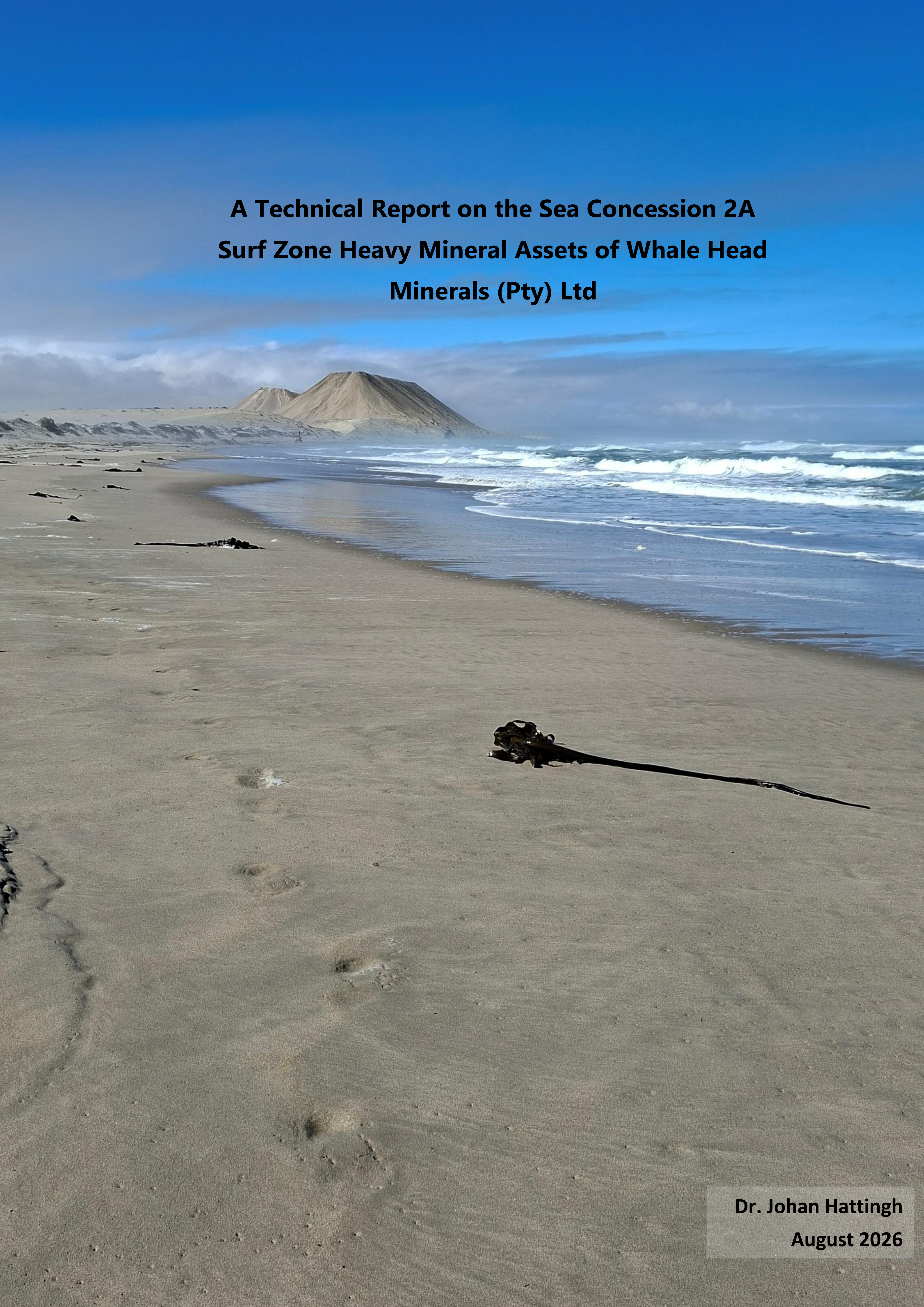

A Technical Report on the Sea Concession 2A Surf Zone Heavy Mineral Assets of Whale Head Minerals (Pty) Ltd

Dr. Johan Hattingh

August 2026

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Cover photo:

A southward view from the beach looking onto the surf zone of Sea Concession 2A. The concession's eastern boundary is defined by a line running parallel to and from 31.49m seaward of the low-tide mark. The western boundary is 1 000m seaward of the high-tide mark. In the background, tailings dumps from the historical onshore diamond mining activities at Perdevlei are visible.

