surface area of 1.57 m², although the core might impact a surface area slightly larger than this. In addition to this, prospective targets will be analysed by a uniquely designed drill tool that can dredge gravel from the seabed. Material will be processed onboard by a processing plant, and tailings will be discarded overboard, thereby causing sediment plumes, in this instance as a near-shore deposit. Pending the final tool design, the drill bit footprint will be between 3 and 5 m² with an expected average hole depth of 3m. Sample volumes are anticipated to be in the range of 9 to 15 m³ per sample. An estimated total of 300 drill samples spaced at roughly 300 m apart from north to south will be required during Phase 2 (reconnaissance sampling).

Impacts from sampling are likely to result in localised removal of benthic organisms and their habitat within the footprint of the sampling tool, which due to the relatively small size of the various coring tools, is expected to be virtually negligible. However, the impacts from drill sampling are expected to be more extensive (total area affected is approximately 1 500 m²). These impacts include direct habitat loss and smothering of the benthos adjacent to sampling sites associated with localised tailings discard. The samples are discrete (not contiguous), and as a result, recolonisation from adjacent undisturbed areas is possible. Considering the available area of similar habitat on the continental shelf of the West Coast, the reduction in benthic biodiversity through sediment removal can be considered negligible.

The impact on the offshore benthos as a result of the cumulative removal of sediments from sampling is considered to be of medium intensity at a local scale (i.e. sampling locations). Full recovery is expected to take place within the short to medium term (i.e. 6 - 15 years), as the sampled areas are expected to have slow infill rates and may persist for extended periods (years). Furthermore, biomass often remains reduced for several years as long-lived species like molluscs and echinoderms need longer to re-establish the natural age and size structure of the population. It is generally accepted that offshore disturbed areas take longer to recover than those in shallow water further inshore (Figure 3.1). Important drivers of inshore habitat recovery are related to the exposure to dynamic physical processes such as wave action and sediment refill from river mouths (Biccard et al. 2020a). Hence, recovery times greatly increase with depth and distance from sources of sedimentation (the Olifants river and Groenrivier may play a role in delivering sediment to the nearshore environment during flood events and could potentially accelerate recovery of the affected benthos).

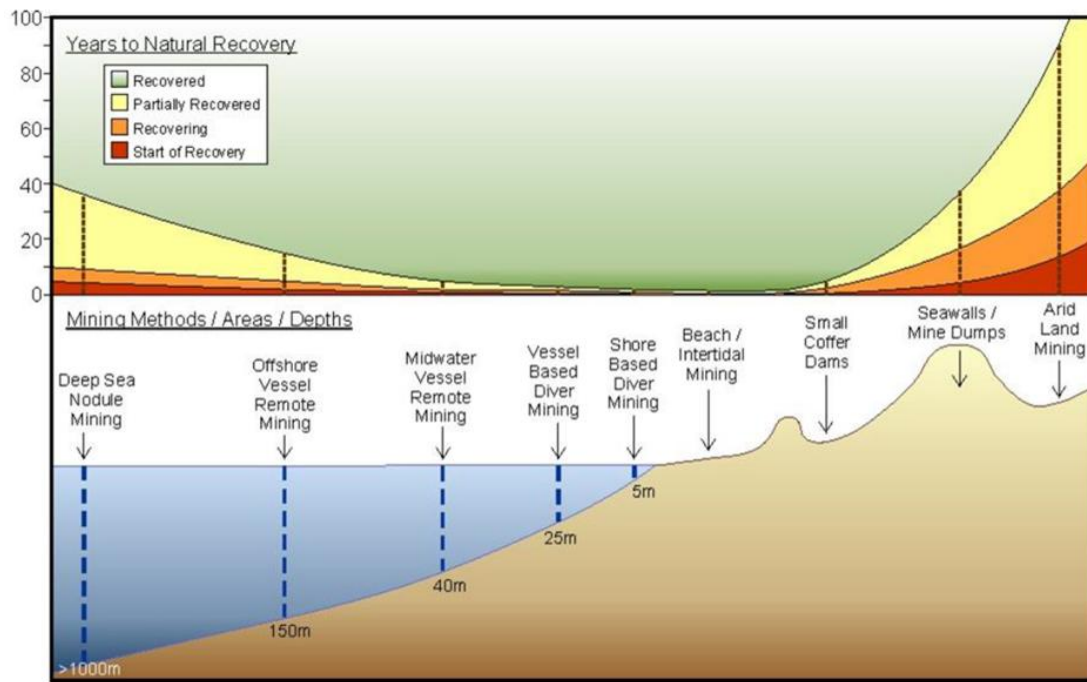


Figure 3.1. Maximum times to various stages of natural recovery (still impacted, recovering, partially recovered and recovered) reported in the literature for various local studies of marine mining, and relevant international studies on other seabed disturbances (Penney et al. 2007).

No direct mitigation is considered necessary for seabed sampling and localised smothering of the benthos (tailings disposal). However, it is possible to implement careful planning and management of potential discharges to ensure that tailings are not discarded onto sensitive reef habitat (Penney et al. 2007, Pulfrich 2017). Offshore reefs identified with geophysical tools and any prior information within Concession Area 11C should be visually assessed (by means of drop camera deployments or remotely operated underwater vehicle) during the baseline environmental survey with regular repeat surveys following mining operations in the area – offshore reefs may not be directly impacted (mined) but are at risk of being indirectly impacted by tailings disposal. Essential mitigation involves management of tailings disposal such that they are not discarded onto sensitive habitats such as reefs. This is part of the mitigation hierarchy adopted by industry leaders. With mitigation, this impact is rated to be of ‘LOW’ significance (Table 3.9).

Table 3.9. Benthic Impacts of seabed sampling and tailings disposal.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	High 3	Medium-term 2	Medium 6	Definite	MEDIUM	-ve	High
Essential mitigation measures:								
Planning and management of potential discharges to ensure that tailings are not discarded onto potentially sensitive habitats such as reefs.								
Best Practice:								
When planning where to undertake seabed sampling, sites outside of CBA: Natural areas, EBSAs and otherwise previously identified sensitive habitats must be prioritised. If these cannot be avoided then areas								

identified by geophysical surveys as potentially less sensitive should first be assessed by camera/ROV before sediment sampling takes place. Sensitive areas should be considered as a last resort.								
- Offshore reefs within Concession Area 11C should be visually assessed (by means of drop camera deployments or remotely operated underwater vehicle) during the baseline environmental survey with regular repeat surveys following mining operations in the area. - Information gathered during all seabed sampling, reef identification and seabed video/camera assessments must be made available in a usable format to the South African government (DFFE) and SANBI to inform future Marine Spatial Planning and confirmation of CBA status.								
With mitigation	Local 1	Medium 2	Medium-term 2	Low 5	Definite	LOW	-ve	High

3.1.5 FINE SEDIMENT PLUMES

During the sampling process, sedimentary material that has been brought to the surface will be processed onboard and unwanted material (tailings) will be discarded overboard, thereby causing sediment plumes. These plumes can affect light penetration through the water column and can adversely affect phytoplankton productivity in the water column (Johnston 1981, Poopech 1982, Kirk 1985, Parsons et al. 1986a b, O'Toole 1997, Monteiro 1998, Pulfrich 2017). Suspended sediment plumes can also develop either near the seabed, or in mid-water due to the dynamic collapse and diffusion of the sediment jet following the discharge. Suspended sediment concentrations generated at the point of discharge, the extent and area over which plumes disperse, and their duration, depend largely on the proportions of silts, muds and clays in the mined sediments, as well as the sea-surface conditions during disposal. The finer sediments discharged at the surface generate a plume in the upper water column, which is dispersed away from the vessel by prevailing currents, diluting to background levels at increasing distances from the vessel.

In addition to reduced phytoplankton productivity, suspended sediments may also affect the biological responses of consumers (hatching success, larval survival and foraging behaviour) provided they contain inorganic particles (Wilber & Clarke 2001). Although, these plumes differ in intensity and timing from natural background conditions, marine communities in the Benguela region are well adapted to such events as they are frequently exposed to naturally elevated suspended-sediment levels (Penney et al. 2007). Where deep-water sampling/prospecting is practiced, increased turbidity in the pelagic offshore environment as result of tailings plumes is not expected to have any significant effects on the marine biota (Penney et al. 2007, Pulfrich 2017). The latter statement is well supported as numerous modelling studies and aerial observations of plumes generated from mining vessels have shown that concentration of suspended sediments reduce rapidly with distance from the vessel, allowing a fairly fast settlement and dilution of fine sediment fractions (Figure 3.2) (Poopech 1982, Hitchcock & Drucker 1996, Shillington & Probyn 1996, CSIR 1998, Carter & Midgley 2000). In addition, studies conducted on dredge-mining operations have recorded that water-column turbidity returns to natural background levels within a few hours after dredging has ceased (Whiteside et al. 1995).

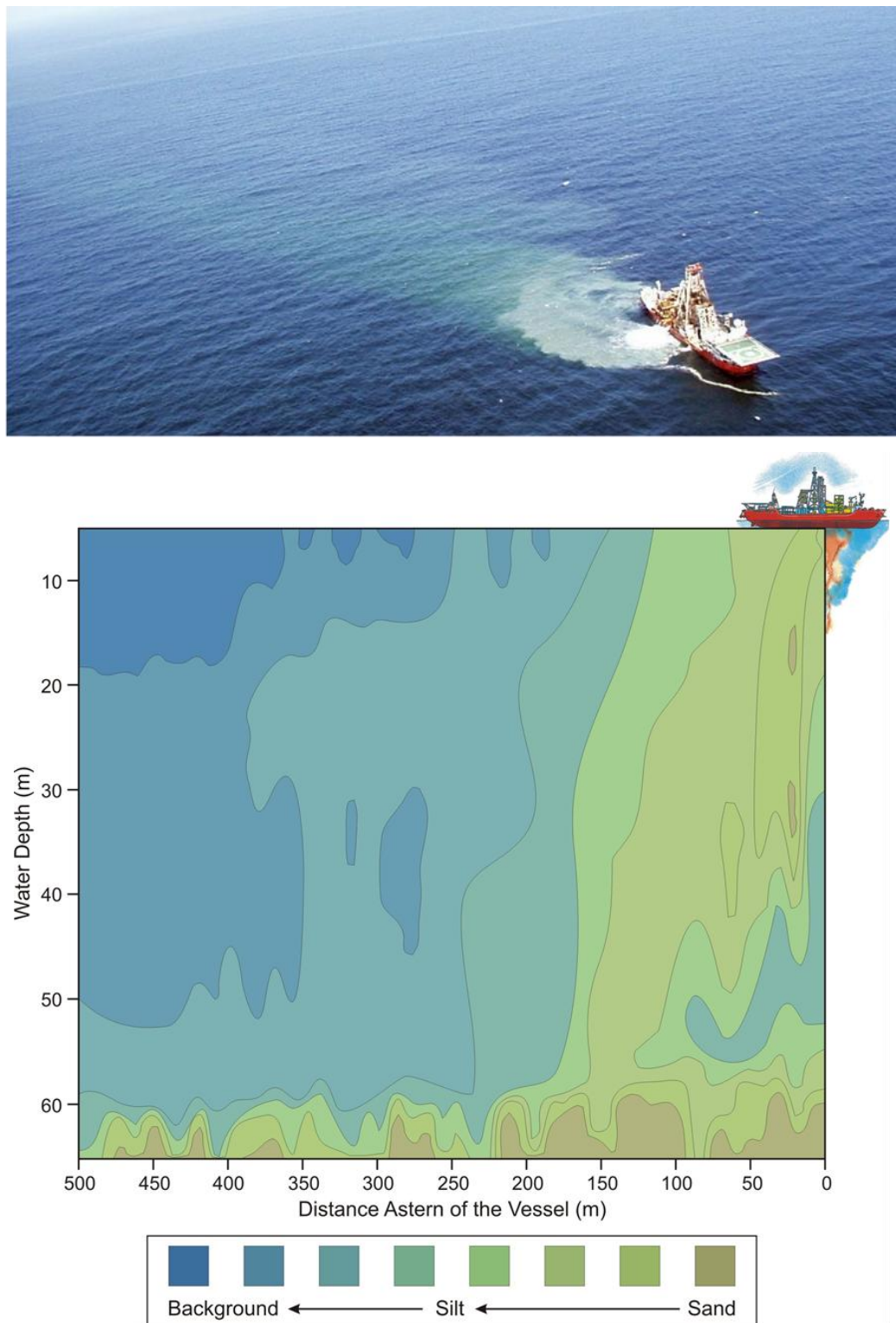


Figure 3.2. An example of suspended sediment plume from the MV Grand Banks operational in the Atlantic 1 MLA (Top). Acoustic Doppler Current Profiler (ADCP) longitudinal section along a tailings plume astern of a marine diamond mining vessel off southern Namibia, showing the depth and distance distribution of sediment particles of various size fractions behind the vessel (adapted from CSIR (1998); Penney et al. (2007)).

Sampling activities in 11C will not be contiguous. This will result in a delay in time while the seabed tool is transferred to the new sampling site before additional sediment is

released overboard with the next sample. Furthermore, the volumes of sediment that are expected to be collected and processed in this project are relatively small, and hence impacts on the environment are expected to be insignificant and without any measurable cumulative impact (Table 3.10). No direct mitigation is feasible as tailings disposal is an integral part of this sampling method.

Table 3.10. Potential Impact of tailings discharge and fine sediment plumes on the pelagic habitat.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Short-term 1	Very low 3	Definite	VERY LOW	-ve	High
Best Practice: No essential or potential mitigation measures identified								

3.1.6 IMPACT OF ARTIFICIAL LIGHT AT NIGHT FROM VESSELS

Artificial light at night is a significant source of light pollution that interferes with the natural cycles of light and darkness and modifies the intensity, spectra, frequency and duration of light reaching and penetrating the natural water bodies, including the ocean's surfaces, and natural landscapes (Zapata et al. 2019, Nelson et al. 2021). During this project phase, vessels associated with survey activities are likely to be the greatest source of artificial light at night.

The impact of artificial light at night on natural ecosystems and wildlife populations is receiving increasing research attention, and there is a wealth of information that illustrates that artificial light at night influences animal orientation, circadian rhythm (nocturnal and diel activity), spatial distribution, habitat use, migration/dispersal, foraging efficiency and predatory behaviour, schooling behaviour in fish, stress hormones, and reproduction and life history traits (Brüning et al. 2018, Nelson et al. 2021, Bassi et al. 2022). Artificial light at night can influence the different levels of ecosystem organisation from individual organisms' physiology and behaviour through to ecosystem function and provision of ecosystem services (Zapata et al. 2019).

The biological effects of artificial light at night include metabolic disruption, oxidative stress, immunological dysfunction, sleep loss, energy expenditure and altered growth rate (Navara & Nelson 2007, Bedrosian et al. 2011, Wyse et al. 2011, Gaston et al. 2015, Raap et al. 2015). These effects are linked to organisms' internal rhythms that are driven by daily, seasonal, and lunar light cycles (Gaston & Sánchez De Miguel 2017).

Sensitivity to light and requirements for optimal living conditions and ecological functioning varies between groups of organisms (e.g., invertebrates, fish, birds, reptiles, humans) and even within species (CWA 2020). Most organisms utilise light or visual cues to locate and capture food. For aquatic species, it is well known that different taxa (such as phytoplankton, zooplankton, fish, squid and prawns) respond to artificial light (Timmer & Magellan 2011, Grubisic 2018, Bassi et al. 2022) and biological responses will vary with the magnitude, duration, frequency, and predictability of exposure to artificial light at night (Zapata et al. 2019).

Fish have exhibited changes in circadian rhythm at illuminances (1 lux) that occur in indirectly illuminated environments (Brüning et al. 2018). Values well below 1 lux are

commonly found for moonlight and skyglow (Jägerbrand & Bouroussis 2021). Normal working light from a ship has been found to disrupt fish and zooplankton behaviour to at least 200 m depth across an area of >0.125 km² around the ship (Berge et al. 2020). It is important to note that behavioural responses to artificial light vary among taxa. While some species are known to be attracted to light, others are known to avoid light (Marangoni et al. 2022). Zooplankton tend to avoid light, undertaking diel vertical migration to depth during daylight to avoid the threat of visual predation, and surfacing at night to feed. Diurnal vertical migration is a characteristic feature in all oceans and is considered to be the largest synchronised movement of biomass on the planet (Hays 2003). This process has a strong effect on the movements of pelagic communities and as it occurs in response to light, has the potential to be greatly affected by artificial light (Berge et al. 2020).

Offshore, where oceanscapes tend to have less artificial lighting than near the coast, an intense source point of artificial light can attract marine birds across long distances (Montevecchi 2006). Bird strikes, involving a variety of species, on artificially lit vessels at sea are common at night (Merkel 2010). Many nocturnal seabird species are highly attracted to artificial light, as they forage on bioluminescent prey (Imber 1975, Montevecchi 2006). Intense artificial light can cause birds, particularly migrating passerines, to circle the light source for hours to days, especially during foggy and overcast conditions, such as those frequently occurring on the West Coast, sometimes resulting in the birds collapsing from exhaustion, potentially limiting them from having sufficient energy to make landfall or survive winter and/or reproduction. The attraction of marine birds, especially seabirds such as prions, storm petrels, and petrels, to offshore hydrocarbon platforms due to artificial lighting often results in collisions due to disorientation, which may cause mortality. Storm-petrels, petrels and shearwaters are more attracted to artificial light in their fledgling stage than when they are adults, making the fledglings more vulnerable to impacts such as collisions. Marine birds have also been observed feeding in the artificial light from vessels and hydrocarbon platforms, as the light tends to concentrate their prey (Montevecchi 2006, Marangoni et al. 2022). The amount of light spill that will reach the areas surrounding the vessels is unknown but will be influenced to a large degree by climate/atmospheric conditions. Artificial skyglow (direct lighting emitted or reflected upwards, scattered in the atmosphere and reflected back to the ground; see Kyba et al. (2011)) can spread light pollution hundreds of kilometres from its source (Luginbuhl et al. 2014).

Due to their extensive distributions, the numbers of pelagic species (large pelagic fish, turtles and cetaceans) encountered during the proposed geophysical survey is expected to be low. Given that the Concession Area is located near to a main marine traffic route, the area is already impacted by increased anthropogenic lighting and the intensity of the impact is considered to be of low significance (meaning the impacts are anticipated to result in minor/slight change, disturbance, or nuisance with minor consequences or deterioration, given the small number of additional vessels this work will involve). Due to anticipated numbers and the proximity of survey area to the main traffic routes, the increase in ambient lighting in the offshore environment would be of low intensity and regional in extent (although limited to the area in the immediate vicinity of the vessel) over the short-term (4 months). (Table 3.11). While the sensitivity of receptors to vessel lighting is considered to be high, the impact is assessed as of low significance prior to mitigation because of the short-term duration and small extent (Table 3.11). While the use of lighting on project vessels cannot be eliminated due to safety and navigational

requirements, and the vessel will operate as per its owner approved operating procedures, the application should ensure that these procedures encourage angling lights downwards rather than out to sea, restricting use of lights to a minimum and the use of red filters. With the implementation of these mitigation measures, this impact can be reduced to very low negative significance (Table 3.11).

Table 3.11. Impact of artificial light at night from vessels on marine fauna.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Low 1	Short-term 2	Low 5	Probable	LOW	-ve	High
Essential Mitigation measures:								
• Reduce the lighting to a minimum compatible with safe operations whenever and wherever possible to reduce nocturnal faunal attraction. • Position light sources, if possible and consistent with safe working practices, in places where emissions to the surrounding environment can be minimised i.e., aim lighting downward rather than out to sea. • Plan procedures for how to care for downed seabirds and ensure that personnel are adequately trained in this regard. • Monitor the presence of seabirds and identify mortalities, even when birds do not land on the vessel, especially in foggy conditions and at night. • Report ringed/banded birds to the appropriate ringing/banding scheme (details are provided on the ring).								
With mitigation	Regional 2	Low 1	Short-term 1	Low 5	Possible	VERY LOW	-ve	High

3.1.7 WASTE DISCHARGES DURING VESSEL OPERATIONS

Water quality in the vicinity of exploration, sampling and associated support vessels may be impaired by various forms of waste discharged into the marine environment. During operation, normal discharges to the sea can come from a variety of sources but these are all regulated generally by onboard waste management plans which must be MARPOL compliant. The impacts on marine life depend on the properties of the waste discharged. The various kinds of waste produced at sea, their associated impacts and management protocols are outlined below.

DISCHARGE OF WASTES AND HYDROCARBONS

Vessel operators may experience accidental spills from operational machinery, which could include hydrocarbons such as hydraulic fluids, diesel, oils and/or hazardous substances. Spills of this nature are highly toxic and unless carefully managed, may pollute nearshore and coastal environments as well as damage and potentially destroy, marine organisms (wreckage of a vessel). The duration of the impact would depend on the biodegradation of the type of waste. Solid wastes (e.g. plastics, scrap metals) may take decades or centuries to degrade. Cumulative impacts are unlikely due to the low likelihood of major accidents such as collision or wreckage. Strict waste management plans should be enforced for all operators; all deck drainage from workspaces and ballast water to be discharged must meet the MARPOL compliance level of 15 ppm oil in water. This is achieved through use of an oily-water separation system. The oily substances must be skimmed off the top of the discharge water and added to the waste (oil) lubricants and disposed of on land.

SEWAGE

In accordance with MARPOL, sewage effluent must not produce visible floating solids in, nor cause discolouration of the surrounding water. The treatment system must provide primary settling, chlorination and dechlorination before the treated effluent can be discharged into the sea. The discharge depth is variable, depending upon the draught of survey vessel at the time, but should not be less than 5 m below the surface.

LITTER

Large numbers of marine organisms, including fish and marine mammals, are killed or injured by becoming entangled in debris (Wallace 1985), while others, including seabirds, are at risk through the ingestion of small plastic particles (Shomura & Yoshida 1985). The problem of litter entering the marine environment has escalated dramatically in recent decades, with an ever-increasing proportion of litter consisting of non-biodegradable plastic materials. Objects that are particularly harmful to marine fauna include plastic bags and bottles, pieces of rope and small plastic particles (Wehle & Coleman 1983). Large numbers of marine organisms, including fish, birds and marine mammals, are killed or injured by becoming entangled in debris (Wallace 1985) while others, including seabirds, are at risk through the ingestion of small plastic particles (Shomura & Yoshida 1985). All reasonable measures must be implemented to ensure that no littering takes place during installation, operation and closure of oil and gas production facilities.

FOOD (GALLEY) WASTE

Food waste may be discharged after it has been passed through a grinder in cases where the drilling unit or production facility is located more than 3 nautical miles offshore. Discharge of whole food waste is permitted beyond 12 nautical miles offshore. The ground wastes must be capable of passing through a screen with openings <25 mm. The daily volume of discharge from a standard drilling unit is expected to be <0.5 m³ (Pulfrich 2015). This volume is not expected to be exceeded for exploration and prospecting activities in Concession Area 11C.

DETERGENTS

Detergents used for washing exposed marine deck spaces are discharged overboard. The toxicity of detergents varies greatly depending on their composition, but low-toxicity, biodegradable detergents should preferably be used. Those used on work deck spaces would be collected with the deck drainage and treated as described above.

COOLING WATER

Electricity on exploration, sampling and associated support vessels is typically provided by diesel-powered engines and generators, which are cooled by pumping water through a set of heat exchangers. The cooling water is then discharged overboard. Other equipment is cooled through a closed loop system, which may use chlorine as a disinfectant. Such water would be tested prior to discharge and would comply with relevant Water Quality Guidelines.