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1. Executive Summary

1.1. Introduction

Whale Head Minerals (Pty) Ltd ("WHM") is a private company that applied for a Mining Right to mine heavy mineral deposits on the West Coast of South Africa, between Port Nolloth and Alexander Bay, within the diamond mining concession boundaries of Alexkor SOC Limited ("Alexkor"). The company maintains offices and staff in Alexander Bay, Northern Cape Province.

Kazera Global Plc, a company listed on AIM in London, is the majority shareholder in WHM. The directors of Kazera Global Plc instructed Creo Geo Consulting (Pty) Ltd ("Creo") in April 2026, to prepare an Independent Technical Report in conformity with standards and in compliance with the JORC Code, issued by the Australasian Institute for Mining and Metallurgy ("AusIMM"), under whose technical jurisdiction these mineral resources fall. The guidelines as set out in the JORC Code are considered by Kazera Global Plc to be a concise recognition of the best practice reporting methods for this type of mineral development and accord with the principles of open and transparent disclosure that are embodied in internationally accepted Codes for Corporate Governance.

This report describes the exploration results and mineral resources at the Sea Concession 2A Mining Right area at the Alexkor mine, earmarked by WHM for development.

1.2. Location, Property Description, Ownership and Legal Tenure

The project is situated in the arid north-western coastal region of South Africa's Northern Cape Province, with its southern border located some 23 km north of Port Nolloth. Here the Sea Concession 2A Mining Right area covering 3,012.95 hectares within the broader 3,515.38-hectare marine diamond concession. It occupies a 30km stretch of coast between latitudes 28° 05′ 28″ S and 29° 05′ 28″ S. The concessions cover an approx. 950m wide coastal strip, ranging from 31.49m seaward of the low-tide mark to 1 000m seaward of the high-tide mark, occupying the nearshore surf zone (0–4.5 m depth at low tide) and the midwater area (deepening steadily to ~22 m). The Mining Right is located directly adjacent to Alexkor's land-based diamond mining areas (Perdevlei, Holgat South, Holgat North, and Giftkop). The R382 road running between Port Nolloth and Alexander Bay offers clear views of historic exploration trenches and high tailings/overburden dumps. Inland elevations rise sharply to 20 m above mean sea level (amsl) within 300 m of the shore, leading to raised marine terraces up to 90 m amsl. The coastal platform features low, undulating relief underlain by stabilized palaeodune sands (<1 m to >8 m thick). Surface water is completely absent year-round, with zero active terrestrial drainage systems. Alexander Bay receives an average of just 20 mm of rain annually (primarily in winter), contrasted against a massive annual evaporation rate of 2,524 mm.

Average midday temperatures range from 20.6°C (July) to 27.5°C (January). July night temperatures average 8.3°C. Prevailing south-westerly winds consistently reach gale force (>70 km/h) from September to early April. Winter is dominated by stormy north-westerlies, occasionally interrupted by hot, dry easterly "bergwinds." Dense fog is a regular daily occurrence, typically lasting from late afternoon through to the following morning. Sparse coastal dune vegetation and xerophytic succulent shrubs typical of Namaqualand.

A north-northwest-trending coast consisting of steep rocky cliffs in the south and two primary sandy beaches (2.6 km and 6.1 km long) in the north, punctuated by minor embayments and rocky outcrops. An exceptionally flat, gentle average seabed gradient of 0.01. Semi-diurnal (two high and two low tides daily) tidal regime with a moderate tidal range of 1.55 m above Mean Lower Low Water (MLLW) is heavily influenced by wind and barometric pressure.

The mining concession is governed by a split-commodity (heavy minerals and diamonds) framework on state- and community-owned land.

WHM is a South African company (Reg: 2020/088549/07) and is 79% owned by AIM-listed Kazera Group PLC. The remaining 21% shareholding is held by private individuals and Kazera on behalf of employees, local communities, and private partners to fulfil South African Broad-Based Black Economic Empowerment (B-BBEE) requirements.

Mineral tenure and split-commodity Rights are shared between Alexkor, a state-owned enterprise, holding a massive 84,583-hectare marine and terrestrial mining right (granted Dec 2000) spanning Farms 1 and 155, which includes marine concessions 1A, 1B, 1C, 2A, 3A, 4A, and 4B. Alexkor's license is strictly limited to diamonds. WHM has secured a targeted Mining Right within the Sea Concession 2A footprint that is strictly limited to heavy minerals (HM).

Surface ownership of Farm 1 and Farm 155 belongs predominantly to the community-led Richtersveld Sida Hub Communal Property Association (CPA), with Alexkor administering the land on their behalf (excluding Portions 8 and 9 of Farm 1, which are owned directly by Alexkor).

1.3. Geology

The Namaqualand coast between Kleinzee and Alexander Bay is defined by a crystalline Precambrian basement unconformably overlain by unconsolidated to semi-consolidated Cenozoic sediments.

Deformed during the Pan-African orogeny (isoclinal folding, NW-dipping foliation, and conjugate jointing), this basement exhibits structural features that directly control coastal morphology and heavy mineral trap-site development.

The Cenozoic unconsolidated sediments cover marine terraces cut into the Precambrian basement during the Tertiary to Pleistocene where diamondiferous and heavy-mineral-bearing raised beach deposits as transgressive-regressive complexes (ranging from centimetres to over 10m thick) were deposited. This in turn is overlain by aeolian cover as extensive Pleistocene-to-present dune fields capping the marine sequences, largely obscuring onshore outcrops.

Alluvial diamonds and heavy mineral placers are co-located due to shared transport and depositional mechanisms governed by hydraulic equivalence, selective entrainment, and differential settling. Transport mechanics were governed by tectonic and eustatic drivers during the Late-Miocene and post-African tectonic uplift renewed erosion along westward-draining river systems. Deeper river incision cut into older interior terraces, feeding massive quantities of heavy minerals and coarse gravels (cobble-sized vein quartz and Nama quartzite) to the Atlantic coast. This was followed by marine winnowing where highly energetic wave action and northward longshore drift systematically stripped lower-density quartz and feldspar, concentrating the dense heavy mineral lag as placer deposits along the shoreline.

Exploration potential is highly localized, with distinct high-potential targets at both micro and macro scales. Meteorological and oceanographic drivers active since the Pleistocene governed the South Atlantic's highly energetic weather patterns and acted as the primary engine for sorting and exposing heavy mineral deposits. Here Summer South-Westerlies (up to 70+ km/h): Generate major swells (up to 10 m) that drive northward littoral drift. Winter North-Westerlies causing storm fronts causing high-energy waves that actively transport sediments shoreward. Winter Offshore Bergwinds (Easterlies) moves vast volumes of terrestrial sand onto the continental shelf. This naturally strips away fine-grained overburden and exposes shallow-water heavy mineral lag deposits that would otherwise be buried.

Source rivers resulting in point source enrichment at the river mouths is the primary suppliers of heavy minerals and diamonds to the West Coast in the form of westward-draining fluvial networks. The Palaeo-Orange River System is the primary regional sediment supply driver. This system historically shifted from a southern outlet (near the modern Olifants River) during the Late Cretaceous, to the relic Koa Valley (Oligocene–Miocene), and finally to its current northern mouth. During its Pliocene migration, it left extensive mineral-rich source deposits across the interior, which younger coastal rivers subsequently incised and reworked. Primary heavy mineral conduits are the Orange, Buffels (Kleinzee), Swartlintjies, Spoeg, Groen, and Olifants rivers. These river mouths serve as major point sources, with peak heavy mineral and diamond enrichment consistently concentrated on the northern down-current (down-drift) side of the river mouths.