Based on the relatively small volumes of waste that can be expected, the potential impact of operational discharges from exploration and sampling/prospecting on the marine environment are of very low consequence, and the extent is likely to be limited to the immediate area around the vessel(s).

Overall, the potential impact of operational discharges on the marine environment is considered to be of VERY LOW significance. With the implementation of the stipulated mitigation measures this is reduced to INSIGNIFICANT (Table 3.12).

Table 3.12. Waste discharge during vessel operation.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Medium-term 2	Very low 4	Probable	VERY LOW	-ve	High
Essential Mitigation measures: • Inform & empower all staff about sensitive marine species & suitable disposal of waste; • Ensure compliance with relevant MARPOL standards; • A Shipboard Oil Pollution Emergency Plan (SOPEP) must be prepared for all vessels and should be in place at all times during operations; • Deck drainage should be routed to a separate drainage system (oily water catchment system) for treatment to ensure compliance with MARPOL (15 ppm); • All hydraulic systems should be adequately maintained and hydraulic hoses should be frequently inspected; and • Spill management training and awareness should be provided to crew members of the need for thorough cleaning-up of any spillages immediately after they occur in order to minimise the volume of contaminants washing off decks. Best Practice: • Develop a waste management plan using waste hierarchy; • All process areas should be bunded to ensure drainage water flows into the closed drainage system; • Drip trays should be used to collect run-off from equipment that is not contained within bunded areas and the contents routed to the closed drainage system; • Low-toxicity biodegradable detergents should be used in the cleaning of all deck spillages;								
With mitigation	Local 1	Low 1	Short term 1	Very low 3	Improbable	INSIGNIFICANT	-ve	High

3.1.8 IMPACTS ON FISHERIES

According to the International Regulations for Preventing Collisions at Sea (COLREGS 1972), vessels engaged in seismic surveys are recognised as vessels limited in their ability to manoeuvre and as such, vessel engaged in other activities (such as fishing) are obliged to give way. Furthermore, the implementation of a safety (exclusion) zone around the seismic vessel will exclude any other users of the sea from these areas. In practice, this exclusion zone takes form of a moving footprint extending around the survey vessel (Mason 2017). In this case, the size of the footprint can be expected to be around 500 m in extent.

Exclusion of fishing vessels from fishing areas, possible altered behaviour of fish due to seismic activities and interference with shipping could have (indirect) socio-economic implications for the affected industries. Fisheries might be affected by target species avoiding seismic survey areas for several days after the survey has terminated or the vessel has moved on (Mason 2017).

Fisheries sectors operating within Concession Area 11C that could be impacted include those listed in section 2.5 (small pelagic purse seine, tuna pole and line and traditional linefish). Overlap with each of these sectors is shown in Figure 2.9, Figure 2.10 and Figure

2.11– the catches from these sectors made within the Concession Area 11C are all of limited significance as a proportion of the national total catch of each of these fisheries. Furthermore, the remote, the offshore location of the 11C concession area (50 km north of the nearest coastal fishing community at Doringbaai and with a landward boundary 5 km offshore) means that impacts on local small-scale **fishers** due to prospecting in this concession area will not occur. Overall, the impact is assessed to be INSIGNIFICANT and recommended Best Practice would be to inform key stakeholders from the potentially affected Small pelagic, Tuna Pole and line and Traditional Linefish sectors (Table 3.13).

Table 3.13. Impact on fisheries.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 2	Short-term 1	Very Low 3	Possible	INSIGNIFICANT	-ve	High
Best Practice: Prior to survey commencement, key stakeholders (see below) should be consulted and informed of the proposed survey activity and the likely implications thereof.								

BEST PRACTICE RECOMMENDATION

Prior to survey commencement, the following key stakeholders should be consulted and informed of the proposed survey activity (including navigational co-ordinates of the survey area, timing and duration of proposed activities) and the likely implications thereof:

- Fishing industry / associations (contactable via liaison@fishsa.org):
 - SA Marine Linefish Management Association (SAMLMA);
 - South African Pelagic Fishing Industry Association (SAPFIA);
 - South African Tuna Association (SATA);
 - South African Tuna Longline Association (SATLA);
 - Large Pelagic Small Medium & Micro Enterprises Association (LPSMME); and
 - Local fishing communities.
- Other associations and organs of state
 - DFFE;
 - SAMSA;
 - South African Navy Hydrographic office; and
 - Overlapping and neighbouring right holders.

These stakeholders should again be notified at the completion of surveying when the survey vessel(s) is/are off location. The operator must request, in writing, that the South African Navy Hydrographic office release Radio Navigation Warnings and Notices to Mariners throughout the survey periods. The Notice to Mariners should give notice of (1) the co-ordinates of the proposed survey area, (2) an indication of the proposed timeframes of surveys and day-to-day location of the survey vessel(s), and (3) an indication of the required safety zone(s) and the proposed safe operational limits of the survey vessel. These Notices to Mariners should be distributed timeously to fishing companies and directly onto vessels where possible.

3.1.9 CUMULATIVE IMPACTS

Anthropogenic activities can result in numerous and complex effects on the natural environment. While many of these are direct and immediate, the environmental effects of individual activities or projects can interact with each other in time and space to cause incremental or aggregate effects. Impacts from unrelated activities may accumulate or interact to cause additional effects that may not be apparent when assessing the activities individually. Cumulative effects are defined as the total impact that a series of developments, either present, past or future, will have on the environment within a specific region over a particular period of time (DEAT IEM Guideline 7, Cumulative effects assessment 2004).

Coastal and marine mining is a well-established along South Africa's west coast between St Helena Bay and the Orange River mouth (Figure 3.3). There are prospecting and mining permits allocated for most of the nearshore, land based and surf zone coastal concessions between the Olifants and Orange River mouths (Figure 3.3). These mines are largely extracting diamondiferous gravels. Between the Olifants estuary mouth and Brand se Baai mineral sands are extracted by Tormin and Tronox mines in intertidal and land based coastal operations respectively. There are also offshore oil and gas production and prospecting licenses with additional exploration applications currently underway (Figure 3.3). The prospecting and exploration methods for oil and gas exploration (seismic surveys and core/drill sampling) are similar (although normally of greater intensity as the oil and gas reserves are typically deeper and located in pockets of sedimentary rock below the sea floor) to those used for offshore diamond and other mineral exploration. There has been a recent increase in applications for prospecting and exploration rights along the west coast and increased prospecting/survey activity in the short term and marine mining in the long-term is anticipated.

This means that cumulative impacts of marine prospecting and mining must be considered at a broader spatial scale in a strategic manner for each potential impact identified. Obtaining detailed information on the scale, extent, methodology (and hence intensity) of various current and pending applications is, however, not possible within the prescribed timeframes of a Basic Assessment Process for a single application (such as this one). This requires a revised strategic level Environmental Impact Assessment to assess cumulative impacts with a medium to high level of confidence. The last strategic level EIA that assessed marine and coastal diamond mining Impacts in the region was a Benguela Current Large Marine Ecosystem Programme (BCLME) study undertaken over the period 2004–2007 (Penney et al. 2007).

It is, however, logical and reasonable, to anticipate that many of the potential impacts assessed for this project would continue together with other projects that are ongoing or scheduled to come on-line. The result is that the spatial Extent would change from "local" to "regional", whilst the duration would change from "short-term" (<2 years) to at least "medium term" (2–15 years) or even "long-term" (>15 years, mostly reversible in the case of prospecting, but not always for mining). The intensity of impacts is anticipated to remain as they are assessed here for operations of this nature, but may be higher for other sea-based mineral and energy projects in different areas with different objectives. Each of the impacts identified in Section 3.1.1 to Section 3.1.8, can thus be assessed in this manner to determine their cumulative impacts.

For the purpose of assessing the cumulative impacts of prospecting within Concession area 11C, a precautionary approach was taken. This requires an assessment of a “worst case” scenario. In other words, instead of assessing the cumulative impacts of each impact identified in Section 3.1.1 to Section 3.1.8, we assessed the negative impact that was found to be of highest significance, i.e., the Medium Significance impact of seismic surveys on marine mammals. Then we can assume that the cumulative impacts of all other impacts will either be of the same, or lower significance.

We therefore provide an assessment of the negative cumulative impacts of marine prospecting along the west coast that demonstrates how an impact that was assessed as being of “Medium” significance would be assessed as being of “High” negative significance when considering it in conjunction with other projects and their impacts (Table 3.14).

Effective implementation of international best practice mitigation measures (in this example of potential seismic survey impacts on cetaceans that would include seasonal timing of the surveys, compulsory MMSOs, soft starts, PAM monitoring etc.) by all active operations would reduce the “probability” of the impact and result in a “MEDIUM” significance cumulative impact. This assessment will also have a “low confidence” due to the lack of information on other activities in the region.

Table 3.14. Assessment of cumulative Impacts of a “MEDIUM” Significance negative significance (e.g. Underwater noise disturbance to marine mammals) by numerous, simultaneous or sequential marine prospecting operations along the South African west coast.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH	-ve	Low
Proposed mitigation measures. Mitigation measures as recommended for each individual impact. In this example: • A designated onboard Marine Mammal and Seabird Observer (MMSO) (at least 1 per shift) to ensure compliance with mitigation measures during geophysical surveying. • MMSO to conduct pre-survey visual scans of at least 30 minutes for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses • “Soft starts” should be carried out for equipment with source levels greater than 210 dB re 1 µPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the vicinity. Where this is not possible, the equipment should be turned on and off over a 20 minute period to act as a warning signal and allow cetaceans to move away from the sound source. • Terminate the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area. • Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November) and ensure that migration paths are not blocked by sonar operations. • Passive Acoustic Monitoring (PAM) must be incorporated into any survey programme and used to detect cetaceans, particularly during periods of low visibility.								
With mitigation	Regional 2	Medium 2	Long-term 3	High 7	Possible	MEDIUM	-ve	Low

The same assessment should be applied to the positive impacts that have been identified. We again take a modest approach and assess the lowest positive impact, i.e., the “INSIGNIFICANT” socio-economic benefits of prospecting on the local communities

of the area. We can then assume that the cumulative impacts of all other positive impacts will either be of the same, or higher significance. We therefore provide an assessment of the positive cumulative impacts of marine prospecting along the west coast that demonstrates how an impact that was assessed as being “INSIGNIFICANT”, would be assessed as being of “VERY LOW” positive significance when considering it in conjunction with other projects and their impacts (Table 3.15). Note that the assessment was based on a short-term duration so as to not overestimate the positive impacts.

Table 3.15. Assessment of cumulative Impacts of an “INSIGNIFICANT” positive significance (e.g. Local socio-economic benefits) by numerous, simultaneous or sequential marine prospecting operations along the South African west coast.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Medium 2	Short-term 1	Low 5	Possible	VERY LOW	+ve	Low
No mitigation measures deemed necessary.								

It is recommended that a strategic level Environmental Impact Assessment (EIA) process based on marine spatial planning principles be undertaken to assess and manage potential cumulative impacts in a holistic manner and to identify and implement regional level mitigation measures. The decision-making authority (DMPR) must take cognisance of this recommendation to do a strategic level EIA in order for Specialists and Environmental Assessment Practitioners to accurately assess cumulative impacts.



Figure 3.3. Extent of prospecting and mining applications and operations along South Africa's West Coast (Source: Sowman et al. (2023)).

4 CONCLUSIONS AND RECOMMENDATIONS

Anchor Environmental Consultants were requested to undertake a marine specialist study for Trans Atlantic Diamonds (Pty) Ltd who are applying for a diamond prospecting right for Concession Area 11C, offshore of the Western Cape Coast. Proposed activities include geophysical exploration and sampling/prospecting to detect the presence of palaeo-beach deposits at different submerged sea levels that occur in Concession Area 11C, which are known from other concessions to contain diamondiferous gravels. Seismic surveying will be conducted using a dedicated survey vessel with a hull-mounted MBES (high frequency range) and Topas sub-bottom profiler (SBP) system (mid-frequency range) collecting high-resolution acoustic data. A description of the affected environment is provided. Habitat and biota of conservation importance were identified and mapped in relation to the proposed survey area. The likelihood of occurrence of affected marine fauna within the proposed survey area was ascertained from available literature. Important user groups such as fisheries are described and mapped in relation to the proposed survey area. Potential impacts from the proposed exploration and prospecting activities were identified. Impacts were assessed and, where possible, mitigation measures have been identified to avoid/minimise/reduce any impacts.

Assessment of potential impacts associated with the proposed activities range from medium to insignificant but with effective mitigation these are all reduced to very low, low or insignificant (Table 4.1). The potential impact of most concern that was assessed as Medium negative significance prior to mitigation was seismic disturbance to marine mammals. It is known that migrating humpback and southern right whales are frequently encountered on the west coast of southern Africa and encounters with odontocetes such as dusky dolphins and Heaviside's dolphin (listed as Near Threatened on the IUCN Red List are likely throughout the year (Elwen et al. 2010, IUCN 2025). Furthermore, humpback calves are vulnerable during the southern migration which takes place during the months of September and October.

Of the proposed seismic survey activities, the Topas sub-bottom profiler system which uses shallow (35-45 kHz) and medium penetration (1-10 kHz) "Chirp" seismic pulses to map the sediment horizon could present a risk to dusky and Heaviside's dolphins. These species are regarded as mid-frequency cetaceans (Simon Elwen pers. comm.) that could be at risk during the proposed seismic survey. A noise modelling study (using marine mammal noise exposure criteria from Southall et al. (2019)) that was undertaken in Greenland in 50-250 m water depth for a similar MBES and Chirp sub-bottom profiler geophysical survey system predicted worst case scenario impact ranges for HF and LF cetacean hearing groups of less than 100 m for both PTS and TTS (Barham & Mason 2021). It is recommended that MMSOs be on duty during the proposed seismic survey activities and as a precaution, the listed mitigation measures are followed. Should seismic surveys continue into the night or during periods of low visibility (mist is frequently encountered at sea along the west coast), it is also recommended that a passive acoustic monitoring (PAM) system be used. Seismic surveying must be confined to seasons when cetaceans are scarce to ensure minimal disturbance (Gründlingh et al. 2006). Implementation of these mitigation measures should ensure that potential impacts on marine mammals arising from the proposed seismic survey activities in Concession Area 11C would be unlikely.

Temporary exclusion of fishing vessels from the concession area during seismic survey and sampling/prospecting activities is also of potential concern. However, there are very low levels of historical fishing catch and effort reported by the potentially affected small pelagic, tuna pole and longline sectors in the 11C concession area. Furthermore, the remote, offshore location of the 11C concession area means that impacts on local small-scale fisherman due to prospecting in this concession area are improbable. Overall, the potential impacts on fisheries are assessed to be insignificant. Offshore reef habitat is expected to be encountered in Concession Area 11C (Figure 2.4). These reefs are considered sensitive habitat, and it is recommended that they be visually assessed (by means of drop camera deployments or remotely operated underwater vehicle) during the baseline environmental survey with regular repeat surveys in the event of future mining operations in the area – offshore reefs may not be directly impacted (mined) but are at risk of being indirectly impacted by smothering from tailings disposal. These offshore rocky reefs are colonised by a range of epifauna including bryozoans, encrusting and upright sponges, solitary and colonial ascidians, sea anemones and cold-water coral colonies – the latter being slow-growing and taking many years to become established (Biccard et al. 2020a). Studies undertaking assessments of prospecting and mining-related impacts on these habitats in this region are relatively new and the time taken for disturbed epifaunal communities inhabiting offshore rocky reefs to recover has not yet been determined (Biccard et al. 2020a).

Table 4.1. Summary table of potential marine ecological and fisheries impacts associated with offshore diamond exploration activities (seismic survey and sampling/prospecting) in South African Sea Area Concession Area 11C.

Impact	Mitigation	Consequence	Probability	Significance	Status	Confidence
Seismic disturbance to plankton	No mitigation	Very Low 3	Possible	INSIGNIFICANT	-ve	Medium
Seismic disturbance to invertebrates	No mitigation	Very low	Possible	INSIGNIFICANT	-ve	Medium
Seismic disturbance to fish	No mitigation	Very low	Possible	INSIGNIFICANT	-ve	Medium
Seismic disturbance to marine mammals	No mitigation	Medium	Probable	MEDIUM	-ve	Medium
	With mitigation	Medium	Improbable	LOW	-ve	Medium
Seismic disturbance to seabirds	No mitigation	Low	Probable	LOW	-ve	Medium
	With mitigation	Low	Improbable	VERY LOW	-ve	Medium
Seismic disturbance to turtles	No mitigation	Very low	Improbable	INSIGNIFICANT	-ve	Medium
Impact of drilling on marine fauna	No mitigation	Very low	Possible	INSIGNIFICANT	-ve	Medium
Marine megafauna collisions with survey vessels	No mitigation	Low	Possible	VERY LOW	-ve	High
	With mitigation	Very low	Improbable	INSIGNIFICANT	-ve	High

Impact	Mitigation	Consequence	Probability	Significance	Status	Confidence
Offshore based seabed sampling and tailings disposal	No mitigation	Medium	Definite	MEDIUM	-ve	High
	With mitigation	Low	Definite	LOW	-ve	High
Fine sediment plumes	No mitigation	Very low	Definite	VERY LOW	-ve	High
Artificial light at night from vessels	No mitigation	Low	Probable	LOW	-ve	High
	With mitigation	Low	Possible	VERY LOW	-ve	High
Waste discharges during vessel operations	No mitigation	Very low	Probable	VERY LOW	-ve	High
	With mitigation	Very low	Improbable	INSIGNIFICANT	-ve	High
Impact on fisheries	No mitigation (see best practice recommendations)	Very Low	Possible	INSIGNIFICANT	-ve	High
Cumulative impacts of 'medium' significance	No mitigation	High	Probable	HIGH	-ve	Low
	With mitigation	High	Possible	MEDIUM	-ve	Low
Cumulative impacts of 'insignificant' significance	No mitigation	Low	Possible	VERY LOW	+ve	Low

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6 APPENDICES

6.1 APPENDIX I. IMPACT RATING METHODOLOGY

The significance of all potential impacts that would result from the proposed project is determined in order to assist decision-makers. The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur. The significance of each identified impact was thus rated according to the methodology set out below:

Step 1 – Determine the consequence rating for the impact by determining the score for each of the three criteria (A-C) listed below and then adding them. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

Rating	Definition of Rating	Score
A. Extent – the area over which the impact will be experienced.		
Local	Confined to project or study area or part thereof (e.g. limits of the concession area)	1
Regional	The region (e.g. the whole of Namaqualand coast)	2
(Inter) national	Significantly beyond Saldanha Bay and adjacent land areas	3
B. Intensity – the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources.		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. Duration – the time frame for which the impact will be experienced and its reversibility.		
Short-term	Up to 2 years	1
Medium-term	2 to 15 years	2
Long-term	More than 15 years (state whether impact is irreversible)	3

The combined score of these three criteria corresponds to a Consequence Rating, as follows:

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Example 1:

Extent	Intensity	Duration	Consequence
Regional	Medium	Long-term	High
2	2	3	7

Step 2 – Assess the probability of the impact occurring according to the following definitions:

Probability – the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Example 2:

Extent	Intensity	Duration	Consequence	Probability
Regional 2	Medium 2	Long-term 3	High 7	Probable

Step 3 – Determine the overall significance of the impact as a combination of the consequence and probability ratings, as set out below:

PROBABILITY					
CONSEQUENCE		Improbable	Possible	Probable	Definite
	Very Low	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	Low	VERY LOW	VERY LOW	LOW	LOW
	Medium	LOW	LOW	MEDIUM	MEDIUM
	High	MEDIUM	MEDIUM	HIGH	HIGH
	Very High	HIGH	HIGH	VERY HIGH	VERY HIGH

Example 3:

Extent	Intensity	Duration	Consequence	Probability	Significance
Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH

Step 4 – Note the status of the impact (i.e. will the effect of the impact be negative or positive?)

Example 4:

Extent	Intensity	Duration	Consequence	Probability	Significance	Status
Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH	-ve

Step 5 – State the level of confidence in the assessment of the impact (high, medium or low).

Impacts are also considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in the table below. Depending on the data available, a higher level of confidence may be attached to the assessment of some impacts than others. For example, if the assessment is based on extrapolated data, this may reduce the confidence level to low, noting that further ground-truthing is required to improve this.

Confidence rating	
Status of impact	+ve (beneficial) or -ve (cost)
Confidence of assessment	Low, Medium or High

Example 5:

Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH	-ve	High

The significance rating of impacts is considered by decision-makers, as shown below. Note, this method does not apply to minor impacts which can be logically grouped into a single assessment.

INSIGNIFICANT: the potential impact is negligible and will not have an influence on the decision regarding the proposed activity.

VERY LOW: the potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity.

LOW: the potential impact may not have any meaningful influence on the decision regarding the proposed activity.

MEDIUM: the potential impact should influence the decision regarding the proposed activity.

HIGH: the potential impact will affect a decision regarding the proposed activity.

VERY HIGH: The proposed activity should only be approved under special circumstances.

Step 6 – Identify and describe practical mitigation and optimisation measures that can be implemented effectively to reduce or enhance the significance of the impact. Mitigation and optimisation measures must be described as either:

- Essential: must be implemented and are non-negotiable; and
- Best Practice: must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Essential mitigation and optimisation measures must be inserted into the completed impact assessment table. The impact should be re-assessed with mitigation, by following Steps 1-5 again to demonstrate how the extent, intensity, duration and/or probability change after implementation of the proposed mitigation measures.

Example 6:

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH	-ve	High
Essential mitigation measures								
• Xxx • Xxxx								
With mitigation	Local 1	Low 1	Long-term 3	Low 5	Improbable	VERY LOW	-ve	High

OR

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Low 1	Medium term 2	Very low 4	Improbable	INSIGNIFICANT	-ve	High
Mitigation measures:								
Not considered to be necessary due to low significance.								

Step 7 – Prepare a summary table of all impact significance ratings as follows:

Phase	Impact identified	Severity	Probability	Significance	Status	Confidence
xxxxxx	Impact 1: xxx	Medium	Improbable	LOW	-ve	High
	With mitigation	Low	Improbable	VERY LOW	-ve	High
	Impact 1: xxx	Very Low	Definite	VERY LOW	-ve	Medium
	With mitigation	Very Low	Improbable	INSIGNIFICANT	-ve	Medium

Indicate whether the proposed development alternatives are environmentally suitable or unsuitable in terms of the respective impacts assessed by the relevant specialist and the environmentally preferred alternative.



**BASIC ASSESSMENT PROCESS FOR THE PROPOSED
PROSPECTING IN SEA CONCESSION AREA 11C BY TRANS
ATLANTIC DIAMONDS (PTY) LTD**

Trans Atlantic Diamonds (Pty) Ltd
Office 1603 Portside
4 Bree Street
Cape Town, Western Cape, 8001



Appendix 5:
Heritage Specialist Study

Anchor Environmental Consultants
8 Steenberg House, Silverwood Close, Tokai, South Africa
www.anchorenvironmental.co.za





TerraMare Archaeology (Pty) Ltd

Archaeological and Heritage Consulting

Project Number: J0101

Date: 2026-03-11

To: Anchor Environmental
8 Steenberg House
Silverwood Close
Tokai
7945

Contact: Cheruscha Swart
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Email: [cheruscha@anchorenviro
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Concession Area 11C: Report Validity Confirmation Letter

Dear Cheruscha

In 2021, I produced a maritime Heritage Impact Assessment (HIA) for ACO Associates cc to support the Prospecting Rights renewal application by Trans Atlantic Diamonds (TAD) for Sea Concession Area 11C (EA Application WC30/5/1/1/2/10384PR), which extends from approximately 9 km north of the Tronox Namakwa Sands mine at Brand se Baai to Pikkersbaai, about 30 km north of the mouth of the Oliphants River on the west coast of the Western Cape Province

TAD missed the submission deadline for the application and is currently reapplying for the Prospecting Right. As part of this re-application, the Department of Mineral and Petroleum Resources (DMPR) has advised TAD that the Public Participation Process must be repeated and may use the original Basic Assessment Report (BAR) and Environmental Management Programme (EMPr). However, the DMPR has stipulated that the application must be supported by letters from the specialists confirming that their studies remain valid and applicable.

Proposed Prospecting Activities in Concession Area 11C:

The prospecting activities within Concession Area 11C assessed in the 2021 HIA included geophysical surveying and seabed sampling to identify and target potentially diamondiferous deposits within the concession area.

The geophysical survey aimed to collect high-resolution seismic, multibeam echosounder and magnetometer seabed data across the concession area.

TerraMare Archaeology (Pty) Ltd (Reg. No. 2023/885234/07)

Directors: J Gribble, G.L Euston-Brown

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The seabed sampling programme entailed the collection of between 100-200 vibrocores and/or sonic drill cores, depending on the seabed sediment conditions. Each core will have a diameter of 10 cm and will be collected to depths of between three and five metres below the seabed surface.

The 2021 HIA for Concession Area 11C found that of these physical activities, the seabed sampling had the potential to directly impact submerged heritage resources. The proposed geophysical surveying would have no impact on heritage resource in or on the seabed.

Summary of the 2021 HIA Findings:

The 2021 HIA assessed the potential within Concession Area 11C for palaeontological resources, submerged prehistoric archaeological sites and/or materials, and maritime archaeology (principally historical shipwrecks). The following findings were made:

- Palaeontology: Sea level oscillations during ice-age/glacial shallowing episodes have resulted in the erosion of Neogene and Quaternary cemented crusts or “hardgrounds”. This has produced loose surficial seabed sediment which can contain a wide array of phosphorite nodules, phosphatic shell casts of various ages, the fossilised bones and teeth of sharks and other fishes, the skulls of extinct whale species and the occasional remains of land-living animals that roamed the ice-age exposed shelf.

The HIA found that examples of this fossil material may be found in the core samples and recommended that any fossils found during the processing of the core samples must have the details of their context recorded and be kept for identification by an appropriate specialist. If significant, these finds must be deposited in a curatorial institution such as the IZIKO SA Museum.

The PIA also recommended that a set of cores from this palaeontologically poorly known area is subject to detailed study, possibly as a post-graduate project, with radiocarbon dates: this to ensure the identification of, for example, extralimital, Agulhas “sub-fossil” shell species in the loose shells of the Last Transgression Sequence which requires a level of seashell knowledge.

- Submerged Prehistory: Although there have been no specific studies of the submerged prehistory of the West Coast, the well-documented archaeological evidence for a hominin presence along the coast and hinterland adjacent to Concession Area 11C in the Earlier, Middle and Later Stone Age is plentiful.

The occupation and exploitation of the exposed continental shelf by hominins during periods of lower sea level is attested by finds of prehistoric archaeological material in submerged, marine contexts in Table Bay and elsewhere in the world. This, and the long occupation human occupation of the West Coast, suggests that archaeological sites and materials could be present on and within the seabed of Concession Area 11C in water depth is less than 120 m, the approximate lowest sea level stand of the last glacial period.

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Such prehistoric archaeological material may be affected by core sampling, although the significance of any prospecting-related impacts on such material was assessed in the HIA to be very low. It was, nevertheless, recommended that a) any core sample sections which contain alluvial material, particularly where organic remains are present, are retained for palaeoenvironmental assessment and b) the possibility is considered of retaining samples of the coarser fraction (i.e. gravel and stone bigger than c. 20 mm) of sorted core sediment for assessment by an archaeologist for the presence of prehistoric lithic material.

- Maritime Archaeology: The maritime history of the West Coast dates to almost the first days of the Dutch settlement in Table Bay but there are relatively few recorded wrecks in the vicinity of Concession Area 11C. Neither of the two recorded historical wrecks in the area – the *Zulu Coast I* and *Meteren* – are within the concession area and while the possibility exists for the remains of currently unknown and unrecorded wrecks to be present, the likelihood was assessed to be remote and impacts to historical shipwrecks were scoped out of the HIA.

Statement of Continued Validity and Applicability of the HIA:

The current TAD reapplication for the Prospecting Right in Concession Area 11C is being undertaken on the basis of the same activities proposed in the 2021 application.

A review of the findings of the 2021 HIA also indicates that the heritage resources baseline for Concession Area 11C established in the HIA, against which the Prospecting Right application was assessed, remains unchanged.

Potential impacts to heritage resources in or on the seabed of Concession Area 11C, and the measures recommended to mitigate such impacts are, thus, expected to remain the same for the current Prospecting Right application.

Based on the above I can confirm that, based on my professional opinion, the 2021 HIA remain valid and applicable.

Yours sincerely



John Gribble

for TerraMare Archaeology (Pty) Ltd

MARITIME ARCHAEOLOGICAL IMPACT ASSESSMENT FOR PROSPECTING RIGHTS APPLICATION: SEA CONCESSION AREA 11C, WEST COAST, WESTERN CAPE PROVINCE

Assessment conducted under Section 38 (8) of the
National Heritage Resources Act (No. 25 of 1999) as part of a Basic Assessment

Prepared for

Anchor Environmental Consultants (Pty) Ltd

On behalf of

Trans Atlantic Gem Sales DMCC

Draft for Comment: 25 October 2021



ACO Associates cc
Archaeology and Heritage Specialists

Prepared by

John Gribble

ACO Associates cc

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Fax to e-mail: 086 603 7195

EXECUTIVE SUMMARY

ACO Associates cc has been commissioned by Anchor Environmental Consultants (Pty) Ltd on behalf of Trans Atlantic Gem Sales DMCC, to undertake a desktop maritime archaeological impact assessment to support a prospecting right application for Sea Concession Area 11C which extends from approximately 9 km north of the Tronox Namakwa Sands mine at Brand se Baai to Pikkersbaai, about 30 km north of the mouth of the Oliphants River on the west coast of the Western Cape Province.

The proposed prospecting will entail geophysical surveys and core sampling. Of these activities the core sampling has the potential to affect submerged heritage resources. Core sampling to 3-5 m below seafloor will take place at between 100-200 locations across the concession area.

This desktop maritime heritage impact assessment provides an assessment of the maritime and underwater cultural heritage potential of the concession area, within a study defined as a 1 km buffer around the concession area boundary.

Findings:

Although there have been no specific studies of the submerged prehistory of the West Coast, the archaeological evidence for a hominin presence in the vicinity of the study area in the Earlier, Middle and Later Stone Age is plentiful. The past occupation and exploitation of the continental shelf by hominins during periods of lower sea level suggests that archaeological sites and materials can be expected on and within the current seabed that comprises the concession area.

Extensive cemented crusts or “hardgrounds” formed on formations exposed at the seabed during the Neogene and Quaternary. Sea level oscillated repeatedly, dropping to ice-age palaeoshorelines resulting in these hardgrounds being eroded during the ice-age/glacial shallowing episodes and re-cemented again during interglacial deepening. This has produced a wide array of multiphase phosphorite nodules and phosphatic shell casts of various ages. The bones and teeth of sharks and other fishes, the skulls of extinct whale species and the occasional remains of land-living animals that roamed the ice-age exposed shelf are also phosphatized and reworked into the latest, loose sediments from the Last Transgressive Sequence on the seabed.

The marine shell fossils which occur in the Last Transgression Sequence are predominantly the species expected on the West Coast Shelf, but unexpected species and “extralimitals” (species beyond their normal home range) are quite common. Cold water Agulhas extralimitals have mainly been found during diamond sampling/mining off northern Namaqualand but they can be expected to be more abundant further south such as in Concession Area 14A, as well as more species occurring. In addition to dating the incursions on Agulhas current influence, the individual shells are snapshot archives of the palaeoceanographic conditions at the time, as revealed by incremental analyses of stable isotopes and trace elements

The maritime history of the West Coast dates back to almost the first days of the Dutch settlement in Table Bay but there are relatively few recorded wrecks in the vicinity of the concession area. Neither of the two historical wrecks in the area – the *Zulu Coast I* and *Meteren* – are within Concession Area 11C or the study area created for this assessment and while the possibility exists for the remains of currently unknown and unrecorded wrecks to be present in the concession area, this is so remote that it has been discounted.

Conclusions:

This assessment of the heritage resources of Concession Area 11C indicates that there may be some potential for submerged prehistoric archaeological material in sediments to be affected by prospecting, in that portion of the concession area where the water depth is less than 120 m. Although the significance of any prospecting-related impacts on such material is assessed to be very low, it is recommended that:

- any core sample sections which contain alluvial material, particularly where organic remains are present, are retained for palaeoenvironmental assessment; and
- the possibility is considered of retaining samples of the coarser fraction (i.e. gravel and stone bigger than c. 20 mm) of sorted core sediment for assessment by an archaeologist for the presence of prehistoric lithic material.

These actions would result in the changing of the impact status from negative to positive because of a potential benefit to archaeological research and knowledge that could accrue from access to such information.

With regard to palaeontological resources, fossils found during the processing of the core samples must have the details of context recorded and be kept for identification by an appropriate specialist and if significant, to be deposited in a curatorial institution such as the IZIKO SA Museum. The identification of extralimital, Agulhas “sub-fossil” shell species in the loose shells of the Last Transgression Sequence requires a level of seashell knowledge. The best outcome for a set of cores from this poorly-known area is that they are the subject of a detailed study, possibly as for a B.Sc. Honours or M.Sc. project, with radiocarbon dates.

It is suggested that TAGS engage with the archaeologist and palaeontologist prior to the geotechnical campaign to discuss and agree these proposed mitigation measures.

There appears to be little or no potential for the presence of historical shipwrecks in the concession area and this heritage receptor was scoped out of the assessment of impact.

In the unlikely event that shipwreck material or seabed debris is identified in the geophysical data to be collected as part of the prospecting programme or during the prospecting itself, the find must be reported to the archaeologist and SAHRA and then avoided during the core sampling.

It is our reasoned opinion that the proposed prospecting activities in Concession Area 11C are likely to have a very low impact on submerged prehistoric and palaeontological heritage resources, and no impact on maritime and underwater cultural heritage resources.

Provided the recommendations to mitigate and offset potential impacts are implemented, the proposed prospecting can be considered to be archaeologically and palaeontologically acceptable.

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SPECIALIST DECLARATION

I, John Gribble, declare that:

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



Signature of the specialist

ACO Associates cc

Name of company (if applicable):

25 October 2021

Date

GLOSSARY

Archaeology: Remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Early Stone Age: The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Holocene: The most recent geological time period which commenced 10 000 years ago.

Hominin: A member of the tribe Hominini which comprises those species regarded as human, directly ancestral to humans, or very closely related to humans.

Late Stone Age: The archaeology of the last 20 000 years associated with fully modern people.

Marine Isotope Stages: Alternating warm and cool periods in the Earth's paleoclimate, deduced from oxygen isotope data reflecting changes in temperature derived from data from deep sea core samples.

Middle Stone Age: The archaeology of the Stone Age between 20 000-300 000 years ago associated with early modern humans.

Pleistocene: A geological time period (of 3 million – 10 000 years ago).

Quaternary: The current and most recent of the three periods of the Cenozoic Era spanning the period from ± 2.5 million years ago to the present.

SAHRA: South African Heritage Resources Agency – the compliance authority which protects national heritage.

ABBREVIATIONS

BA	Basic Assessment
DMRE	Department of Mineral Resources and Energy
EA	Environmental Authorisation
EEZ	Exclusive Economic Zone
HIA	Heritage Impact Assessment
LSA	Late Stone Age
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002)
MSA	Middle Stone Age
NEMA	National Environmental Management Act (No. 107 of 1998)
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
UNCLOS	United Nations Convention on the Law of the Sea

1 INTRODUCTION

ACO Associates cc has been commissioned by Anchor Environmental Consultants (Pty) Ltd (Anchor) on behalf of Trans Atlantic Gem Sales DMCC (TAGS), to undertake a desktop maritime archaeological impact assessment to support a prospecting right application for Sea Concession Area 11C which extends from approximately 9 km north of the Tronox Namakwa Sands mine at Brand se Baai to Pikkersbaai, about 30 km north of the mouth of the Oliphants River on the west coast of the Western Cape Province (Figure 1).

TAGS is applying to the Department of Mineral Resources and Energy (DMRE) for a right to undertake offshore prospecting activities, in terms of Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA), as amended. The proposed prospecting activities require Environmental Authorisation (EA) in terms of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), as amended, and an applicant must also comply with Chapter 5 of NEMA with regards to consultation and reporting. For DMRE to consider an application for EA for the proposed prospecting operations, a Basic Assessment (BA) process must be undertaken.

2 PROJECT DESCRIPTION

TAGS's proposed prospecting operations will consist of geophysical surveying and seabed sampling to identify and target potentially diamondiferous deposits within Concession Area 11C.

The following phases of prospecting activity are anticipated:

- Phase 1 will consist of a comprehensive literature review to investigate the depositional environments, sediment stratigraphy and geological units in the area, followed a geophysical survey to collect high-resolution seismic, multibeam echosounder and magnetometer seabed data.

The literature review will allow the applicant to identify target prospecting sites within the concession area while the geophysical data will allow the identification and mapping of features and various rock formations and sedimentary types within the concession area.

Based on the information about the geology of the seabed within Concession Area 11C generated in Phase 1, an appropriate sampling programme for Phase 2 will be developed.

- Phase 2 will comprise of programme of seabed core sampling activities using vibrocores and/or sonic drill cores – each of which is effective for different seabed sediment conditions.

Between 100-200 core samples, each with a diameter of 10 cm, will be collected to depths of 3-5 m below the seabed surface.

- Phase 3 will draw the data generated by Phases 1 and 2 into a feasibility study that will estimate of the extent, distribution and the size of the mineral resource present and make recommendations regarding future mining of the concession area.

Of the prospecting activities to be undertaken as part of this application it is the seabed coring which has the potential to affect submerged heritage resources.

It is understood that the prospecting right will not provide the required environmental authorisation (EA) to TAGS for mining activities to be undertaken and that any future intention to undertake mining within the application area will require a further application for EA, accompanied by the necessary impact assessment and public consultation process.

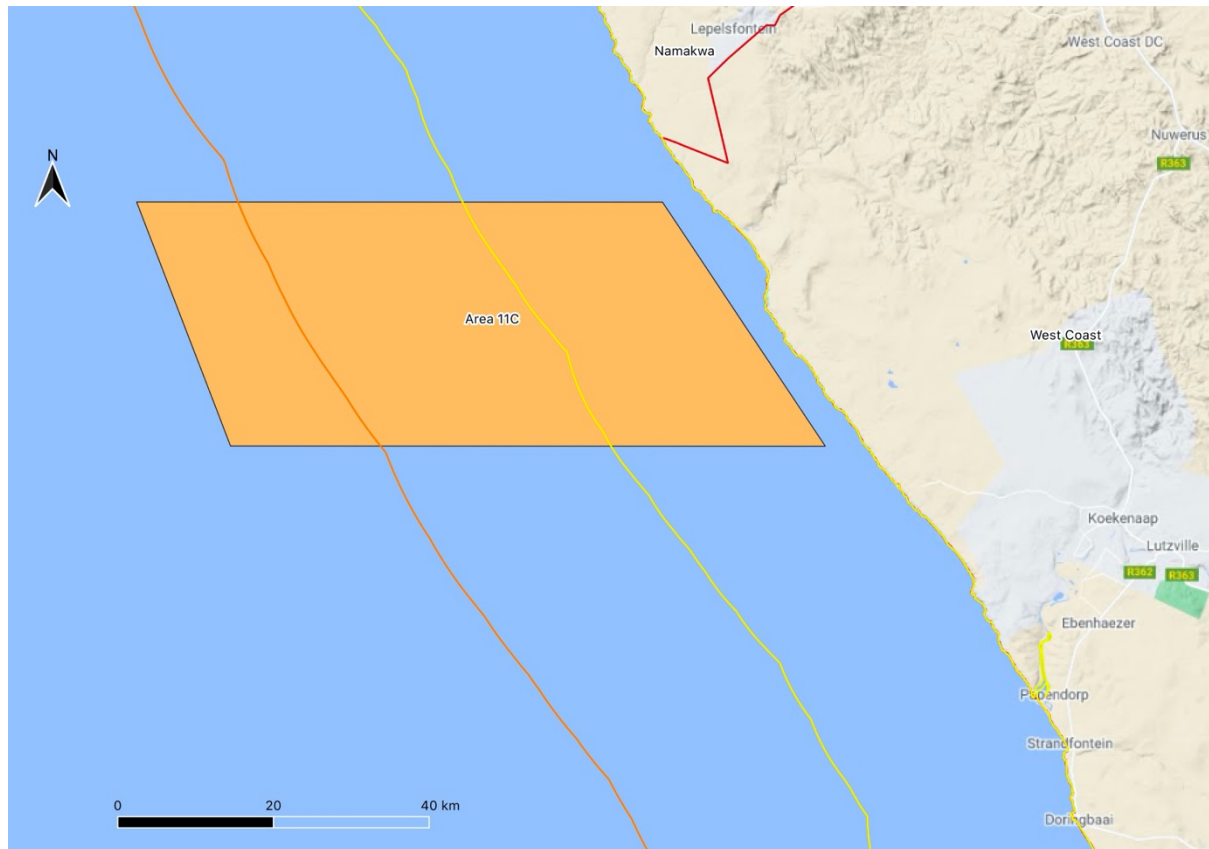


Figure 1: The location of Concession Area 11C on the West Coast. The yellow and red lines which bisect the concession area mark the outer edges of South Africa's territorial waters and maritime cultural / contiguous zone respectively (Source: Google Earth).

3 TERMS OF REFERENCE

As part of the BA process, TAGS has appointed specialists to assess the potential risks of prospecting on the marine environment, heritage resources, commercial fisheries and socio-economic resources within Concession Area 11C.

ACO Associates has been commissioned to produce a Heritage Impact Assessment (HIA) to identify heritage resources which may be impacted by the prospecting activities in the concession area, to assess their significance and provide recommendations for mitigation, as required by the NEMA, as amended.

This document therefore includes the following:

- A desk-top level literature review to assess the potential for maritime archaeological sites, and submerged pre-colonial sites within the concession area; and

- A comment from a palaeontologist regarding the potential for impacts to palaeontological features and material arising from the prospecting in the concession area.

The results of the studies listed above are integrated in this HIA report, along with an assessment of the sensitivity and significance of any heritage resources, an evaluation of the potential impacts on them arising from prospecting activities in and on the seabed, and recommendations for measures to mitigate any negative impacts of these activities on them.

The HIA must be submitted for comment to the South African Heritage Resources Agency (SAHRA), the relevant statutory commenting body under the NEMA.

4 RELEVANT LEGISLATION

4.1 National Heritage Resources Act (No 29 of 1999)

The National Heritage Resources Act (NHRA) came into force in April 2000 with the establishment of SAHRA, replacing the National Monuments Act (No. 28 of 1969 as amended) and the National Monuments Council as the national agency responsible for the management of South Africa's cultural heritage resources.

The NHRA reflects the tripartite (national/provincial/local) nature of public administration under the South African Constitution and makes provision for the devolution of cultural heritage management to the appropriate, competent level of government.

Because national government is responsible for the management of the seabed below the mean high water mark, however, the management of maritime and underwater cultural heritage resources under the NHRA does not devolve to provincial or local heritage resources authorities but remains the responsibility of the national agency, SAHRA.

The NHRA gives legal definition to the range and extent of what are considered to be South Africa's heritage resources. According to Section 2(xvi) of the Act a heritage resource is "any place or object of cultural significance". This means that the object or place has aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

In terms of the definitions provided in Section 2 of the NHRA, maritime and underwater cultural heritage can include the following sites and/or material relevant to this assessment:

- Material remains of human activity which are in a state of disuse and are in or on land [which includes land under water] and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures (Section 2(ii));
- Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts

found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation (Section 2(ii)); and

- Any movable property of cultural significance which may be protected in terms of any provisions of the NHRA, including any archaeological artefact or palaeontological specimen (Section 2(xxix)).

Of the heritage resource types protected by the NHRA, the proposed prospecting in Concession Area 11C has the potential to impact the following:

- Submerged pre-colonial archaeological sites and materials;
- Maritime and underwater cultural heritage sites and material, which are principally historical shipwrecks; and
- Palaeontological features and material, which are defined by the NHRA as the fossilised remains or fossil trace of animals or plants which lived in the geological past.

As per the definitions provided above, these cultural heritage resources are protected by the NHRA and a permit from SAHRA is required to destroy, damage, excavate, alter, deface or otherwise disturb any such site or material.

It is also important to be aware that in terms of Section 35(2) of the NHRA, all archaeological objects and palaeontological material is the property of the State and must, where recovered from a site, be lodged with an appropriate museum or other public institution.

4.2 Maritime Zones Act (No 15 of 1994)

South Africa's Maritime Zones Act of 1994 is the national legislative embodiment of the international maritime zones set out in the United Nations Convention on the Law of the Sea (UNCLOS). The Act defines the extent of the territorial waters, contiguous zone, exclusive economic zone (EEZ) and continental shelf (which together comprises of some 4.34 million square kilometres of seabed) and sets out South Africa's rights and responsibilities in respect of these various maritime zones.

Under the terms of Sections 4(2) and 6(2) of the Maritime Zones Act respectively, "any law in force in the Republic, including the common law, shall also apply in its territorial waters" and "subject to any other law the Republic shall have, in respect of objects of an archaeological or historical nature found in the maritime cultural zone, the same rights and powers as it has in respect of its territorial waters". The NHRA applies, therefore, within South Africa's territorial waters (12 nautical miles seaward of the baseline) and to the outer limit of the maritime cultural zone (24 nautical miles seaward of the baseline) (see Figure 1 above).

Concession Area 11C straddles the territorial waters and maritime cultural / contiguous zone, and approximately a quarter of the concession area lies outside the 24 nautical mile limit of the maritime cultural zone, within the Exclusive Economic Zone (EEZ). Any offshore activities that have the potential to disturb or damage cultural heritage resources located in or on the seabed within the territorial waters and maritime cultural zone require the involvement of SAHRA, as a commenting body in respect of the NEMA basic assessment process (see below) and as permitting authority where impacts to sites or material cannot be avoided and damage or destruction will occur.

With respect to the portion of the concession area within the EEZ, the NHRA technically does not apply. However, in terms of Section 9 of the Maritime Zones Act, any law in force in the Republic, including the common law, shall also apply on and in respect of an installation. The definition of an installation includes:

- any exploration or production platform used in prospecting for or the mining of any substance;
- any exploration or production vessel; and/or
- any vessel or appliance used for the exploration or exploitation of the seabed.

The activities on or related to the platform to be used in the proposed prospecting will thus be subject to the requirements of the NHRA even within the EEZ and the mitigation measures recommended in this report, particularly in respect of maritime (shipwreck) heritage resources, and palaeontological material, will need to be applied in this portion of the concession area too.

4.3 National Environmental Management Act (Act No 107 of 1998)

The National Environmental Management Act (No 107 of 1998) (NEMA) provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals that are likely to have a negative effect on the environment.

Regulations governing the environmental authorisation process have been promulgated in terms of NEMA and include the EIA Regulations (GNR R326/2017) and Listing Notices (LN) 1-3 (R327, R325 and R324) that list activities requiring an EA.