1.4. Exploration, Data Quantity and Quality

WHM's April–May 2026 sampling programme was designed to cover as much of the Sea Concession 2A surf-zone area as practicable. Sampling was conducted on an unbiased 450 m

× 30 m grid in the southern section and a 500 m × 30 m grid in the northern section. Sample locations were surveyed, with particular attention to collar elevations.

Sampling was undertaken with a hydraulic excavator during spring low-water conditions in the late April to early May 2026 full-moon lunar cycle. At each sample point, a pit was excavated through the surf-zone sandy substrate and basal gravel layer to bedrock, as far seaward as practicable. A representative composite sample of about 20 kg was collected from the excavated material, and pit depth was measured using depth measurement markings labelled on the boom of the excavator. The sampling campaign collected 30 samples: 18 from the southern section (L1S1–L6S3) and 12 from the northern section (L14S1–L17S3). Pit depths ranged from 4.5 m to 8.9 m.

Sufficient exploration data has been acquired to estimate a Mineral Resource for the Sea Concession 2A surf zone in compliance with JORC reporting standards. Metallurgical feasibility work using a pilot spiral plant indicates favourable potential heavy mineral recoveries. Sampling is representative, covering the deposit appropriately and demonstrating clear geological and grade continuity.

Data acquisition, QA/QC, and auditing involved database management, validation and modelling, resource definition, resulting in a 3D model yielding an estimated Total Heavy Mineral (THM) volume of **2,626,803 m^3**. At an average specific gravity (SG) of **2.53**, this equates to **6,651,065 tonnes**.

Creo is satisfied that compliant QA/QC procedures were followed during sample processing and that spatial data capture techniques were accurate and true. Volume estimation was applied to prospective 2A sediments (shallow-water excavations), with a weighted average grade of **20.04% THM**.

The evaluated area covers **42.86 hectares** (1.42% of the entire Sea Concession 2A area) (the "Evaluation Area"). It excludes rocky coastal zones, which are designated as environmentally sensitive mining no-go areas.

The total resource estimate for the Evaluation Area of Sea Concession 2A surf zone is **6,651,065 tonnes @ 20.04% THM**.

- **Economic Fraction:** 98.5% of the THM assembly.
- **Non-Economic Fraction:** 1.5% of the THM assembly.
- **Contained Economic HM: 1,312,920 tonnes** (constituting 19.74% of the total resource tonnage).

This estimate has been verified using statistical and manual checks and is considered reasonable.

Geostatistical variography demonstrates distinct grade variations between the top and bottom stratigraphic units, but very low variance horizontally between neighbouring samples within the same horizon. Consequently, global grade figures were successfully calculated by combining individual polygon blocks. Weighted average grades and respective tonnages are compiled below:

Unit	Total Tonnage	THM Contained	Econ HM Contained	Ilmenite	Garnet	Zircon	Rutile	Other
%		20,04	19,74	45	49,5	2,0	1,5	1,5
Tonnes	6 651 065	1 332 873	1 312 920	590 814	649 895	26 258	19 694	19 694

1.5. Mineral Resource Estimate

For the Evaluation Area of Sea Concession 2A to qualify as a Mineral Resource, it must demonstrate reasonable and realistic prospects for economic extraction. This requires defining the location, quantity, grade, continuity, and geological characteristics through specific evidence.

Because heavy mineral mineralization is inherently highly variable, defining a resource depends heavily on appropriate spatial distribution and sample density.

Whale Head Minerals conducted an unbiased sampling programme with sufficient numbers and spacing density to demonstrate geological continuity. While this allows the Evaluation Area of Sea Concession 2A surf zone to be evaluated under the JORC Code, the resource is, therefore, classified as an **Inferred Mineral Resource** based on the following:

- **Resource Class Criteria:** Radius distances derived from sample spacing and variography results were used to define the classification.
- **Confidence Level:** Continued mineralization is demonstrated with high certainty in at least two dimensions at the sample sites. However, because the quantity, grade, and mineral content are estimated from limited geological evidence (trench and pit samples), geological continuity is assumed but not fully verified, resulting in a **moderate level of confidence**.