The proposed prospecting in Concession Area 11C triggers activities listed in LN3 and requires an application for EA that follows the Basic Assessment process.

The BA process aims to identify and assess all potential environmental impacts (negative and positive) and the BA report should recommend how potential negative impacts can be effectively mitigated and how benefits can be enhanced.

5 METHODOLOGY

This desktop HIA provides an assessment of the maritime and underwater cultural heritage potential of Concession Area 11C within the study area defined in Section 5.1 below.

The report includes a short description of what comprises South Africa's maritime and underwater cultural heritage and the maritime history of West Coast, and a discussion of potential maritime heritage resources of the concession area within that wider context. This includes potential pre-colonial archaeological sites and materials in offshore, submerged contexts.

The HIA draws information from readily available documentary sources and databases, including SAHRA's Maritime and Underwater Cultural Heritage database, a database of

underwater heritage resources maintained by ACO Associates, and from relevant primary and secondary sources and aims to identify as accurately as possible the maritime heritage resources within the concession area.

Recent reports from the area by the palaeontologist Dr John Pether have been used to assess the potential for prospecting to impact on submerged palaeontological resources (see Section 6.2).

An assessment of the potential impacts of the proposed prospecting on maritime and underwater cultural heritage resources is provided and this is supported by recommendations for measures to mitigate possible impacts arising from prospecting operations in the concession area.

5.1 Maritime Study Area

The study area for this HIA is defined as a 1 km buffer around the concession area boundary (Figure 2).

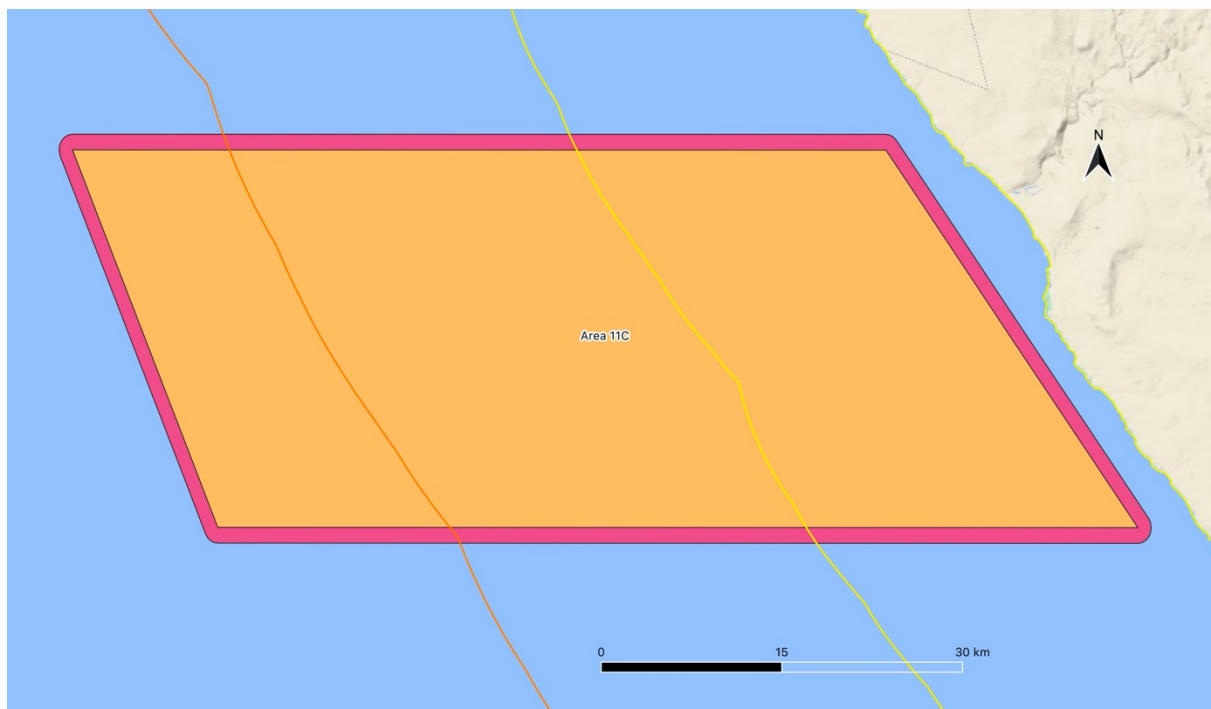


Figure 2: The 1 km buffer (red polygon) around Concession Area 11C that defines the Study Area used for this HIA (Source: Google Earth).

5.2 Limitations

South Africa's record of maritime and underwater cultural heritage resources is based on a mix of information derived in the main from historical documents and other secondary sources and from very limited primary sources such as geophysical data and other field-based observations and site recordings. Similarly, direct evidence for submerged pre-colonial archaeological sites and materials on the South African continental shelf is very limited, but

sites found in similar offshore contexts elsewhere in the world and the known terrestrial archaeology of the West Coast illustrate the potential for such sites around our coast.

While every effort has been made to ensure the accuracy of the information presented below, the reliance on secondary data sources means that there are considerable gaps and inaccuracies in this record and the locations of most of the wrecks referred to in the following sections are approximate. The potential also exists for currently unknown and/or unrecorded maritime heritage sites to be encountered within the concession area in the course of prospecting activities.

6 UNDERWATER CULTURAL HERITAGE

South Africa has a rich and diverse underwater cultural heritage. Strategically located on the historical trade route between Europe and the East, South Africa's rugged and dangerous coastline has witnessed more than its fair share of shipwrecks and maritime dramas in the last 500 years. At least 2,400 vessels are known to have sunk, grounded, or been wrecked, abandoned or scuttled in South African waters since the early 1500s. This doesn't include the as yet unproven potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions along the South African east coast, or the potential for wrecks of vessels which disappeared between Europe and the East to be present in our waters.

The record of South Africa's long association with the sea is much broader than historical shipwrecks and extends far back into prehistory and is represented around the South African coast by thousands of pre-colonial shell middens and large numbers of tidal fish traps, which reflect prehistoric human exploitation of marine resources since the Middle Stone Age (MSA), more than 150,000 years ago. This element of our maritime heritage has a largely unexplored, but increasingly acknowledged manifestation in the submerged, offshore environment, consisting of pre-colonial terrestrial archaeological sites and palaeolandscapes which are now inundated by the sea.

This assessment considers the potential for submerged prehistoric archaeological resources, palaeontological resources and historical shipwrecks in Concession Area 11C.

6.1 Submerged Prehistory

Since the start of the Quaternary, approximately 2.6 million years ago, the world has been subject to a series of cooling and warming climatic cycles in which sea level was mainly lower than it is today. During the last 900,000 years, global sea levels have fluctuated substantially on at least three occasions, the result of increased and decreased polar glaciation. The dropping of sea levels was caused by the locking up in the polar ice caps of huge quantities of seawater as global temperatures cooled. The most extreme recent sea level drop occurred between circa 20,000 and 17,000 years ago when during Marine Isotope Stage 2 (MIS) at the height of the last glaciation, the sea was more than 120 m lower than it is today (Waelbroeck *et al*, 2002; Rohling *et al*, 2009).

As with the MIS 2 low sea level stand, those which corresponded with MIS 4 (~70,000 years ago), MIS 6 (~190,000 years ago), MIS 8 (~301,000 years ago) and MIS 12 (~478,000 years ago) would have “added a large coastal plain to the South African land mass” (Van Andel, 1989:133) where parts of the continental shelf were exposed as dry land (see Cawthra *et al*, 2016) (Figure 3).

The exposure of the continental shelf would have been most pronounced on the wide Agulhas Bank off the southern Cape coast, and it is estimated that a new area of land, as much as 80,000 km² in extent, was exposed during the successive glacial maxima (Fisher *et al*, 2010) Figure 4 gives an indication of the likely extent of the continental shelf exposure on the south and west coasts during the second to last glaciation (MIS 6).

The exposed continental shelf was quickly populated by terrestrial flora and fauna, and also by our human ancestors who were dependant on these resources (Compton, 2011). As a result, for periods numbering in the tens of thousands of years, on at least three occasions during the last 500,000 years, our ancestors inhabited areas of what is now seabed around the South African coast. This means that a large part of the archaeological record of the later Earlier, Middle and early Late Stone Age is located on the continental shelf and is now “inundated and for all practical purposes absent from [that] record” (Van Andel, 1989:133-134).

Until relatively recently there was little or no access to the submerged prehistoric landscapes and sites on the continental shelf, although discoveries in various parts of the world of drowned, formerly terrestrial landscapes is providing increasing evidence for the survival of prehistoric archaeological sites on and within the current seabed.

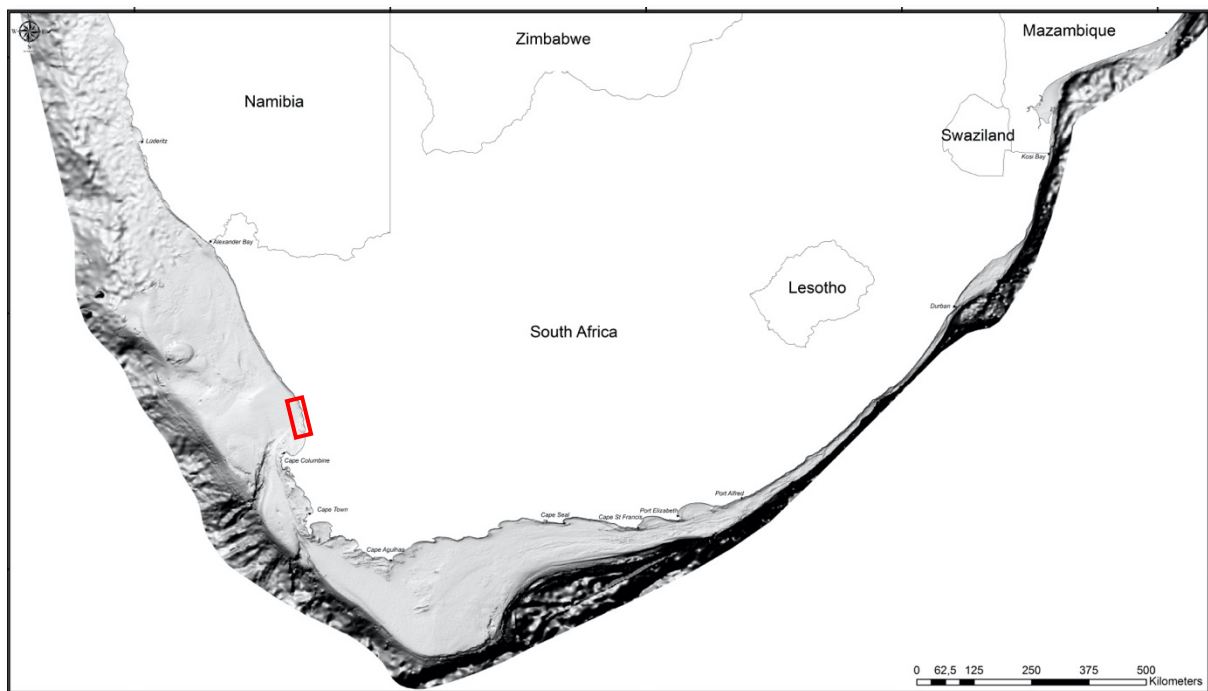


Figure 3: Shaded relief map showing the entire extent of the South African continental shelf. The approximate location of Concession Area 11C is marked by the red box (After De Wet 2012:106).



Figure 4: Possible extent of the South African continental shelf c. 137,000 years ago. The approximate location of Concession Area 11C is marked by the red box (After Franklin et al, 2015)

Well-known example of such evidence include archaeological material and late Pleistocene faunal remains recovered in the nets of fishing trawlers in the North Sea between the United Kingdom and the Netherlands throughout the 20th century (Peeters *et al*, 2009; Peeters, 2011) and the University of Birmingham's recent archaeological interpretation of 3D seismic data, collected in the same area by the oil and gas industry, which has revealed well-preserved prehistoric landscape features across the southern North Sea (Fitch *et al*, 2005, Gaffney *et al*, 2010).

Closer to home, there is archaeological evidence for a prehistoric human presence in what is now Table Bay. In 1995 and 1996 during the excavation of two Dutch East India Company shipwrecks, the *Oosterland* and *Waddinxveen*, divers recovered three Early Stone Age (ESA) handaxes from the seabed under the wrecks. The stone tools, which are between 300,000 and 1.4 million years old, were found at a depth of 7-8 m below mean sea level and were associated with Pleistocene sediments from an ancient submerged and infilled river channel (Figure 5). Their unrolled and unworn condition indicate that they had not been carried to their current position by the ancient river and suggests that they were found more or less where they were dropped ESA hominins more than 300,000 years ago (possibly during MIS 8 (~301,000 years ago) or MIS 12 (~478,000 years ago)), when the sea level was at least 10 m lower than it is today (Werz and Flemming, 2001; Werz *et al*, 2014).

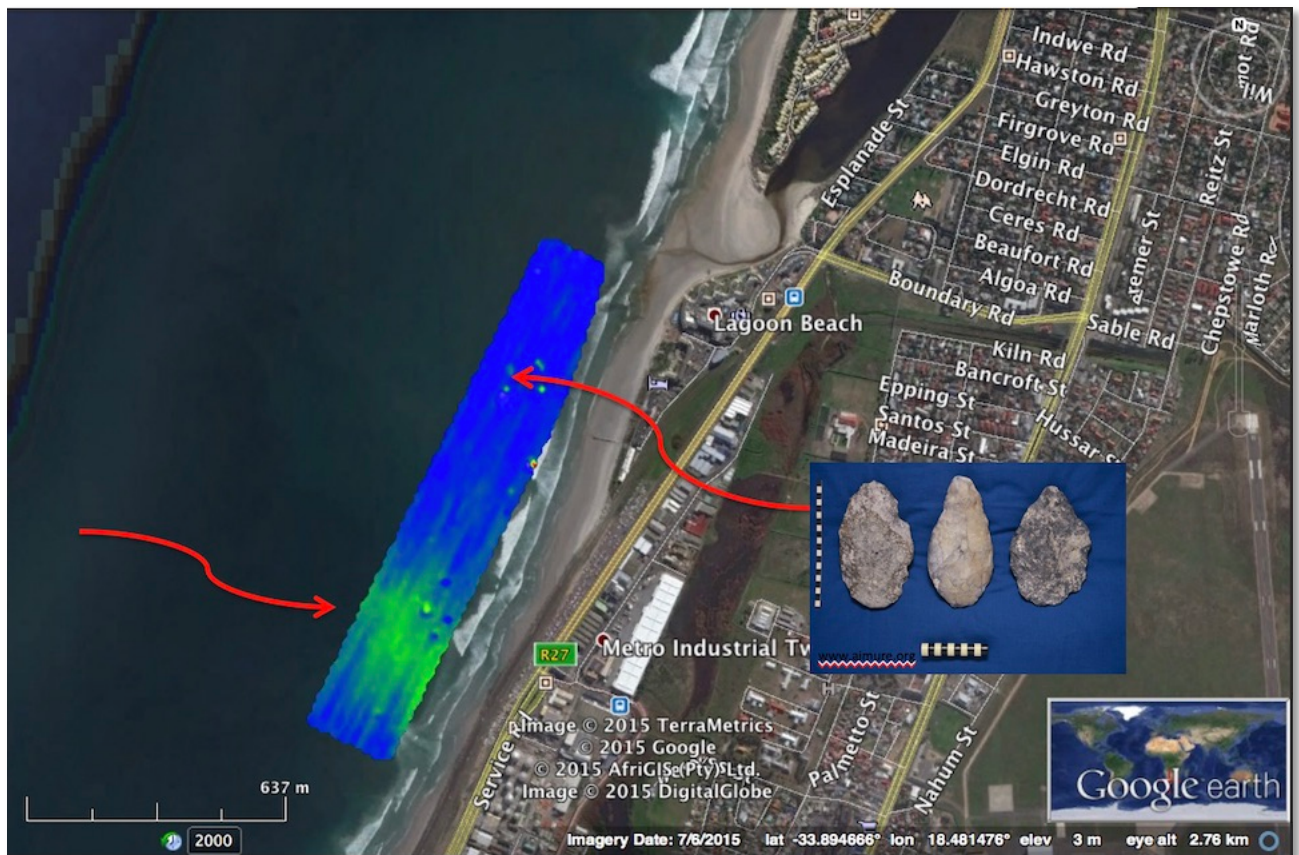


Figure 5: Location of the find of Table Bay ESA handaxes (inset) off Milnerton (top arrow) overlain on magnetometer data which shows the submerged palaeo-channel (green) of the Salt River (bottom arrow).

6.1.1 Submerged Prehistory Potential of Concession Area 11C

There have, to date, been no specific studies of the submerged prehistory of the West Coast. However, the archaeological evidence for a hominin presence along the coast in the vicinity of the study area in the Earlier, Middle and Later Stone Age (LSA) is plentiful.

Diepkloof Rock Shelter, inland of Elands Bay and south-east of the concession area, for example, contains evidence of a nearly continuous human occupation for nearly 85,000 years (see Parkington and Poggenpoel, 1987; Texier et al, 2010), while Elands Bay Cave, on the coast at the mouth of the Verloren Vlei, preserves archaeological evidence of the Pleistocene / Holocene transition during the LSA (Parkington, 1988).

Further south at Hoedjiespunt in Saldanha Bay, four hominid teeth, four or five small fragments of cranium, and two postcranial bones from one or two individuals have been found in an ancient hyena lair and are associated with uranium series dates on ostrich eggshell fragments which imply an ESA / MSA age of 130,000 to 180,000 years for the hominids (Berger and Parkington, 1996).

Nearby, at Churchaven on the Langbaan Lagoon a set of fossilized human footprints were discovered in an aeolianite slab in 1995. They are thought to be those of a female human (hence their nickname "Eve's footprints") and have been dated to approximately 117,000

years ago, during the MSA and very close to the start of the last glaciation when sea levels would have been starting to drop (see <http://www.sawestcoast.com/fossileve.html>).

LSA coastal shell middens are ubiquitous along the West Coast, as are numerous MSA shell middens; the latter being some of the earliest evidence in the world for the exploitation by our ancestors of marine resources. Older, ESA lithics are also commonly found along on the West Coast (David Halkett ACO Associates, pers. comm.).

As discussed in the previous section, the maximum sea level low stand during the Quaternary, when hominins would have been present in and on the South African landscape, was -120 m. Any areas of South Africa's current seabed shallower than -120 m thus have the potential to have been used by our ancestors and to preserve the archaeological evidence of that use.

Only a portion of Concession Area 11C falls within this range (Figure 6), with most of the concession area being in waters substantially deeper than this.

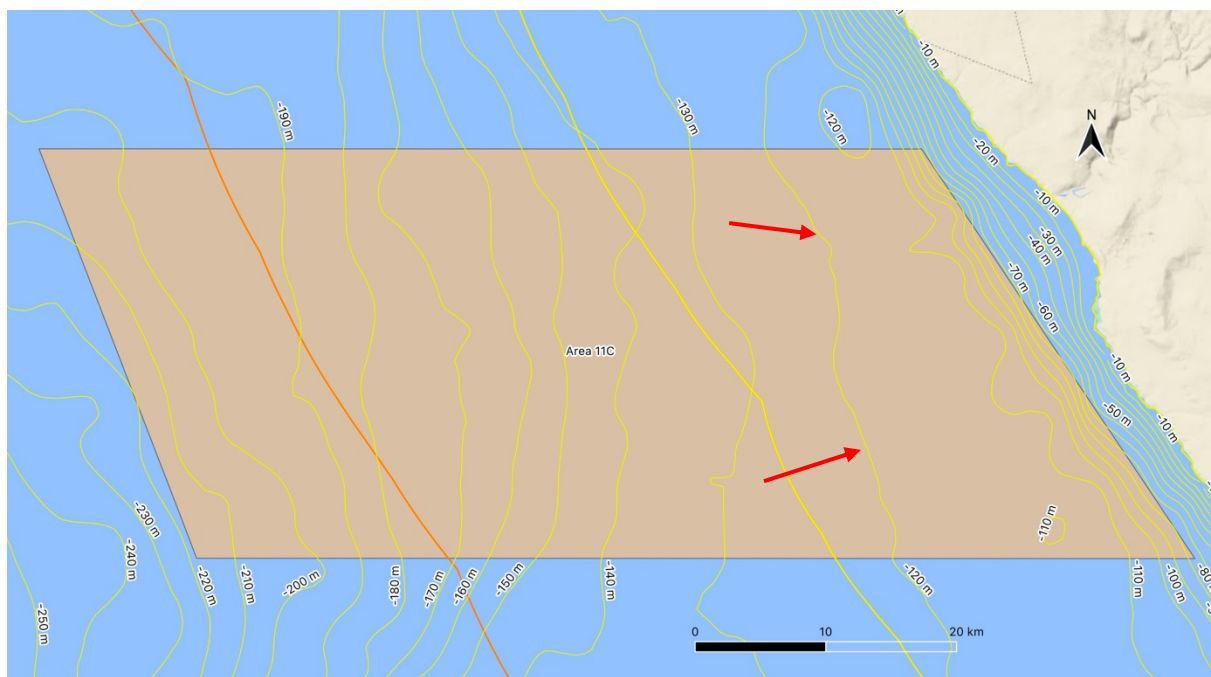


Figure 6: Seabed bathymetry of Concession Area 11C showing the position of the -120 m contour (red arrows), below which there is little or no potential for submerged pre-colonial archaeological remains (Source: Google Maps).

Although no geophysical data are yet available for Concession Area 11C, seabed sediment mapping by O'Shea (1971) further up the coast at Kleinsee indicates that a channel cut by the palaeo-Buffels River extends offshore to the west of Kleinsee while further up the coast, "submerged fluvial channels extending seawards from Langklip Bay and between Hondeklip Bay and the Swartlinterjies River are clearly indicated by the bathymetry" (Hattingh, 2015:5).

These channels and their associated sediment bodies have the potential for associated, now submerged, archaeological material and palaeoenvironmental evidence and are illustrative of the likely situation with many of the other major rivers that feed into the Atlantic along the West

Coast and which have submerged palaeo-channels extending offshore, including the Olifants River south of Concession Area 11C. These channels are an important target for diamond mining as they are the source of and contain diamondiferous gravel.

During times of lower sea level in the past, the palaeo-rivers along the West Coast would have flowed across the exposed continental shelf and these ancient river courses, whose channels are today buried under more recent seabed sediment, would have been an important focus for hominin activity on the exposed continental shelf.

As demonstrated in Table Bay, there is the potential for the occurrence of ancient, submerged archaeological material in association with palaeo-river channels. This may take the form of archaeological artefacts or, where ancient alluvial sediment within these channels has survived post-glacial marine transgressions, there is the potential to recover palaeoenvironmental data (pollens, foraminifera and diatoms, for example) which can contribute contextual information to our understanding of the ancient human occupation of South Africa.

6.2 Seabed Geology and Palaeontology

The following description of the geology of the affected formations on the continental shelf and their palaeontological potential in the vicinity of the concession area is drawn from previous reports and comments provided by Dr John Pether (2021a & b).

The seabed geology of the continental shelf within Concession Area 11C shows successively younger formations seawards from the coast. Cretaceous and Paleogene units comprise the main bulk of the bedrock geology of the area and are succeeded by cappings of Miocene and Pliocene units.

These bedrock formations comprise the “footwall” to overlying, much younger late Quaternary to present-day deposits which, for the most part, form a more or less soft veneer over the continental shelf.

Seabed sediment distribution on the inner continental shelf is patchy and largely determined by the topography of the bedrock, with mini-basins of sediments interspersed by bedrock high outcrops. The oldest seabed deposits preserved occur in deeper, local bedrock depressions and palaeochannels in the Precambrian bedrock, beneath the latest Quaternary basal gravels.

Pether (2021b) suggests that there are several permutations for what type of seabed deposits might be preserved, and these largely depend on the space (depth) within the depressions and position on the shelf. These may include earlier-Quaternary marine conglomerates and sandstones as remnants that escaped erosion during the latest transgression from the Last Ice Age (Last Glacial Maximum) low sea level.

Pether’s idealized sequence in a deeper bedrock depression on the inner shelf may include all or part of the following (refer to Figure 7):

- Unit 1 - a gravel deposited during the MIS5/6 transgression ~135 ka.

- Unit 2 - a succeeding muddy shelf sand deposited during the Last Interglacial sea level highstand.
- Unit 3 - a shelly, variously-cemented sandstone deposited during the subsequent regression (MIS 5a and 4), constituting the basal unit of the Last Regression Sequence.
- Unit 4 - Subsequent terrestrial deposits that may include colluvium, pan deposits and dune sands, with land snails, possible animal remains and perhaps archaeological material, capped by a soil and/or incipient calcrete (MIS 3 and 2).
- Unit 5 - an erosion surface overlain by the basal gravel of the Last Transgression Sequence (early MIS 1).
- Unit 6 - succeeding shelly sand fining up to muddy shelf sand (current interglacial highstand, later MIS 1).

For the most part, however, the inner-shelf bedrock is overlain only by the Last Transgression Sequence basal gravel (Unit 5) and the shelf upward-fining sediments (Unit 6).

6.2.1 Palaeontology of Concession Area 11C

During the later Neogene and Quaternary, the continental shelf was dominated by upwelling processes, with high organic productivity and authigenic mineralization of seabed rocks, clays and biogenic particles by phosphatization and glauconization. Extensive cemented crusts or “hardgrounds” formed on formations exposed at the seabed.

Sea level oscillated repeatedly, during the period, dropping to ice-age palaeoshorelines as much as 140 m below present sea level. The seabed hardgrounds were eroded during the ice-age/glacial shallowing episodes and re-cemented again during interglacial deepening.

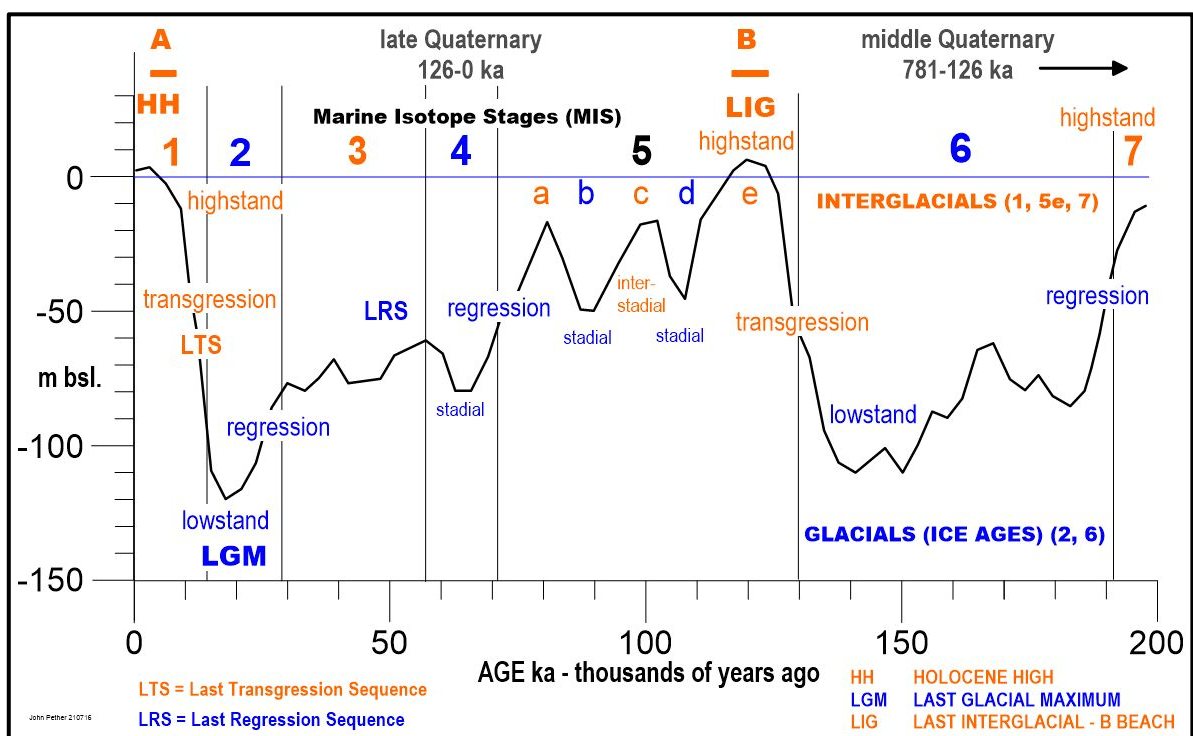


Figure 7: Sea level history and palaeoclimatic nomenclature for the last 200 ka (After Pether, 2021b)

This has produced a wide array of multiphase phosphorite nodules and phosphatic shell casts of various ages. The bones and teeth of sharks and other fishes, the skulls of extinct whale species and the occasional remains of land-living animals that roamed the ice-age exposed shelf are also phosphatized and reworked into the latest, loose sediments from the Last Transgressive Sequence (Unit 5) on the seabed.

Samples of this reworked material turns up in bottom-trawl fishnets, scientific dredging and during diamond-mining operations and the specimens which have been donated to scientific institutions have been invaluable contributions to our knowledge of the palaeontological potential of the continental shelf.

The marine shell fossils which occur in the Last Transgression Sequence are predominantly the species expected on the West Coast Shelf, but unexpected species and “extralimitals” (species beyond their normal home range) are quite common. For instance, the Last Ice Age palaeoshoreline gravels are dominated by a “Venus shell” clam, *Tawera philomela*. This cold-water species, along with others, reached the Cape coast from the mid-Atlantic islands of Tristan da Cunha and Gough, apparently thrived here and then became extinct locally during the last deglaciation (Pether, 1993). During the subsequent deglaciation/warming, several warm-water species from the south and east coasts “invaded” the western shelf temporarily.

This shows a more marked influence of Agulhas water rounding the Cape and affecting the Benguela System during the global-warming steps of the last deglaciation (Pether, 1994). These Agulhas extralimitals have mainly been found during diamond sampling/mining off northern Namaqualand but they can be expected to be more abundant further south such as in Concession Area 11C, as well as more species occurring. In addition to dating the incursions on Agulhas influence, the individual shells are snapshot archives of the palaeoceanographic conditions at the time, as revealed by incremental analyses of stable isotopes and trace elements.

6.3 Maritime History of the South African Coast

In 1498 the Portuguese explorer Vasco da Gama finally pioneered the long-sought sea route around Africa from Europe to the East. Since then, the southern tip of the African continent has played a vital role in global economic and maritime affairs, and until the opening of the Suez Canal in 1869, represented the most viable route between Europe and the markets of the East (Axelson, 1973; Turner, 1988; Gribble, 2002; Gribble and Sharfman, 2013).

The South African coast is rugged, and the long fetch and deep offshore waters mean that the force and size of seas around the South African coast are considerable, a situation exacerbated by prevailing seasonal winds.

The geographical position of the South African coast on the historical route to the East and the physical conditions mariners could expect to encounter in these waters have, in the last five centuries, been responsible for the large number of maritime casualties which today form the bulk of South Africa’s maritime and underwater cultural heritage (Gribble, 2002).

At least 2,500 vessels are known to have sunk, grounded, or been wrecked, abandoned or scuttled in South African waters since the early 1500s. More than 1,900 of these wrecks are more than 60 years old and are thus protected by the NHRA as archaeological resources. This list is by no means complete and does not include the as yet unproven potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions along the South African east coast.

For obvious historical reasons, the earliest known South African wrecks are Portuguese, dating to the sixteenth century when that country held sway over the route to the East. Due to the later, more prolonged ascendancy of first the Dutch and then the British in European trade with the East and control at the Cape, the majority of wrecks along the South African coast are Dutch and British. However, at least 36 other nationalities are represented amongst the other wrecks that litter the coast.

Da Gama's maritime incursion into the Indian Ocean laid the foundation for more than 500 years of subsequent European maritime activity in the waters off the South African coast. The Portuguese and other European nations who followed their lead around the Cape and into the Indian Ocean, however, joined a maritime trade network that was thousands of years old and in which east and south-east Africa was an important partner.

This trade spanned the Indian Ocean and linked the Far East, South-East Asia, India, the Indian Ocean islands and Africa. Archaeological evidence from Africa points to an ancient trade in African products – gold, skins, ivory and slaves – in exchange for beads, cloth, porcelain, iron and copper. The physical evidence for this trade includes Persian and Chinese ceramics excavated sites on African Iron Age like Khambi, Mapungubwe and Great Zimbabwe (see Garlake, 1968, Huffman, 1972, Chirikure, 2014), glass trade beads found in huge numbers on archaeological sites across eastern and southern Africa (Wood, 2012).

There is shipwreck evidence on the East African coast for this pre-European Indian Ocean trade (see for example Pollard et al 2016) and clear archaeological and documentary evidence that this trade network extended at least as far south as Maputo in Mozambique. This suggests that there is the potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions to exist along the South African east coast and offshore waters.

The more than 2,500 historical shipwrecks that make up the bulk of South Africa's underwater cultural heritage are a thus huge, cosmopolitan, repository of information about mainly global maritime trade during the last five centuries and potentially much further back into the past. These sites contain a wealth of cultural material associated with that trade and clues to the political, economic, social and cultural changes that accompanied this trade, and which contributed to the creation of the modern world.

6.3.1 Maritime Heritage of the West Coast and Concession Area 11C

The maritime history of the West Coast dates to almost the first days of the Dutch settlement in Table Bay. The Dutch settlers were quick to recognise and exploit the rich marine resources of the West Coast and fishing and sealing flourished, with the catches transported down the

coast to supply the VOC settlement in Table Bay. This industry led to the development of fishing villages at Saldanha Bay and Lamberts Bay: the former, together with places like Elands Bay, also later becoming ports for the export of grain and other produce from the Swartland and Cederberg (Ingpen 1979).

During the early nineteenth century the West Coast islands became the focus of an international ‘white gold’ rush to exploit their rich guano resources. The guano was soon depleted but the discovery of rich copper deposits in Namaqualand and the Richtersveld led to the use of Alexander Bay, Robbe Bay (now Port Nolloth) and Hondeklip Bay by the early 1850s and the development of local, coasting shipping services to support this new industry (The Nautical Magazine and Naval Chronicle 1855: 297-303; Ingpen 1979).

Except for Saldanha Bay, the West Coast historically lacked good harbours. Combined with the regular coastal fogs, a largely rocky shoreline and dangerous inset currents this took its toll on shipping over the years.

According to SAHRA’s Maritime and Underwater Cultural Heritage database, the national record of underwater cultural heritage curated on the South African Heritage Resources Information System (SAHRIS) (<http://www.sahra.org.za/sahris>), there are at least 89 shipping casualties recorded between the Berg and Orange Rivers, many of which were vessels involved in coastal trade and fishing.

Only two of these maritime casualties took place close to Concession Area 11C (**Error! Reference source not found.**) and neither falls within the Study Area defined for this report. Both wrecks are, however, discussed below and included in Table 1.

Table 1: Shipwrecks in the vicinity of Concession Area 11C.

Ship Name	Approximate Position	Place	Event Type	Vessel Category	Nationality	Year	Notes
<i>Zulu Coast I</i>	-31.1821S 17.7720E	Groen River Mouth (near)	Wrecked	Motor coaster	South African	1953	Wrecked in fog about 60 km south of Hondeklip Bay
<i>Meteren</i>	-31.4396S 17.9827E	30km north of Oliphants River	Wrecked	Wooden hoeker	Dutch	1723	Wrecked after anchor dragged in heavy swell.

The *Zulu Coast I* was a South African registered motor coaster of 380 tons, commanded by Captain Patterson and owned by Thesens. She was wrecked in thick fog on 8 April 1953.

The *Meteren* was a Dutch hoeker of 190 tons built in 1719 in the Enkhuisen yard for the Amsterdam chamber of the Verenigde Oost-Indische Compagnie (VOC). This small vessel was outward bound from Texel in the Netherlands to the Cape to be used as a packet between Cape Town and Delagoa Bay in Mozambique. During the voyage six of her 29 crew died of scurvy and when only ten men were able to work, the master, Willem van Turenhout anchored in a calm area close to the coast, a little north of the mouth of the Oliphants River.

When a swell set in she dragged her anchors and was pushed ashore and wrecked. Five of the remaining crew drowned. Of the 18 who survived, eight who could still walk wandered in the veld for 25 days before being found and taken to safety. The sick men who remained near the wreck are believed to have died of starvation or thirst.

What appears to be the wreck of the *Meteren* was found by diamond divers in 2001 and several artefacts recovered at the time including the badly abraded remains of a bronze swivel gun, lead sheeting, a decorated pewter knife and Dutch "klompie" bricks were donated to Iziko Museums of South Africa.

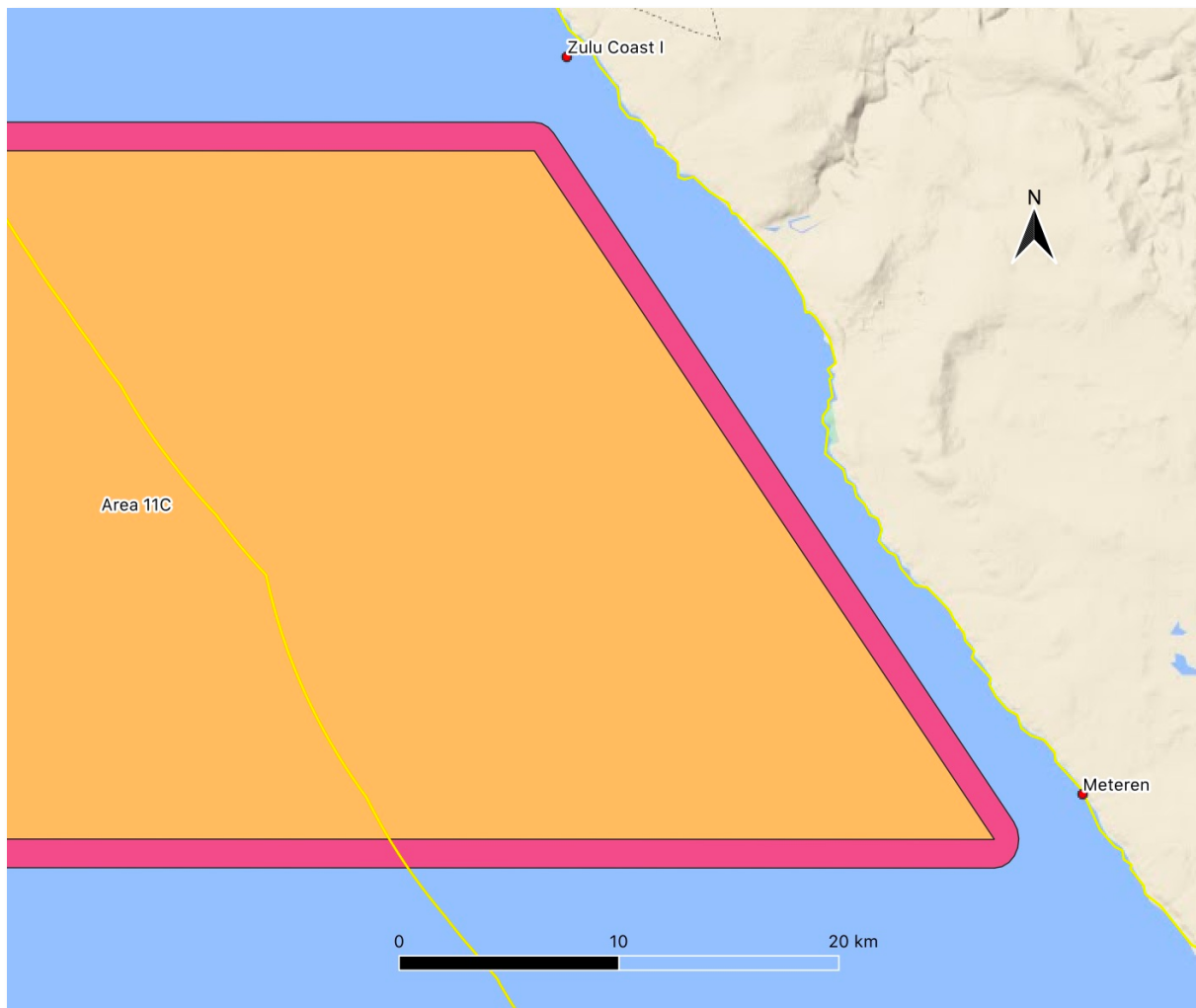


Figure 8: Known historical wrecks located in the vicinity of the Study Area around Concession Area 11C
(Source: Source: Google Earth).

Both wrecks are older than 60 years of age and thus protected by the NHRA as heritage resources. The *Meteren* in particular holds great archaeological interest. For the purposes of this impact assessment, however, neither of these wrecks is within Concession Area 11C.

Lastly, it must be stated that although unlikely, the possibility does exist for the remains of currently unknown and unrecorded wrecks to be present in the concession area. The historical records contain many references to vessels that were lost without trace between their points

of departure and arrival. Where survivors of such events were subsequently rescued, the loss was recorded, but in many cases, vessels simply never arrived at their destination and could thus lie anywhere along their intended route. The potential for the occurrence of such unrecorded wrecks was illustrated in 2008 when a 16th century Portuguese wreck, since identified as the *Bom Jesus*, was unexpectedly found during the diamond mining south of Oranjemund in Namibia (see Alves 2011).

7 IMPACT ASSESSMENT

Potential impacts associated with prospecting in Concession Area 11C relate to submerged prehistoric and maritime archaeological heritage resources, and possibly, palaeontological features and fossil material. In all cases impacts can arise where interventions on and in the seabed intersect with heritage resources – either directly where sites or material are damaged or disturbed by activities such as the core sampling being proposed, or indirectly where downstream effects of seabed activities can affect sites or material. That said, the small footprint of the core sampling is very unlikely to cause downstream effects on the surrounding seabed.

It is difficult to quantify the impacts on cultural heritage resources of seabed activities such as prospecting because the locations and extent of these resources – particularly submerged prehistoric and palaeontological resources - are generally poorly understood and the nature of the environment limits the potential for identifying such sites and monitoring the intrusive activities.

The potential impacts associated with seabed prospecting are assessed for the three heritage resource classes - submerged prehistory, palaeontology and shipwrecks/maritime heritage - in the following sections. The assessment is based on the methodology set out in Appendix 1 below.

7.1 Submerged Prehistory

The past use by our hominin ancestors of the exposed continental shelf is beyond doubt and the evidence of this presence is possible wherever archaeological material and palaeoenvironmental evidence has survived post-glacial marine transgressions. Although no geophysical data for the concession area are presently available, there is the potential for this material to be found on, or associated with, just such surviving palaeo-landsurfaces or in association with any now submerged palaeo-channels in water shallower than c. -120 m within Concession Area 11C.

The small footprint of the seabed interventions associated with prospecting means that the potential for interaction with or impact on submerged prehistoric archaeological material in Concession Area 11C will be small, although the likelihood that prospecting will target features like the palaeo-beach deposits, as a source particularly of diamondiferous gravels, does increase the potential for interactions and impacts.

If impacts on submerged prehistoric archaeological resources occur, they will be negative because the finite and non-renewable nature of these resources means that they cannot recover if disturbed, damaged or destroyed.

7.1.1 Impacts of Seabed Coring

Seabed core sampling will be undertaken using one or more of the coring tools described earlier, deployed from a dedicated sampling vessel. The coring methods are all based on the insertion of a plastic sleeve or casing, varying between 7 and 15 cm in diameter, into the seabed, using either high frequency, resonant energy generated inside the sonic head or vibration from the coring head. When the sleeve is extracted from the seabed it contains a sediment core which provides a record of the stratigraphy of the top 3-5 m of the seabed.

The physical intrusion of the cores into the seabed is very small, and the potential impacts of core sampling in Concession Area 11C on prehistoric heritage resources on or in the seabed will be localised. Where impacts do occur, they will be irreversible/permanent because the finite and non-renewable nature of heritage resources means that they cannot recover if disturbed, damaged or destroyed.

The intensity of impact will be low, given the very limited physical intrusion into or disturbance of the seabed of the coring and the probability of occurrence is possible.

The significance of the impact is assessed to be very low but where impacts do occur their effects will be negative.

The lack of concrete information about the presence of submerged prehistoric resources in the concession area means that the level of confidence in this assessment of impacts is low.

In respect of mitigation measures, it is suggested that:

- any core samples sections which contain alluvial material, particularly where organic remains are present, are retained and are subject to palaeoenvironmental assessment; and
- the possibility is considered of retaining samples of the coarser fraction (i.e. gravel and stone (20 mm +)) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material.

Access to such samples for palaeoenvironmental and archaeological assessment may offset the potential impacts of core sampling and would result in the changing of the impact status from negative to positive because of a potential benefit to archaeological research and knowledge that could accrue from access to such information. It is suggested that TAGS engage with the archaeologist and palaeontologist prior to the geotechnical campaign to discuss and agree this proposed mitigation.

The assessment of impacts on submerged prehistoric resources from core sampling can be summarised as follows:

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Long-term (Irreversible) 3	Low 5	Possible	VERY LOW	-ve	Low
Proposed mitigation measures:								
Core sample sections which contain alluvial material, particularly where organic remains are present, are retained and subject for palaeoenvironmental assessment. This could <u>offset</u> any potential impacts.								
With mitigation	1	1	3	5	Possible	VERY LOW	+ve	Low

7.2 Palaeontology

7.2.1 Impacts of Seabed Coring

The palaeontological impact of the coring in Concession Area 11C will be localised. Where impacts do occur, they will be irreversible/permanent because the finite and non-renewable nature of heritage resources means that they cannot recover if disturbed, damaged or destroyed.

The intensity of impact will be low, given the very limited physical intrusion into or disturbance of the seabed of the coring and the probability of occurrence is possible.

The significance of the impact is assessed to be very low but where impacts do occur their effects will be negative.

The lack of concrete information about the possible presence or distribution of palaeontological resources in the concession area means that the level of confidence in this assessment of impacts is low.

In respect of mitigation measures, the small volumes of the core samples greatly reduce to likelihood of capturing the sparse fossils reworked from the older, pre- late Quaternary formations and the “extralimitals” in the Last Transgression Sequence. However, the potential for extralimital Agulhas species to be present in the cores is important as these specimens have context in the geological and faunal succession in the core, unlike the specimens usually selected from the loose, mixed shells crossing the oversize screens on sampling/mining vessels. It is also possible that a core or two might intersect rarely preserved lagoonal deposits which are important for providing points on the sea-level curve applicable to the West Coast (Runds *et al.*, 2018).

It is therefore suggested that a set of cores from this poorly-known area are the subject of a detailed study (possibly as a B.Sc. Honours or M.Sc. project), with radiocarbon dates.

Any fossils such as petrified bone and teeth and shell casts, usually phosphatic, found during the processing of the cores must have the details of context recorded and must be kept for identification by an appropriate specialist and if significant, to be deposited in a curatorial institution such as the IZIKO SA Museum.