No audited Mineral Resource and Ore Reserve statement has been previously issued for the Sea Concession 2A heavy mineral deposit. The total estimated resource for the Evaluation Area of Sea Concession 2A is an **Inferred Mineral Resource of** is **6,651,065 tonnes @ 20.04% THM**. This resource includes **1,312,920 tonnes** of economic heavy minerals. No Ore Reserves are currently declared.

	Mineral Resource Category							
Classification	**Tonnage**	**Classification**	**Total Resource Tonnage**	**Econ HM Tonnage (t)**	**Grade (%) Ilmenite**	**Grade (%) Garnet**	**Grade (%) Zircon**	**Grade (%) Rutile**
Total Probable	**0**	**Total Indicated**						
		Total Inferred	**6 651 065**	**1 312 920**	**45%**	**49,5%**	**2,0%**	**1,5%**
Total Reserves	**0**	**Total Resources**	**6 651 065**	**1 312 920**	**590 814**	**649 895**	**26 258**	**19 694**

Based on local mineralization styles and submerged strandline heavy mineral placer formations, the remaining 98.58% of Sea Concession 2A is considered a viable geological target. Assuming a conservative mineralization extent of only 50%, compared to the Evaluated surf zone area, this substantial **Geological Target** holds an estimated **265,200,000 additional tonnes of heavy mineral deposits**, with the grade yet to be determined.

1.6. Conclusions and Recommendations

The Evaluation Area of the Sea Concession 2A surf zone deposit is a world-class heavy mineral resource. It significantly outperforms regional and global peers across two critical metrics: a remarkably high THM grade and a superior proportion of high-value economic minerals. This high-energy marine environment has naturally classified and concentrated dense minerals far beyond typical shoreline or aeolian averages. Given these exceptional grades, further capital expenditure is highly warranted. Significant scope exists to expand the resource footprint with minimal geological risk. As the primary controls such as wave-driven, near-shore depositional processes, operate within a highly predictable active marine framework, future exploration targets can be delineated with high confidence. The dynamic, high-energy environment of the deeper water zones makes traditional terrestrial or standard marine drilling ineffective. To define the resource accurately under these severe meteorological and oceanographic conditions, future campaigns must transition to a specialized marine dredging operation. This will require specialised mining platforms involving the deployment of dedicated dredging vessels or modular platforms engineered for local wave and wind limits. Further to this it will also require pumping systems that safely manage transport distances and head pressure constraints to deliver material from the surf zone to onshore facilities.

This specialized approach will secure operational safety, maintain data integrity, and optimize overall process efficiency.

2. Introduction and Terms of Reference

2.1. Introduction

Whale Head Minerals (Pty) Ltd ("WHM") is a private company that applied for a Mining Right to mine heavy mineral deposits on the West Coast of South Africa, between Port Nolloth and Alexander Bay (Figure 1), within the diamond mining concession boundaries of Alexkor SOC Limited ("Alexkor"). The company maintains offices and staff in Alexander Bay, Northern Cape Province.

Kazera Global Plc, a company listed on AIM in London holds 79% of the shares in WHM. The directors of Kazera Global Plc instructed Creo Geo Consulting (Pty) Ltd ("Creo") in April 2026 to prepare an Independent Technical Report, in conformity with standards and in compliance with the JORC Code, issued by the Australasian Institute for Mining and Metallurgy ("AusIMM"), under whose technical jurisdiction these mineral resources fall. The guidelines as set out in the JORC Code are considered by Kazera Global Plc to be a concise recognition of the best practice reporting methods for this type of mineral development and accord with the principles of open and transparent disclosure that are embodied in internationally accepted Codes for Corporate Governance.

WHM was awarded the Walviskop Mine Permit a few kilometers south of the southern border of the 2A Mining Right area in 2020 and has been mining this 5-hectare permit area ever since. The 3 012.95 ha 2A Mine Right area was applied for and granted to WHM in 2024 with final execution of the Right expected in August 2026. This report describes the exploration results and mineral resources at the Sea Concession 2A Mining Right area at the Alexkor Mine, earmarked by WHM for development (Figure 1).