Such work would offset the potential impacts of the prospecting activities and would result in the changing of the impact status from negative to positive because of a potential benefit to palaeontological research and knowledge that could accrue from such information. It is suggested that TAGS engage with the archaeologist and palaeontologist prior to the geotechnical campaign to discuss and agree this proposed mitigation.

The assessment of impacts on palaeontological resources from core sampling can be summarised as follows:

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Negligible (Low) 1	Long-term (Irreversible) 3	Low 5	Possible	VERY LOW	-ve	Low
Suggested mitigation measures:								
- Any fossils found during the processing of cores must have the details of context recorded, must be kept for identification by an appropriate specialist and, if significant, be deposited in a an appropriate institution; - The possible detailed study and dating of a set of cores, possibly as a B.Sc. Honours or M.Sc. project should be considered.								
With mitigation	1	1	3	5	Possible	VERY LOW	+ve	Low

7.3 Maritime Heritage

For the purposes of this impact assessment and based on the discussion of maritime heritage resources in and around Concession Area 11C above, it is evident that a) neither of the two recorded wrecks in the vicinity is within the concession area and b) the possibility that currently unknown historical wrecks or maritime debris are present on the seabed in the concession area is so low that it can probably be discounted.

There is thus unlikely to be any impact arising from prospecting activities on maritime heritage resources and they are scoped out of this impact assessment.

7.4 Summary of Impact Significance Ratings for Heritage Receptors

The results of the impact assessment for the heritage receptors in Concession Area 11C can be summarised as follows:

Impact	Consequence	Probability	Significance	Status	Confidence
Impacts on Submerged Prehistoric Heritage Resources – Core Sampling	Low 5	Possible	VERY LOW	-ve	Low
With Mitigation	5	Possible	VERY LOW	+ve	Low
Impacts on Maritime Archaeological Resources: Core Sampling	No impacts expected - Scoped out				

Impacts on Palaeontological Resources – Core Sampling	Low 5	Possible	VERY LOW	-ve	Low
With Mitigation	5	Possible	VERY LOW	+ve	Low

8 CONCLUSIONS AND RECOMMENDATIONS

This assessment of the heritage resources of Concession Area 11C indicates that there may be some potential in that portion of the concession area where the water depth is less than 120 m for submerged prehistoric archaeological material in sediments to be affected by prospecting. Although the significance of any prospecting-related impacts on such material is assessed to be very low, it is recommended that a) any core sample sections which contain alluvial material, particularly where organic remains are present, are retained for palaeoenvironmental assessment and b) the possibility is considered of retaining samples of the coarser fraction (i.e. gravel and stone bigger than c. 20 mm) of sorted core sediment for assessment by an archaeologist for the presence of prehistoric lithic material.

These actions would result in the changing of the impact status from negative to positive because of a potential benefit to archaeological research and knowledge that could accrue from access to such information.

With regard to palaeontological resources, fossils found during the processing of the core samples must have the details of context recorded and be kept for identification by an appropriate specialist and if significant, to be deposited in a curatorial institution such as the IZIKO SA Museum. The identification of extralimital, Agulhas “sub-fossil” shell species in the loose shells of the Last Transgression Sequence requires a level of seashell knowledge. The best outcome for a set of cores from this poorly-known area is that they are the subject of a detailed study, possibly as for a B.Sc. Honours or M.Sc. project, with radiocarbon dates.

It is suggested that TAGS engage with the archaeologist and palaeontologist prior to the geotechnical campaign to discuss and agree these proposed mitigation measures.

There appears to be little or no potential for the presence of historical shipwrecks in the concession area and this heritage receptor was scoped out of the assessment of impact.

In the unlikely event that shipwreck material or seabed debris is identified in the geophysical data to be collected as part of the prospecting programme or during the prospecting itself, the find must be reported to the archaeologist and SAHRA and then avoided during the core sampling.

8.1 Acceptability of the Proposed Activity with Respect to Heritage Resources

It is our reasoned opinion that the proposed prospecting activities in Concession Area 11C are likely to have a very low impact on submerged prehistoric, palaeontological heritage resources, and no impact on maritime and underwater cultural heritage resources.

Provided the recommendations to mitigate and offset potential impacts are implemented, the proposed prospecting can be considered to be archaeologically and palaeontologically acceptable.

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APPENDIX 1: IMPACT ASSESSMENT METHODOLOGY

The significance of all potential impacts that would result from the proposed project is determined in order to assist decision-makers. The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur. The significance of each identified impact was thus rated according to the methodology set out below:

Step 1 – Determine the **consequence** rating for the impact by determining the score for each of the three criteria (A-C) listed below and then **adding** them. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

Rating	Definition of Rating	Score
A. Extent – the area over which the impact will be experienced		
Local	Confined to project or study area or part thereof (e.g. limits of the concession area)	1
Regional	The region (e.g. the whole of Namaqualand coast)	2
(Inter) national	Significantly beyond Saldanha Bay and adjacent land areas	3
B. Intensity – the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. Duration – the time frame for which the impact will be experienced and its reversibility		
Short-term	Up to 2 years	1
Medium-term	2 to 15 years	2
Long-term	More than 15 years (state whether impact is irreversible)	3

The combined score of these three criteria corresponds to a **Consequence Rating**, as follows:

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Step 2 – Assess the **probability** of the impact occurring according to the following definitions:

Probability– the likelihood of the impact occurring	
Improbable	< 40% chance of occurring

Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Step 3 – Determine the overall **significance** of the impact as a combination of the **consequence** and **probability** ratings, as set out below:

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	Low	VERY LOW	VERY LOW	LOW	LOW
	Medium	LOW	LOW	MEDIUM	MEDIUM
	High	MEDIUM	MEDIUM	HIGH	HIGH
	Very High	HIGH	HIGH	VERY HIGH	VERY HIGH

Step 4 – Note the **status** of the impact (i.e. will the effect of the impact be negative or positive?)

Step 5 – State the level of **confidence** in the assessment of the impact (high, medium or low). Impacts are also considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in the table below. Depending on the data available, a higher level of confidence may be attached to the assessment of some impacts than others. For example, if the assessment is based on extrapolated data, this may reduce the confidence level to low, noting that further ground-truthing is required to improve this.

Confidence rating	
Status of impact	+ ve (beneficial) or – ve (cost)
Confidence of assessment	Low, Medium or High

The significance rating of impacts is considered by decision-makers, as shown below. Note, this method does not apply to minor impacts which can be logically grouped into a single assessment.

- **INSIGNIFICANT:** the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity.
- **VERY LOW:** the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity.
- **LOW:** the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity.
- **MEDIUM:** the potential impact **should** influence the decision regarding the proposed activity.
- **HIGH:** the potential impact **will** affect a decision regarding the proposed activity.
- **VERY HIGH:** The proposed activity should only be approved under special circumstances.

Step 6 – Identify and describe practical **mitigation** and **optimisation** measures that can be implemented effectively to reduce or enhance the significance of the impact. Mitigation and optimisation measures must be described as either:

- **Essential:** must be implemented and are non-negotiable; and
- **Best Practice:** must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Essential mitigation and optimisation measures must be inserted into the completed impact assessment table. The impact should be re-assessed with mitigation, by following Steps 1-5 again to demonstrate how the extent, intensity, duration and/or probability change after implementation of the proposed mitigation measures.

Step 7 – Prepare a summary table of all impact significance ratings.

Finally, indicate whether the proposed development alternatives are environmentally suitable or unsuitable in terms of the respective impacts assessed by the relevant specialist and the environmentally preferred alternative.

**BASIC ASSESSMENT PROCESS FOR THE PROPOSED
PROSPECTING IN SEA CONCESSION AREA 11C BY TRANS
ATLANTIC DIAMONDS (PTY) LTD**

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Appendix 6:
Socio-economic Statement

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FINAL SOCIO-ECONOMIC STATEMENT FOR PROSPECTING ACTIVITIES IN SOUTH AFRICAN SEA AREA 11C

BASIC ASSESSMENT REPORT FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 11C
BY TRANS ATLANTIC DIAMONDS (PTY) LTD

EA Application Ref. No.: WC30/5/1/1/2/10522 PR



April 2026

FINAL SOCIO-ECONOMIC STATEMENT FOR PROSPECTING ACTIVITIES IN SOUTH AFRICAN SEA AREA 11C

BASIC ASSESSMENT REPORT FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 11C BY
TRANS ATLANTIC DIAMONDS (PTY) LTD

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APRIL 2026

Report prepared for:

Trans Atlantic Diamonds (Pty) Ltd
Office 1603 Portside, 4 Bree Street
Cape Town, Western Cape, 8001



TRANS ATLANTIC
DIAMONDS

by:

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Authors: Adam Rees, Lily Bovim, Ken Hutchings and Barry Clark

Citation: Rees A, Bovim LA &, Hutchings K and Clark B. 2026. Final Socio-Economic Statement for Prospecting Activities in South African Sea Area 11C. Specialist Report no. 2348/8 prepared by Anchor Environmental (Pty) Ltd for Trans Atlantic Diamonds (Pty) Ltd. 22 pp.

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EXECUTIVE SUMMARY

Preface

This report was first published in 2022 under Environmental Authorisation (EA) Application Ref. No.: WC30/5/1/1/2/10384 PR. As the PR was not renewed within the prescribed timeline, a resubmission application was submitted to the Department of Mineral and Petroleum Resources (DMPR) in December 2025. This required a new Basic Assessment (BA) Process and circulation of updated reports (where relevant) during a new Public Participation Process (PPP). Sections of this draft report were then updated in March 2026 to reflect revised specialist information and other contextual details. These revisions did not alter the impact assessment, study findings, or overall conclusions. The March 2026 update preceded the PPP (held between 19 March to 23:59 on 20 April 2026), which occurred as part of the BA process under which this study falls. Comments received from Interested and Affected Parties (I&APs) during this period were then addressed, and used to inform necessary revisions to this report (where relevant), with this report thus being the final version to be submitted to the authorities for decision-making.

A note on document interpretation: To facilitate easy interpretation of this updated document—and to indicate where changes have been made in this final report since the March 2026 draft report—all significant alterations/updates have been highlighted in blue.

Introduction

Trans Atlantic Diamonds (Pty) Ltd (TAD) was granted EA and Prospecting Rights (PR) in 2022 for the prospecting of diamonds, gemstones, heavy and industrial minerals, and ferrous, base and precious metals within offshore Sea Concession Area 11C (EA Application Ref. No.: WC30/5/1/1/2/10384 PR). In terms of the NEMA Environmental Impact Assessment (EIA) Regulations (2014), the potential environmental impacts of the proposed prospecting activities must be assessed through a BA process, which includes specialist studies evaluating impacts on various environmental receptors (e.g. socio-economic receptors).

Anchor Environmental Consultants (Pty) Ltd was appointed to assess the socio-economic receptors for Trans Atlantic Diamonds (Pty) Ltd in 2021–2022 as part of the original Prospecting Right application for Concession Area 11C, and again to update the study, where relevant, for the current application. This final report has been revised taking into account comments received during the public participation process.

Project Description

Sea Concession area 11C is located approximately 4 to 5km offshore of the Western Cape Coast, about 40 km north of Strandfontein (Figure 1). The concession covers an area of approximately 164 023 ha with its furthest boundary at the 200 m isobath.

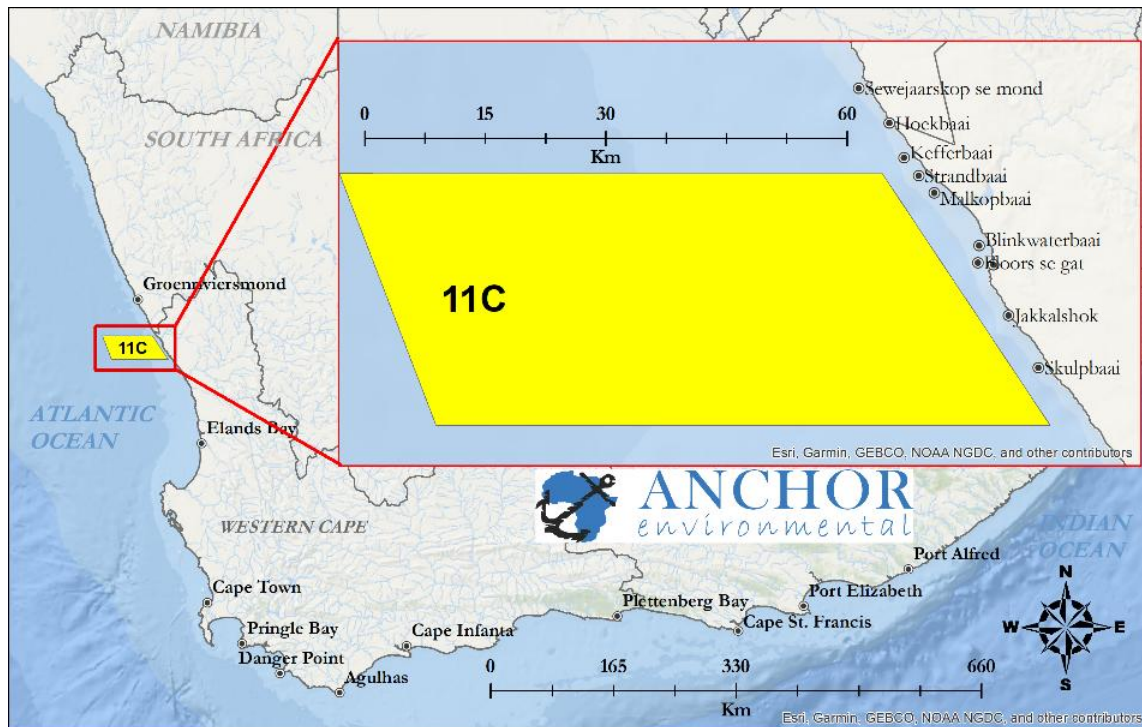


Figure 1. The location of Concession Area 11C along the West Coast.

Proposed activities include geophysical exploration and sampling/prospecting to detect the presence of palaeo-beach deposits at different submerged sea levels that occur in Concession Area 11C, which are known from other concessions to contain diamondiferous gravels.

Seismic (acoustic) surveying will be conducted using a dedicated survey vessel with a hull-mounted MBES (high frequency range) and Topas sub-bottom profiler (SBP) system (mid-frequency range) collecting high-resolution acoustic data. Geophysical surveying will be undertaken along survey lines spaced 100 m to 1000 m apart across select sections throughout the concession area. Sampling will be undertaken in targeted areas identified through the analysis of the acoustic survey data. Four potential methods of collecting geophysical samples from the seabed are being considered. A Van Veen grab with a sampling capacity of approximately 50 kg will be used to collect baseline environmental data on sediment and benthic macrofauna at 20-50 sites. Geotechnical samples to assist in understanding the sea floor geology and resource evaluation will be collected at 100-200 sites using either vibracoring, gravity coring or sonic coring. In addition to the above prospective targets will be analysed by a uniquely designed drill tool that can dredge gravel from the seabed. Pending the final tool design, the drill bit footprint will be between 3 and 5 m² with an expected average hole depth of 3 m. Sample volumes are anticipated to be in the range of 9 to 15 m³ per sample. An estimated total of 300 samples spaced at roughly 300 m apart from north to south will be required. Material from drill sampling will be processed onboard and tailings will be discarded overboard, thereby causing sediment plumes, in this instance as a near-shore deposit.

Report content, Impact Assessment and Mitigation Measures

Demographic profiles for the regional, local and project sites are provided. A brief overview of the economic performance is discussed and placed in relation to the potential impacts associated to the proposed survey area. The proposed prospecting activity is anticipated to potentially

impact coastal communities in the Matzikama municipality, particularly Strandfontein, approximately 40km south of the Concession Area 11C.

Five negative socioeconomic impacts were identified as potentially being associated with the proposed survey/prospecting activities. These are listed in Table 1. Potential impacts associated with the seismic survey and prospecting activities were identified as 1) Temporary disturbance of marine resources 2) Exclusion of fishing vessels from Concession Area 11C; 3) Degradation of water quality in Concession Area 11C, 4) Increase in local socio-economic performance, and 5) Increase in regional socio-economic performance. The former three impacts could potentially impact the livelihoods and household income of three marine fisheries sectors (tuna pole and line, traditional line fish, and Small Pelagic Purse Seine fishers). Potential negative impacts on all three sectors were assessed as '**INSIGNIFICANT**' after mitigation (where required).

Table 1. Potential impacts identified associated with the prospecting activities after mitigation measures are applied.

Impact	Mitigation	Consequence	Probability	Significance	Status	Confidence
Impact 1: Tuna pole and line	No mitigation	Very Low	Possible	INSIGNIFICANT	-ve	High
Impact 2: Traditional Line fish	No mitigation	Very Low	Improbable	INSIGNIFICANT	-ve	High
Impact 3: Small Pelagic Purse Seine	No mitigation	Very low	Probable	VERY LOW	-ve	High
	With mitigation	Very low	Possible	INSIGNIFICANT	-ve	High
Impact 4: Local socio-economic performance	No mitigation	Very Low	Possible	INSIGNIFICANT	+ve	Medium
Impact 5: Regional socio-economic performance	No mitigation	Low	Definite	LOW	+ve	Medium

It is strongly recommended that Trans Atlantic Diamonds should aim to incorporate codes of good practice on Broad Based Black Economic Empowerment issued under Section 9 of the Broad Based Black Economic Empowerment Act, Act 53 of 2003, as amended by Act 46 of 2013. This will include skills transfer programmes, job creation, and supporting local service industry organizations such as manufacturing, production and/or packaging services.

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ABBREVIATIONS AND ACRONYMS

Anchor	Anchor Environmental Consultants (Pty) Ltd.
B-BBEE	Broad-Based Black Economic Empowerment
CPUE	Catch per unit effort
FLO	Fisheries Liaison Officer
GDP	Gross domestic product
GDPR	Gross domestic product
MMO	Marine Mammal Observer
MSY	Maximum Sustainable Yield
OMP	Operational Management Plan
OMP	Operational Management Plan
PAM	Passive Acoustic Monitoring
TAC	Total allowable catch
TAD	Trans Atlantic Diamonds (Pty) Ltd
TAE	Total allowable effort
TPL	Tuna Pole and Longline
WCDM	West Coast District Municipality

I INTRODUCTION

I.1 BACKGROUND

Trans Atlantic Diamonds (Pty) Ltd (TAD) was originally granted Environmental Authorisation (EA) and Prospecting Rights (PR) in 2022 for the prospecting of diamonds, gemstones, heavy and industrial minerals, and ferrous, base and precious metals within offshore Sea Concession Area 11C (EA Application Ref. No.: WC30/5/1/1/2/10384 PR).

Concession Area 11C (approximately 164 023 ha in extent) is located offshore along the Western Cape coast, extending from just south of Hoekbaai to just north of Baai Vals, approximately 40 km north of Strandfontein (Figure 1.1). The inshore boundary lies about 4–5 km from the coast, while the outer boundary extends to the 200 m isobath. The concession area falls within the jurisdiction of the Matzikama Local Municipality, which forms part of the West Coast District Municipality (WCDM). The proposed prospecting activities may directly affect coastal communities within the Matzikama Municipality, particularly Strandfontein.

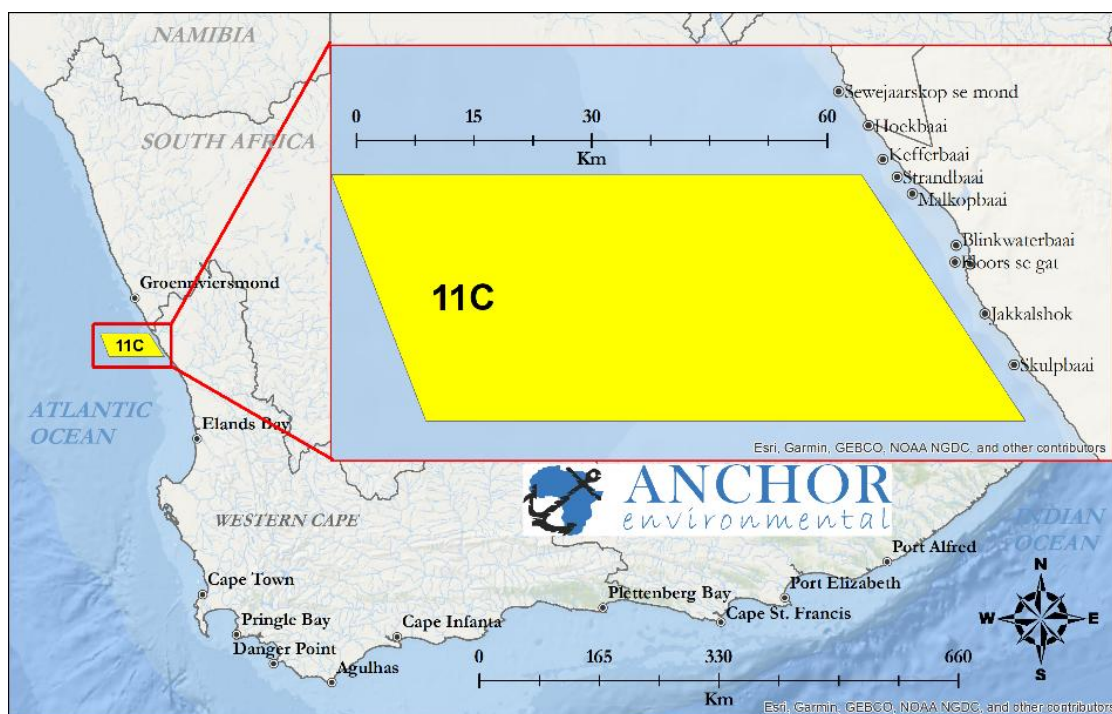


Figure 1.1. The location of Concession Area 11C along the West Coast.

As the PR was not renewed within the prescribed timeframe, the EA and PR lapsed and TAD was required to reapply for EA and PR. A new application was subsequently submitted in December 2025 (Ref. No. WC30/5/1/1/2/10522 PR) to the Department of Mineral and Petroleum Resources (DMPR) in terms of the National Environmental Management Act (NEMA: Act No. 107 of 1998) and the Mineral and Petroleum Resources Development Act (MPRDA; Act No. 28 of 2002). In terms of the NEMA Environmental Impact Assessment (EIA) Regulations (2014), the potential environmental impacts of the proposed prospecting activities must be assessed through a Basic Assessment (BA)

process, which includes specialist studies evaluating impacts on various environmental receptors (e.g. social and economic aspects).

Anchor Environmental Consultants (Pty) Ltd (Anchor) was appointed as the Environmental Assessment Practitioner (EAP) to undertake the required Basic Assessment (BA) process and to support TAD with the original application in 2021/2022, and again for the re-application in 2026. As Anchor also has in-house fisheries and socio-economic specialist expertise, the company was further appointed to undertake a Socio-Economic Assessment for Trans Atlantic Diamonds (Pty) Ltd in 2022 as part of the original Prospecting Right application for Concession Area 11C, and again to update the study, where relevant, for the current application.

This final Socio-Economic Assessment report has been revised taking into account comments received during the public participation process.

In addition, this iteration of the report includes updates to the baseline data and maps relating to local fisheries, specifically the small pelagic purse seine fishery, the traditional linefish sector, and the tuna pole-and-line fishery, to reflect the most recent available data from the Department of Forestry, Fisheries and the Environment (DFFE 2025).

Baseline demographic and socio-economic data for the Regional Study Area (West Coast District Municipality) and the Local Study Area (Matzikama Municipality), such as population statistics and household income levels, have not been updated. This information is not considered critical to the assessment of socio-economic impacts for the proposed activity, as the concession area is located offshore and the primary socio-economic interactions relate to potential impacts on local fisheries. As the fisheries data have been updated, the most relevant socio-economic information for the impact assessment has been addressed. The updated fisheries information does not materially alter the impact assessment, and the significance of the identified impacts and the overall conclusions of the study therefore remain unchanged.