The currency used in this report is expressed in US dollars and, unless specified otherwise, all measurements in this report use the metric system.

2.2. Qualified Person, Site Visit and Data Validation

The Qualified Person of this Technical Report states that he is a Qualified person for the areas as identified in the appropriate "Certificate of Qualified Person" attached to this report. Dr. Johan Hattingh, employed by Creo as a geologist with more than 37 years of experience, is the author responsible for the preparation of this report. Dr. Johan Hattingh is a Qualified Person, as defined by the JORC Code. The Qualified Person considers the JORC Code to be the appropriate standard for the Public Reporting of Exploration Results, Mineral Resources and Ore Reserves. The JORC Code sets out minimum standards, recommendations, and guidelines for Public Reporting.

Dr. Johan Hattingh, in his capacity as Qualified Person, conducted several site inspection visits during the period between 2016 and 2026, to the Sea Concession 2A and neighbouring areas. During these visits, discussions were held with key on-site and head office personnel. The technical information used in this CPR was provided by WHM and used in good faith by Creo. Where possible, Creo have satisfied itself that such information is both appropriate and valid to ensure JORC compliance in terms of the level of disclosure.

2.3. Declarations

Creo will receive a fee for the preparation of this report in accordance with normal professional consulting practice. This fee is not contingent on the outcome of the current transaction and Creo will receive no other benefit for the preparation of this report. Creo does not have any pecuniary or other interests that could reasonably be regarded as capable of affecting its ability to provide an unbiased opinion in relation to the Mineral Resources and Ore Reserves of WHM.

Creo does not have, at the date of this report, and has not had in the past, any shareholding in, or other relationship with, Kazera Global Plc, WHM or the Material Properties. The Qualified Person and Creo consider itself to be independent in terms of the JORC Code.

3. Location

The mine is situated in the extreme northwestern corner of the Northern Cape Province, Republic of South Africa. The Sea Concession 2A Mining Right area (heavy minerals only) forms part of the Alexkor diamond mining sea concessions (diamonds only) and is flanked by Alexkor's terrestrial mining areas (diamonds only) to the east (Figure 1).

The north-northwest-trending shoreline is characterized by steep cliffs in the south, transitioning to open sandy beaches with occasional rocky outcrops toward the north. Highly visible exploration trenches and prominent tailings dumps rise above the landscape, making them easily visible from the R382 road connecting Port Nolloth and Alexander Bay. Covering 3,012.95 ha, the Sea Concession 2A Mining Right area spans a 30 km stretch of coast between latitudes 28° 05′ 28″ S and 29° 05′ 28″ S. The southern boundary of the concession lies approximately 23 km north of Port Nolloth (Figure 2). It occupies the surf zone and nearshore mid-water areas adjacent to the coastal Alexkor, Perdevlei, Holgat South, Holgat North, and Giftkop mining areas.

Geographically, the concession covers an approximately 950 m wide coastal strip, extending from 31.49 m seaward of the low-tide mark to 1,000 m seaward of the high-tide mark. This area encompasses the nearshore surf zone (0–4.5 m depth at low tide) and the mid-water zone, which deepens steadily to approximately 22 m. Along the coast, the shoreline consists primarily of prominent sea cliffs and long, open beaches flanked by a series of raised marine terraces that reach elevations of up to 90 m above mean sea level at their inland limits.

Figure 1: Location map of the Sea Concession 2A area and neighbouring towns.