2 STUDY AREA

2.1 INTRODUCTION

To assess the potential socio-economic impacts of the proposed project it is important to understand the socio-economic context in which the proposed project is to be developed and its potential area of impact. Depending on the scale of the potential socio-economic impacts, it may extend beyond the boundaries of the project. Here, the focus will be placed on the regional, local and project area. The proposed prospecting/survey activity falls within the regional West Coast District Municipality (WCDM) and local Matzikama Municipality. The nearest impact site, Strandfontein, is approximately 40 km south of the project site. The socio-economic impact statement will thus consider these regions, focussing on the potential impact on the project site.

2.2 REGIONAL STUDY AREA

The West Coast District Municipality (WCDM) extends over an area of 31 099 km² and has a total population of 464 056 inhabitants and 122 074 households (Table 2.1). The district includes five local municipalities (Matzikama, Cederberg, Bergrivier, Saldanha Bay, and Swartland) which all have access to the Atlantic Ocean as well as the N7 national road (with the exception of Saldanha Municipality) (WCDM, 2021). The population consists of 50.3% female and 49.7% male, with three predominant population groups; Coloured (66.58%), Black African (16.36%), and White (15.71%) communities. Most of the populations' first language is Afrikaans (83.67%) followed by IsiXhosa (8.58%), English (3.98%) and other indigenous languages (IsiNdebele, Sesotho, and Setswana).

The WCDM population dependency ratio is quite high (45.9%) with 68% in the working age group (15-64 years), followed by the young (25%, 0-14 years) and the elderly group (7%, 65+ years). A high dependency ratio puts greater strain on people who are part of the workforce to support their economic dependents (children and elderly people). A higher dependency ratio also means greater pressure on social systems and the delivery of basic services. The level of education in the WCDM is relatively low, with a literacy rate was 79.1% (lower than the average of the Western Cape's 87.2% and slightly lower than the rest of South Africa 80.9%) (Socio Economic Profile West Coast District Municipality). The dropout rate for high school learners (Grades 10 to 12) within the West Coast local municipalities varied from 23.2% to 33%. These high levels of dropouts were influenced by socio-economic factors such as teenage pregnancy, availability of no-fee schools and unemployment (Socio Economic Profile West Coast District Municipality). The average income in the WCDM fall within three ranges: no income (10.5%), R1 to R9 600 per annum (5.3%) and R9 601 to R76 400 per annum for which most of the population can be categorised (57.8%). There were 183 969 people employed in the WCDM in 2018, which constitutes 7.1% of the total employment in the Western Cape. The WCDM experienced an average annual increase of 3 480 jobs over the period 2014-2018, with the Swartland municipality generating the most employment opportunities of 1 146 in the last year, conversely to Matzikama and the Bergrivier municipalities which only created some 546 jobs. In 2019, the WCDM experienced a loss of 389 jobs, which will have a significant impact on the WCDM economy if this trend continues.

The WCDM experienced the slowest economic growth in the Western Cape between 2005-2013, averaging 3.0% (WCDM 2021). In contrast, the province showed a growth rate of 6.8% over the same period. The West Coast experienced strong growth in its construction (6.2%) and commercial services (6.1%), which include wholesale and retail trade, catering and accommodation; transport, storage and communication; and finance, insurance, real estate and business services sectors (WCDM 2021). The sectors that experienced a reduction over the 2005-2013 period was the agriculture (0.3%), manufacturing (0.3%) and other sectors (3.0%). The general government and community, social and personal (CSP) services sector in the West Coast experienced a steady 2.8% growth. The largest sectors in the West Coast economy in 2013 were the finance, insurance, real estate and business services (27%), manufacturing (017%), agriculture, forestry and fishing (14%) and wholesale and retail trade, catering and accommodation services (13%) (WCDM 2021). The agriculture, forestry and fishing sector were the primary source of employment, with 70 060 jobs in 2018, contributing 38.1% to total employment in the WCDM. However, the agriculture, forestry and fishing sector contributed the most to the WCDM employment in 2018 (38.1%, or 70 060 jobs).

Table 2.1. Demographic profile summary of the West Coast District Municipality and Strandfontein (WCDM, 2021).

Indicator	West Coast District	Strandfontein
Population Total	391 766	431
Household Total	106 781	92
Area (km²)	31 118.6	4.18
Population group		
Coloured (%)	66.58	14.8
Black African (%)	16.36	50.6
White (%)	15.71	33.2
Indian or Asian(%)	0.56	0.9
Other (%)	0.79	0.5
Gender distribution		
Male (%)	49.7	51.4
Female (%)	50.3	48.6
First language		
Afrikaans (%)	83.67	69.4
English (%)	3.98	3.2
IsiXhosa (%)	8.58	22.6
Setswana (%)	0.63	0
Dependency ratio	45.9	18.1
Average annual income		
No income		10.9
R1 – R9 600 (%)		3.3
R9 601 – R76 400 (%)		47.8
R76 400–R614 400 (%)		38

2.3 LOCAL STUDY AREA

The Matzikama municipality is situated on the north-west coast of the Western Cape and borders the Northern Cape Province (Kamiesberg municipality in the north and Hantam municipalities in the east), the Atlantic Ocean on the west, and the Western Cape (Cederberg municipality) in the south (WCDM 2021). The municipality consist of 18 towns, with three coastal settlements (Doringbaai, Papendorp, and Strandfontein) and several small inland towns which serves as agriculture service centres (Ebenhauser, Lutzville, and Koekenaap) (MM 2019; WCGPT 2018). Matzikama municipality is defined by an arid environment with a flourishing natural irrigation system sustained by the Olifants River. The Olifants River (Vanhynsdorp Government Scheme) consist of 237 km canals and supply water for several towns, industrial and domestic waste, local agriculture, and irrigation (DWS 2019). Most of the economic activities are concentrated in the south of the municipality, with Vredendal being the largest town and primary economic node (WCGPT 2018). The agriculture sector is largely attributed by the viniculture industry and combined with the forestry and fishing sector contributed the most towards Matzikama's municipal GDP and employment in 2018 (Mayson et al., 2020; MM 2019). The agriculture, forestry and fishing sector employed approximately 25 492 people in 2014 consisting of a mixed workforce of semi-skilled and unskilled workers (PGWC 2018). Matzikama's real GDP per capita in 2018 was R39 000 which is considerably lower than most surrounding municipalities, including the WCDM (at R59 000). Matzikama municipality real GDP decreased between 2018 and 2019 by 2.5%, in addition to a low GDP growth rate of 2.1% over the period 2008-2017, which is 0.3% less than the WCDM average growth rate (WCDM 2021; MM 2020). It is estimated that the Matzikama municipality experienced its largest decline in its annual GDP growth rate in 2019 (4%) when compared to the GDP growth rate between 2014 and 2018 (MM 2021/22). It is anticipated that the ongoing COVID-19 pandemic will worsen Matzikama's local economy as a decline in economic performance has already been observed since 2018. A further reduction in municipal revenue, unemployment in the private sector, land grabs for informal housing and the stagnation of development programs is likely to occur in 2021. (MM 2021/22).

2.4 PROJECT SITE

Strandfontein (31.7481° S, 18.2303° E) is mostly a residential resort situated along the west coast of South Africa some 52.5km from Vredendal (Mayson et al., 2020). It has limited economic activities and is characterised by a very low economic growth potential and socio-economic needs (Mayson et al., 2020; SM, 2018). Major economic activities are livestock farming and employment through mining, but most inhabitants are unemployed. However, Strandfontein ranked relatively highly for composite resource and development potential (2nd and 28th, respectively) out of 131 towns in the Western Cape province. Strandfontein has a population of 431 inhabitants and combined with local villages such as Kliprand, Bitterfontein, Nuwerus, Molsvlei, etc. amounts to 7 000 inhabitants) and 92 Households (Table 2.1, Census 2011). The population is 48.6% female and 51.4% male, with the predominant population group being of Black African (50.6%) followed by, White (33.2%), Coloured (14.8%), Indian/Asian (0.9%), and other (0.5 %) communities. Most of the populations' first language is Afrikaans (69,4%), followed by isiXhosa (22.6%), English (3.2%), Sesotho (2.7%) IsiZulu (1.1%), and Sepedi (0,5%). Strandfontein's population dependency ratio 18.6%, with 84.7% of the population falling

in the working age group (15-64 years), followed by young (8.4%, 0-14) and then the elderly group (7%, 65+). Level of education is relatively low: 1.4% have no schooling, 38.6% completed matric, and 17.2% of the population educated to a higher degree. The average household income in Strandfontein ranges from no income (10.9%), R1 to R9 600 (3.3%), with most (47.8%) of the population earning between R9 601-R76 400 per annum (Figure 2.1).

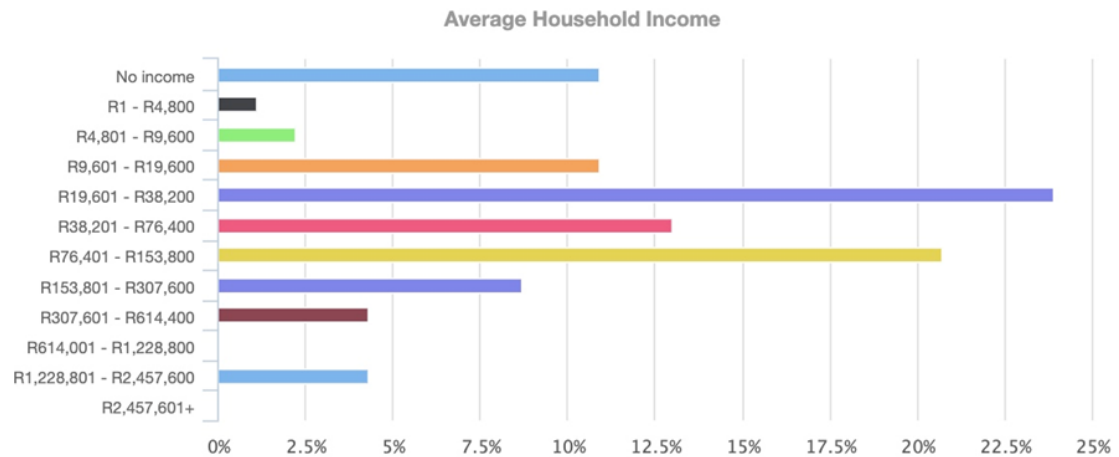


Figure 2.1. Average household income of Strandfontein (WCDM, 2021).

3 IMPACT ASSESSMENT

3.1 SOCIO-ECONOMIC IMPACTS ASSOCIATED WITH THE MARITIME SECTOR

South Africa fisheries sector has an estimated value of R6 billion contributing to 0.1% to the national GDP (DAFF 2019). Of the 22 commercial sectors (listed in SAG 2013/14) the most economically valuable with the greatest catch volumes are the demersal-trawl (hake) and small-pelagic sectors (pilchards, anchovy and red-eye round herring) (Brick & Hasson 2016; SAG 2013/14). The Western Cape is estimated to account for most of the industry value (90%), employment, and income with the primary commercial fisheries (as well as main fisheries ports, and therefore associated industry services) concentrated along the west and south coast of South Africa (Hara et al. 2008; Karaan and Rossouw. 2004). The marine specialist study identified three fishery sectors (Small Pelagic, Traditional Linefish and Tuna Pole and Line) that may overlap with the 11C Concession Area (Rees et al. 2026).

The Concession Area 11C will extend between the inshore boundary about 5 km from the coast and the outer boundary at the 200 m isobath (approximately 70 km offshore). The main users of the sea space in Concession Area 11C are the commercial shipping and fishing industries. Most merchant shipping would travel offshore of the concession area along the continental shelf edge, although crossing of fishing vessels and other prospecting or mining vessels is anticipated. The potential impact of the prospecting activities on the commercial fisheries and their dependence was identified and placed in relation to the potential socio-economic impacts based on the Marine Specialist Report (Rees et al. 2026) and limited available published literature. Potential spatial overlap with the small pelagic, traditional linefish and tuna pole fisheries was identified and assessed. The significance of the potential impacts that would result from the proposed prospecting activities is determined below in order to assist with informed decision-making in the prospecting rights application. The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur. The significance of each identified impact was thus rated according to the methodology in Appendix 1 (Section 6.1).

3.1.1 POTENTIAL SOCIO-ECONOMIC IMPACTS

TUNA POLE AND LINE

The South African tuna pole and line (TPL) sector targets albacore/longfin tuna *Thunnus alalunga*, yellowfin tuna *T. albacares*, bigeye tuna *T. obesus*, southern bluefin tuna *T. maccoyii*, and skipjack tuna *Katsuwonus pelamis* seasonally between November and May (DFFE 2025). Due to the seasonality of the TPL fishery, fishers also have access to snoek *Thyrsites atun* and yellowtail *Seriola lalandi* that are also important targets of the traditional linefishery. The tuna pole fleet consists of approximately 100 vessels ranging from small outboard powered skiboats (7-9 m length) to inboard diesel-powered deck boats (6-25 m length). In the most recent right allocation process 132 fishing rights were allocated for 140 vessels, valid until 2037 (DFFE 2025). The reported albacore tuna catch, which makes up the bulk of the TPL fishery, was 2 471 tonnes in 2018, with a wholesale

value of R124 million, or 1.2% of the total South African commercial fisheries value, and was a similar 2 339.6 tonnes in 2023 (Japp & Wilkinson 2021, DFFE 2025).

The commercial tuna pole fishing grounds lie between Cape Agulhas and the Orange River, but the fleet operates predominantly out of Cape Town and Hout Bay harbours and most fishing effort takes place within 100 nautical miles of these ports particularly in the Cape Canyon and Dassen Gat area (Figure 3.1). Some effort does take place further up the west coast, although this is mostly offshore of, or to the south of Concession Area 11C (Figure 3.1). Impacts on the TPL fleet due to the proposed prospecting activities within 11C are therefore expected to be insignificant.

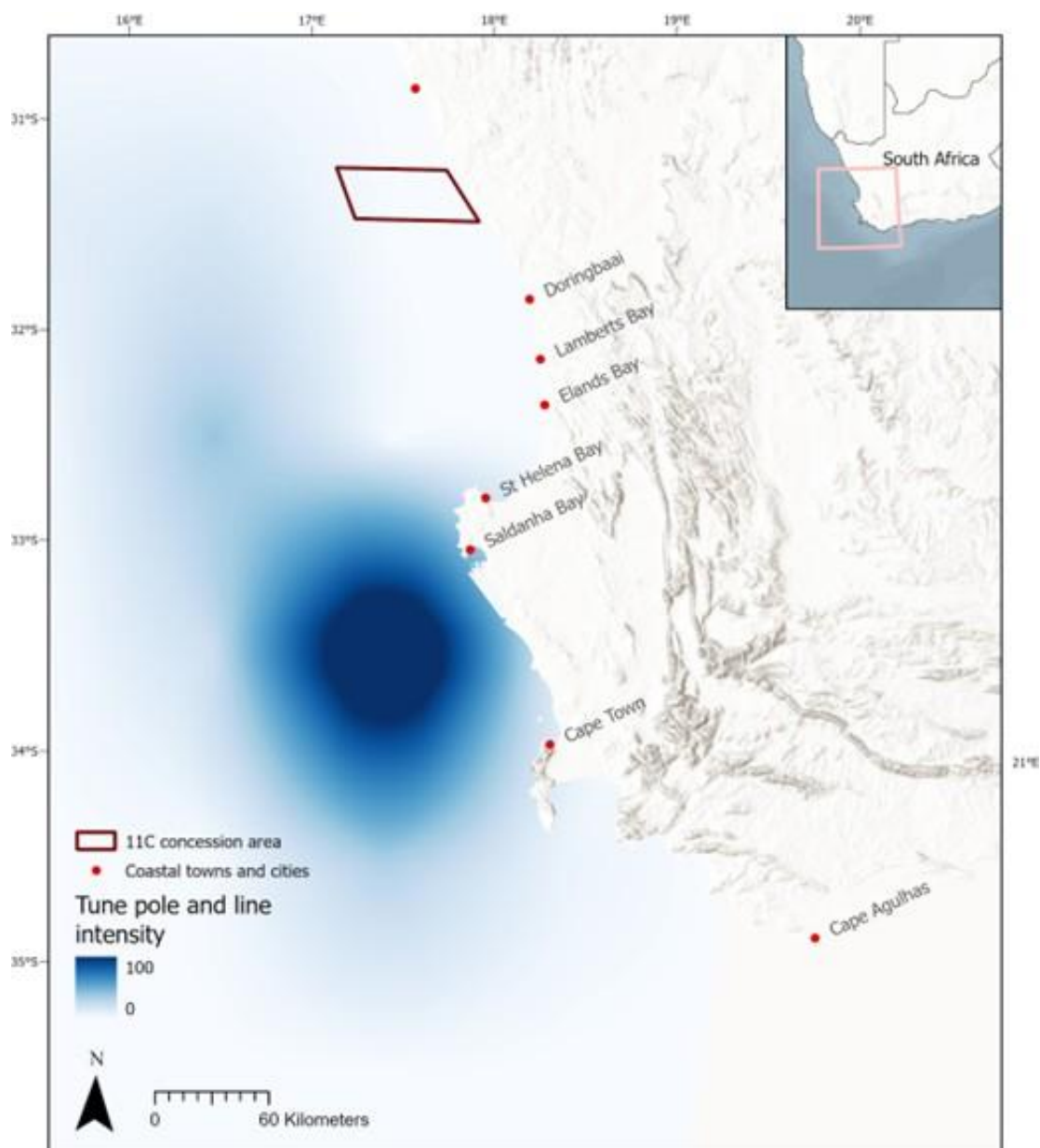


Figure 3.1. Mean annual tuna pole and line fishing effort (boat days) in relation to Concession Area 11C (Source: Norman et al. (2018)).

Table 3.1. Impact rating of the prospecting activity on the Tuna Pole and Line fishery.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Short-term 1	Very Low 4	Possible	INSIGNIFICANT	-ve	High
No mitigation required. :								

TRADITIONAL LINEFISH SECTOR

Linefishing (or “traditional linefishing” as it is known) in South Africa is defined as the capture of fish with hook and line but typically excludes the use of longlines. Together, the three sectors of the linefishery (commercial, recreational, and small-scale) catch approximately 200 of South Africa’s 2 200 marine fish species (DFFE 2025). Linefish is a collective term used to refer to multiple unrelated bony and cartilaginous fish species (marine and estuarine) (Mann 2013), which make up approximately 10% of South Africa’s marine fish diversity (Attwood et al. 2013). Linefish species are typically predatory in nature and include several apex predators such as sharks, groupers, tunas, and large seabreams.

The commercial linefishing sector is exclusively boat-based. From 2006 a maximum allocation of 455 boats has been maintained; however, the number of boats allocated per zone has varied. Linefishing takes place year-round with a highly mobile fleet of powered boats targeting different species in areas of aggregations at different times along most of South Africa’s 2 800 km coast. The traditional linefishery in South Africa uses traditional handline or rod-and-reel methods to catch their target species, most of which are reef-associated with a small number classed as pelagic. With a past effort reduction to some 455 boats in the sector, most now comprise 7 – 10 m “skiboats” with planing hulls and twin outboard engines (150 – 450 hp). About 15% of the vessels still in the commercial linefishery are traditional decked, displacement hull wooden and fiberglass boats. Commercial linefish boats carry 4-12 crew with an average of seven per vessel.

The traditional line fishery is the country’s third most important fishery in terms of tonnage landed and economic value, with the wholesale value of catch being reported as R109.8 million in 2016 (CapMarine 2018). Linefishing is a low-earning, labour-intensive industry that has the highest participation of all South African Commercial Fisheries and is important from a human livelihood point of view. Employing an estimated 27% of all fishers, it has the lowest average employment income of all South African fisheries. Although the commercial linefishery has the largest fleet, it contributes only 6% of the total estimated value of all South African marine fisheries (DEFF 2020).

Linefishers operate in shallow water (generally <100 m depth) and would potentially be negatively impacted by coastal and nearshore seismic exploration, prospecting and mining operations (particularly recreational, small scale and subsistence shore fishing). Concession Area 11 C is, however, relatively far offshore in water that is mostly deeper than 100 m, and far from suitable launch sites. The temporary and spatially limited nature of seismic prospecting activities is also assessed to have insignificant impacts on fish. Therefore, the inshore/offshore movements of nomadic species such as snoek and yellowtail, that are important to the linefish sector, are not expected to be significantly negatively impacted (Rees et al. 2026). A spatial analysis of the reported commercial linefish catch data does not show any activity in reporting blocks that overlap with

Concession Area 11C (Figure 3.2). The proposed prospecting in Concession Area 11C is therefore expected to have a negligible socio-economic impact on the direct and indirect dependants from the traditional linefishing sector (Table 3.2).

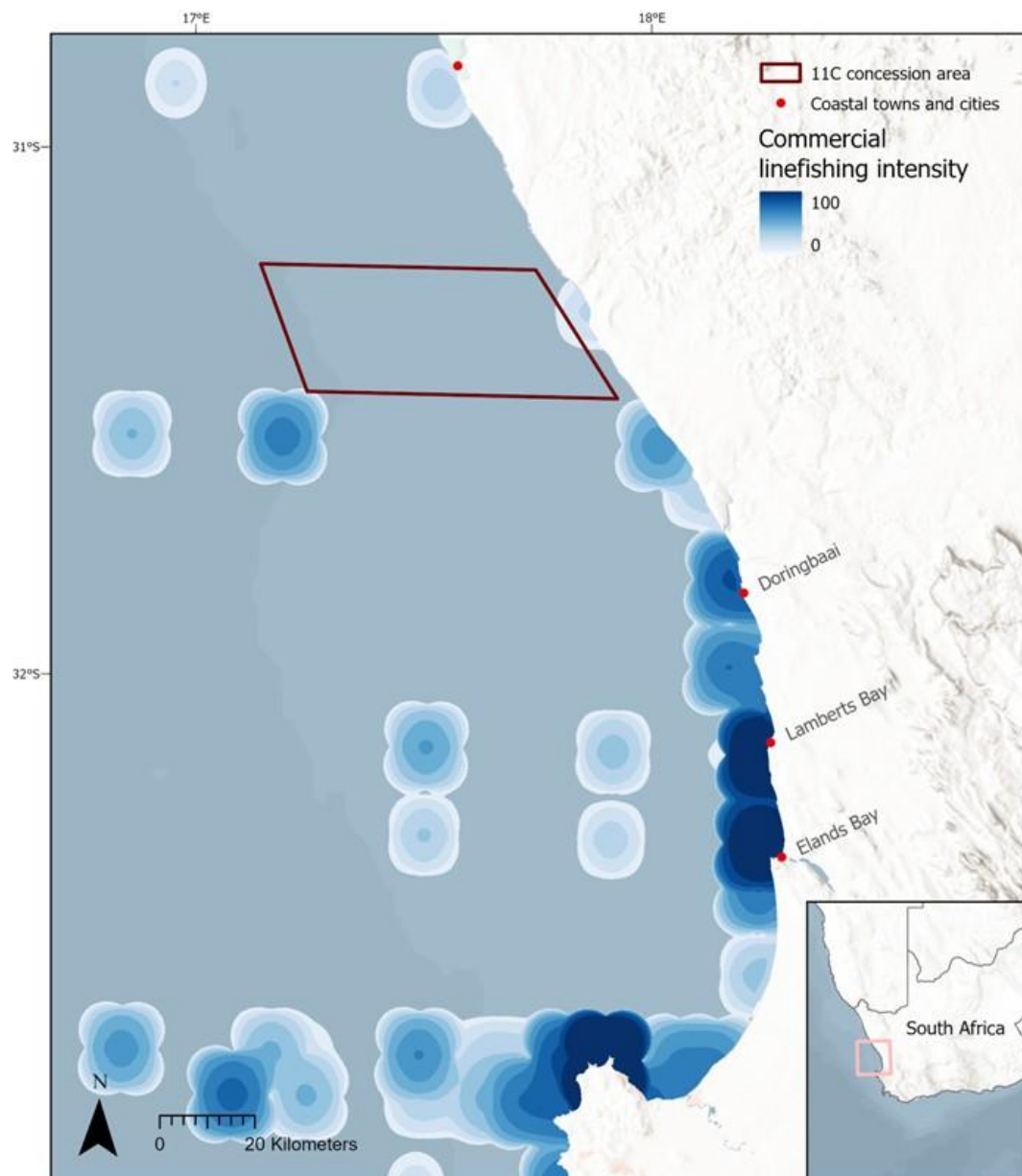


Figure 3.2. Average commercial linefishing intensity along a section of the west coast of South Africa and in relation to Concession Area 11C (Data source: (Sink et al. 2019).

Table 3.2. Impact rating of the prospecting activity on the Traditional Linefish Sector.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Short-term 1	Very Low 3	Improbable	INSIGNIFICANT	-ve	High

SMALL PELAGIC PURSE SEINE FISHERIES

The small pelagic fishery has the largest catch volume for any of the South African fishery sectors and has the second largest annual catch value, estimated to be worth R5.5 billion in 2021 (DFFE 2021, Japp & Wilkinson 2021). Approximately 5 800 people are employed by the small pelagic sector, with the majority employed full-time. The sea-going workers earn the highest salaries in the fishing industry (DFFE 2021). The management of the small pelagic fishery is described in the marine specialist report (Rees et al. 2026).

The small pelagic purse-seine fishery operates between the Orange River and East London mostly in nearshore waters (within 10 km of the coast). The 11C Concession Area just borders the identified priority fishing areas for anchovy and with the sardine directed fishing ground (Figure 3.3) (Norman et al. 2018, Sink et al. 2019). Concession Area 11C itself does not constitute an area where a substantial proportion of the average annual purse seine catch is made. The fishery is unlikely to be significantly negatively affected by small temporary closures/exclusion zones around survey vessels and geotechnical survey sites and potential negative impacts on the livelihoods and household income of participants in this fishery are considered unlikely. The socioeconomic impact is assessed as 'very low', and 'insignificant' after recommended mitigation measures (Table 3.3).

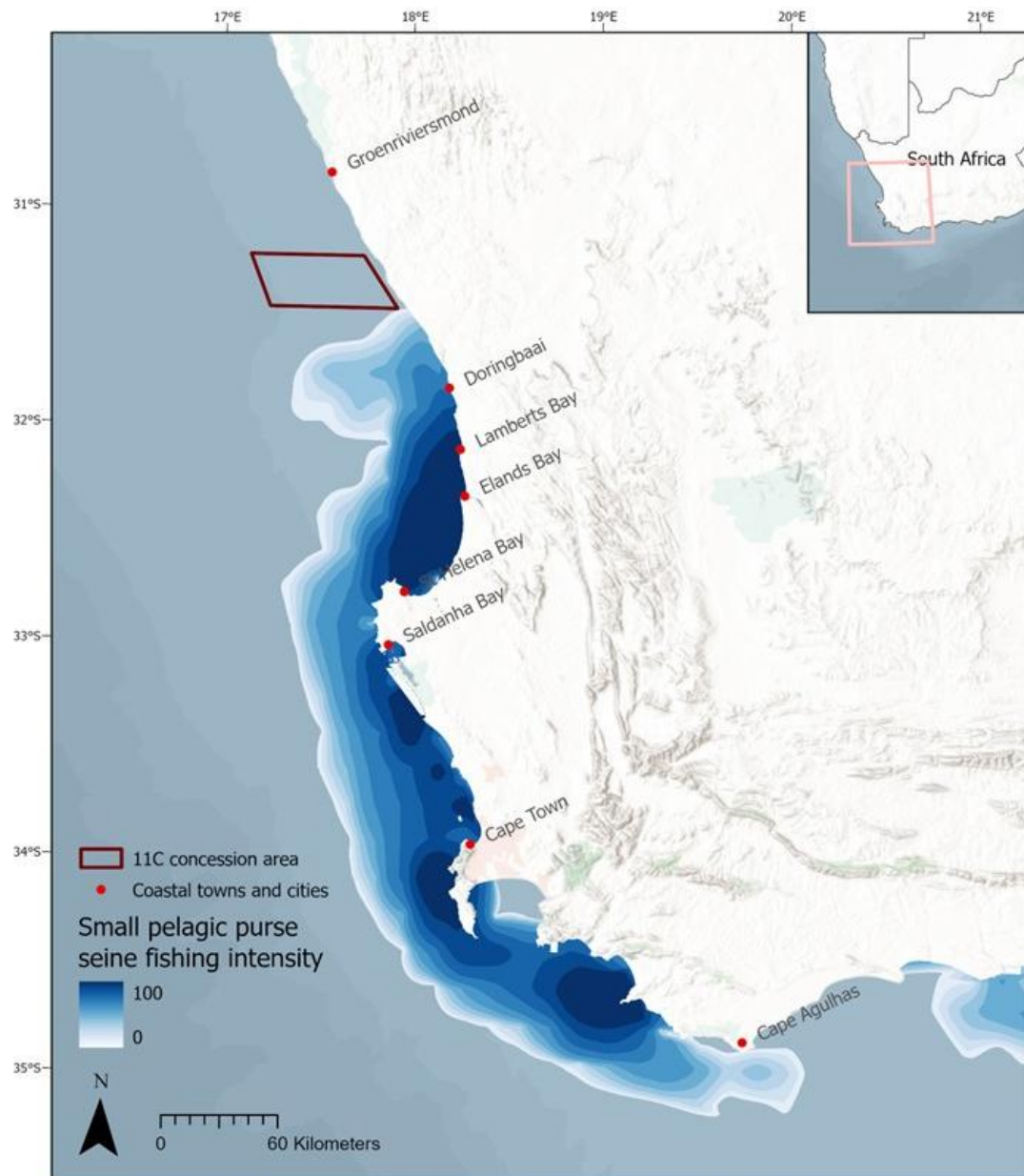


Figure 3.3. Spatial distribution of small pelagic purse seine catch (2000-2016) fishing intensity (Source: (Sink et al. 2019).

Table 3.3. Impact rating of the prospecting activity on the Small Pelagic Purse Seine Fisheries.

	Extent Intensity		Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Short-term 1	Very Low 3	Probable	VERY LOW	-ve	High
Essential mitigation measures:								
- Undertake surveys when fishing effort is lower (preferably out of fishing seasons). - Appoint a fisheries liaison officer (FLO) to facilitate communication with the Small Pelagic Fishing Industry Association. The FLO should report daily on vessel activity and respond and advise on action to be taken in the event of encountering purse seine fishing vessels in the survey area.								
With mitigation	Local 1	Low 1	Short term 1	Very Low 3	Possible	INSIGNIFICANT	-ve	High

3.2 SOCIO-ECONOMIC IMPACTS ASSOCIATED WITH LOCAL AND REGIONAL ECONOMIC PERFORMANCE.

Prospecting activities can contribute positively to the economy through investment, expenditure on goods and services, and the creation of limited direct and indirect employment opportunities. These benefits are generally modest and short-term.

As a result, the potential positive impact on local socio-economic conditions (including the Strandfontein community) is expected to be insignificant (Table 3.4).

Conversely, investment by Trans Atlantic Diamonds in South Africa may provide a broader positive contribution at a regional scale through procurement, operational expenditure, skills development, and specialist employment opportunities (Table 3.5). In addition, the purpose of prospecting is to determine whether an economically viable mineral resource exists, which could inform future development opportunities subject to separate approvals and assessments.

Table 3.4. Impact rating of the prospecting activity on the local socio-economic performance.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Medium 2	Short-term 1	Very Low 4	Possible	INSIGNIFICANT	+ve	Medium
No mitigation measures								

Table 3.5. Impact rating of the prospecting activity on the on the regional socio-economic performance.

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Low 1	Medium-term 2	Low 5	Definite	LOW	+ve	Medium
No mitigation measures								

Trans Atlantic Diamonds should aim to incorporate codes of good practice on Broad Based Black Economic Empowerment issued under the section 9 of the Broad Based Black Economic Empowerment Act, Act 53 of 2003, as amended by Act 46 of 2013. Therefore, the following resource support aims is recommended:

- At least 25% cost of sales excluding labour cost and depreciation must be procured from local producers or local suppliers in SA.
- Job creation – 50% of jobs created are for persons of colour provided that the number of such employees since the immediate prior verified B-BBEE measurements is maintained. Employment opportunities that could be fulfilled:
 - Employment of local security companies.
 - Employment allocated to port duties
 - If feasible, employment of local small-scale fishers vessels as support vessels during survey operations.

- Employment of local or national Geologists, a vessel manager, captain, crew members, scientists etc.
- At least 25% transformation of raw material or beneficiation which includes local manufacturing, production and/or assembly, and/or packaging, or at least 85% of labour cost paid to South African employees by service industry organizations
 - prospecting equipment can be sourced within South Africa or neighbouring communities.
 - investigate if support for operational activities can be provided by local services for; e.g. Refuelling, general supplies, and possible equipment repair)
 - Skills transfer – Training opportunities:
 - Environmental officers.
 - Health and Safety Officers.
 - Marine Mammal Observers (MMOs) and Passive Acoustic Monitoring (PAM) operators.
 - general crew/ deck member.
 - Commercial divers to help with surveys.

4 CONCLUSIONS AND RECOMMENDATIONS

Anchor Environmental Consultants were requested to undertake a socio-economic assessment for Trans Atlantic Diamonds (Pty) Ltd who are applying for a diamond prospecting right for Concession Area 11C, offshore of the Western Cape Coast. The proposed prospecting activity is in a remote location and is unlikely to impact coastal communities in the Matzikama municipality, e.g. Strandfontein, approximately 40km south of Concession Area 11C. A description of Matzikama Municipality's and Strandfontein's demographic profile is, however, provided. A brief overview of the economic performance was discussed and placed in relation to the potential impacts associated to the proposed survey area. The likelihood of the proposed survey to impact the socio-economic standing of areas surrounding Concession Area 11C was rated, based on available resources (i.e., Marine Specialist Report 2348/3 and the wider literature), and the significance of impacts were reported on. Important user groups were identified and potential direct, indirect and cumulative impacts from the proposed exploration and prospecting activities were identified. Impacts were assessed and, where possible, mitigation measures have been identified to avoid/minimise/reduce any impacts.

Potential impacts associated to the seismic survey and sampling/prospecting activities were identified as: 1) Temporary disturbance of marine resources and the 2) Exclusion of fishing vessels from the Concession Area 11C. These impacts are anticipated to potentially impact the livelihoods and household income of marine fisheries groups (i.e., Tuna pole and line, Traditional Line fish, and Small Pelagic Purse Seine fishers). Potential impacts associated with the proposed prospecting activities were as Very Low and Insignificant overall significance. After mitigation measures were applied, potential impacts associated with the proposed activities were all rated as insignificant.

Trans Atlantic Diamonds should aim to incorporate codes of good practice on Broad Based Black Economic Empowerment issued under the section 9 of the Broad Based Black Economic Empowerment Act, Act 53 of 2003, as amended by Act 46 of 2013. This will include skills transfer programmes, job creation, and supporting local service industry organizations such manufacturing, production and/or packaging services.

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6 APPENDICES

6.1 APPENDIX I. IMPACT RATING METHODOLOGY

The significance of all potential impacts that would result from the proposed project is determined in order to assist decision-makers. The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur. The significance of each identified impact was thus rated according to the methodology set out below:

Step 1 – Determine the consequence rating for the impact by determining the score for each of the three criteria (A-C) listed below and then adding them. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

Rating	Definition of Rating	Score
A. Extent – the area over which the impact will be experienced.		
Local	Confined to project or study area or part thereof (e.g. limits of the concession area)	1
Regional	The region (e.g. the whole of Namaqualand coast)	2
(Inter) national	Significantly beyond Saldanha Bay and adjacent land areas	3
B. Intensity – the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources.		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. Duration – the time frame for which the impact will be experienced and its reversibility.		
Short-term	Up to 2 years	1
Medium-term	2 to 15 years	2
Long-term	More than 15 years (state whether impact is irreversible)	3

The combined score of these three criteria corresponds to a Consequence Rating, as follows:

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Example 1:

Extent	Intensity	Duration	Consequence
Regional	Medium	Long-term	High
2	2	3	7

Step 2 – Assess the probability of the impact occurring according to the following definitions:

Probability – the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Example 2:

Extent	Intensity	Duration	Consequence	Probability
Regional 2	Medium 2	Long-term 3	High 7	Probable

Step 3 – Determine the overall significance of the impact as a combination of the consequence and probability ratings, as set out below:

PROBABILITY					
CONSEQUENCE		Improbable	Possible	Probable	Definite
	Very Low	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	Low	VERY LOW	VERY LOW	LOW	LOW
	Medium	LOW	LOW	MEDIUM	MEDIUM
	High	MEDIUM	MEDIUM	HIGH	HIGH
	Very High	HIGH	HIGH	VERY HIGH	VERY HIGH

Example 3:

Extent	Intensity	Duration	Consequence	Probability	Significance
Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH

Step 4 – Note the status of the impact (i.e. will the effect of the impact be negative or positive?)

Example 4:

Extent	Intensity	Duration	Consequence	Probability	Significance	Status
Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH	-ve

Step 5 – State the level of confidence in the assessment of the impact (high, medium or low).

Impacts are also considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in the table below. Depending on the data available, a higher level of confidence may be attached to the assessment of some impacts than others. For example, if the assessment is based on extrapolated data, this may reduce the confidence level to low, noting that further ground-truthing is required to improve this.

Confidence rating	
Status of impact	+ve (beneficial) or -ve (cost)
Confidence of assessment	Low, Medium or High

Example 5:

Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH	-ve	High

The significance rating of impacts is considered by decision-makers, as shown below. Note, this method does not apply to minor impacts which can be logically grouped into a single assessment.

INSIGNIFICANT: the potential impact is negligible and will not have an influence on the decision regarding the proposed activity.

VERY LOW: the potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity.

LOW: the potential impact may not have any meaningful influence on the decision regarding the proposed activity.

MEDIUM: the potential impact should influence the decision regarding the proposed activity.

HIGH: the potential impact will affect a decision regarding the proposed activity.

VERY HIGH: The proposed activity should only be approved under special circumstances.

Step 6 – Identify and describe practical mitigation and optimisation measures that can be implemented effectively to reduce or enhance the significance of the impact. Mitigation and optimisation measures must be described as either:

- Essential: must be implemented and are non-negotiable; and
- Best Practice: must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Essential mitigation and optimisation measures must be inserted into the completed impact assessment table. The impact should be re-assessed with mitigation, by following Steps 1-5 again to demonstrate how the extent, intensity, duration and/or probability change after implementation of the proposed mitigation measures.

Example 6:

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH	-ve	High
Essential mitigation measures								
• Xxx • Xxxx								
With mitigation	Local 1	Low 1	Long-term 3	Low 5	Improbable	VERY LOW	-ve	High

OR

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Regional 2	Low 1	Medium term 2	Very low 4	Improbable	INSIGNIFICANT	-ve	High
Mitigation measures:								
Not considered to be necessary due to low significance.								

Step 7 – Prepare a summary table of all impact significance ratings as follows:

Phase	Impact identified	Severity	Probability	Significance	Status	Confidence
xxxxxx	Impact 1: xxx	Medium	Improbable	LOW	-ve	High
	With mitigation	Low	Improbable	VERY LOW	-ve	High
	Impact 1: xxx	Very Low	Definite	VERY LOW	-ve	Medium
	With mitigation	Very Low	Improbable	INSIGNIFICANT	-ve	Medium

Indicate whether the proposed development alternatives are environmentally suitable or unsuitable in terms of the respective impacts assessed by the relevant specialist and the environmentally preferred alternative.



BASIC ASSESSMENT PROCESS FOR THE PROPOSED PROSPECTING IN SEA CONCESSION AREA 11C BY TRANS ATLANTIC DIAMONDS (PTY) LTD

Trans Atlantic Diamonds (Pty) Ltd
Office 1603 Portside
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Cape Town, Western Cape, 8001



TRANS ATLANTIC
DIAMONDS

Appendix 7: Screening Report

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**SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS
REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE
ENVIRONMENTAL SENSITIVITY**

EIA Reference number:

Project name: Basic Assessment Process for Prospecting in Concession Area

11C Project title: Prospecting in Concession Area 11C

Date screening report generated: 03/12/2025 13:13:43

Applicant: Trans Atlantic Diamonds

Compiler: Anchor Environmental Consultants

Compiler signature:

.....

Application Category: Any activity in an estuary_on the seashore_in the littoral active zone_or in the sea

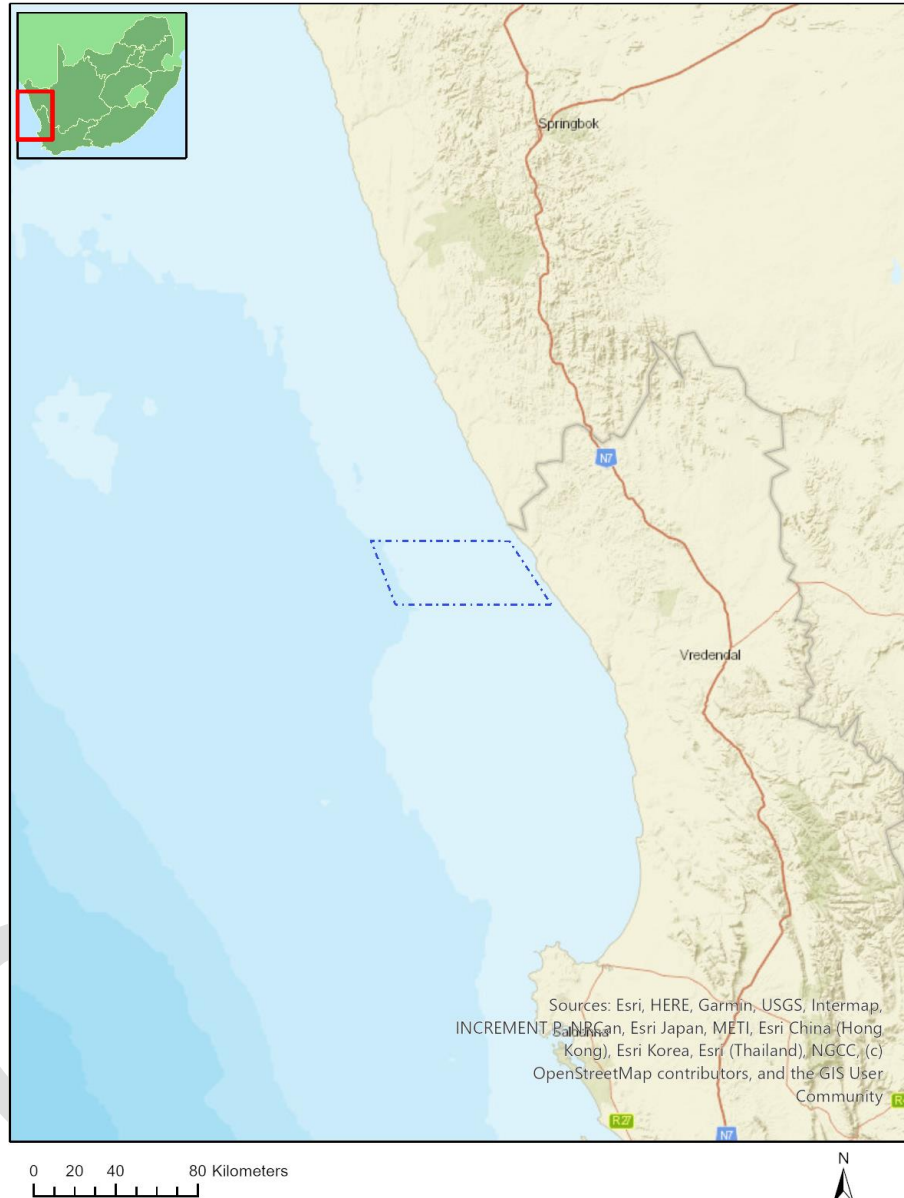
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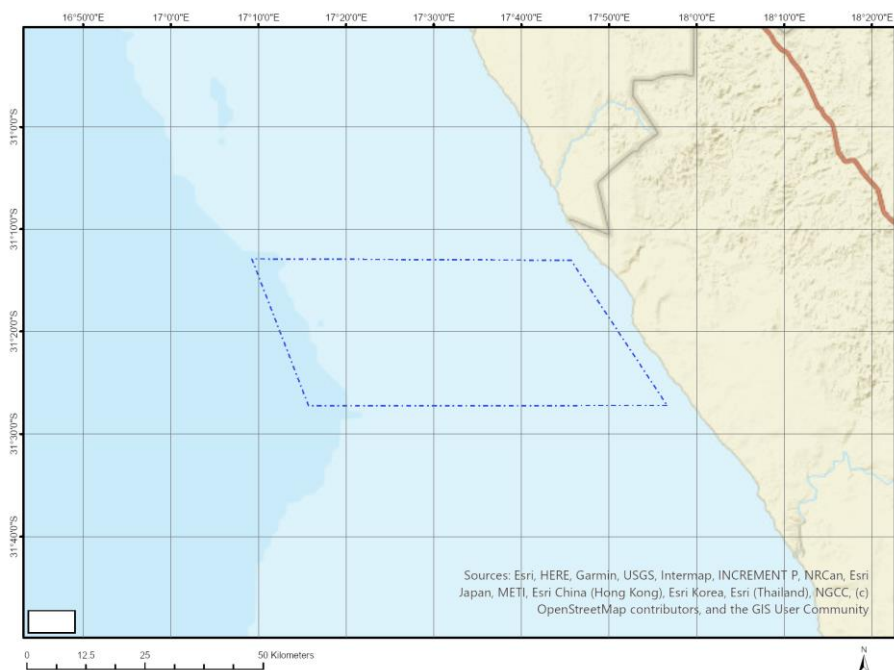
Proposed Project Location

Orientation map 1: General location

General Orientation: Basic Assessment Process for Prospecting in Concession Area 11C



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No intersection with any properties found.

Development footprint¹ vertices:

No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	12/12/20/913	Wind	Approved	14
2	12/12/20/1650	Wind	Approved	15.5
3	12/12/20/1932	Wind	Approved	9.3
4	14/12/16/3/3/1/2599	Solar PV	Approved	15.7

Environmental Management Frameworks relevant to the application

¹ “development footprint”, means the area within the site on which the development will take place and includes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is:

Any activity in an estuary_on the seashore_in the littoral active zone_or in the sea.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

No intersection with any development zones found.

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

No intersection with any sensitive areas found.

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GuidanceforHIA.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GuidanceforPIA.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Marine Impact	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Marine_Impact_Assessment_Protocols.pdf

	Assessment	ssmentProtocols/Gazetted General Requirement Assessment Protocols.pdf
7	Hydrology Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted General Requirement Assessment Protocols.pdf
8	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted General Requirement Assessment Protocols.pdf
9	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Plant Species Assessment Protocols.pdf
10	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Animal Species Assessment Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

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