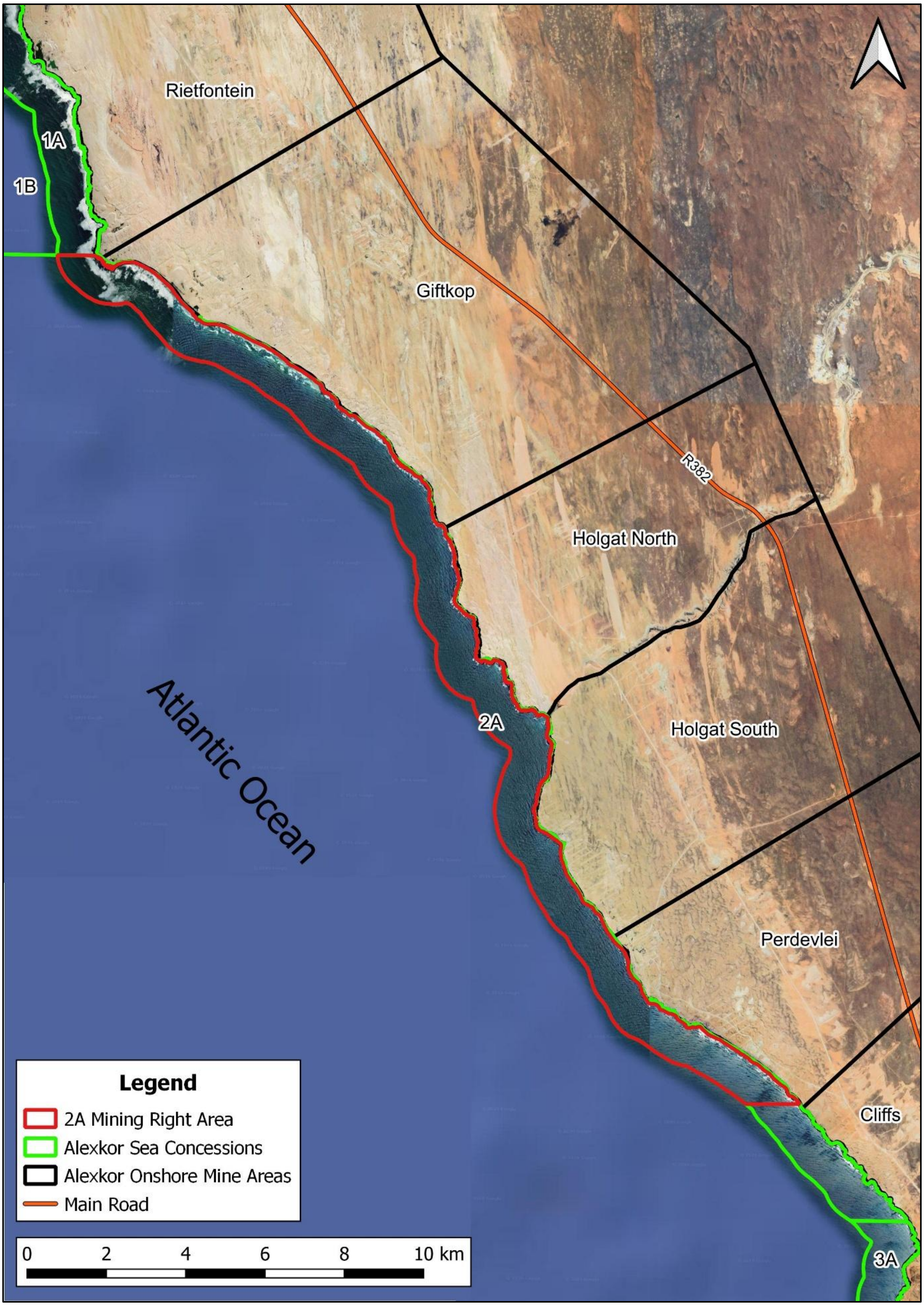

Figure 2: Map showing the extent of the Sea Concession 2A heavy mineral Mining Right application area relative to the Alexkor onshore and offshore diamond Mining Right areas.

4. Corporate structure, Company Details and Legal Tenure

4.1. Corporate structure

Whale Head Minerals (Pty) Ltd is a South African company and 79% subsidiary of Kazera Group PLC, an AIM listed company (Figure 3). The balance of the shares in WHM are held by private individuals, in compliance with Black Economic Empowerment legislation in South Africa and by Kazera on behalf of employees, the local community and private individuals.

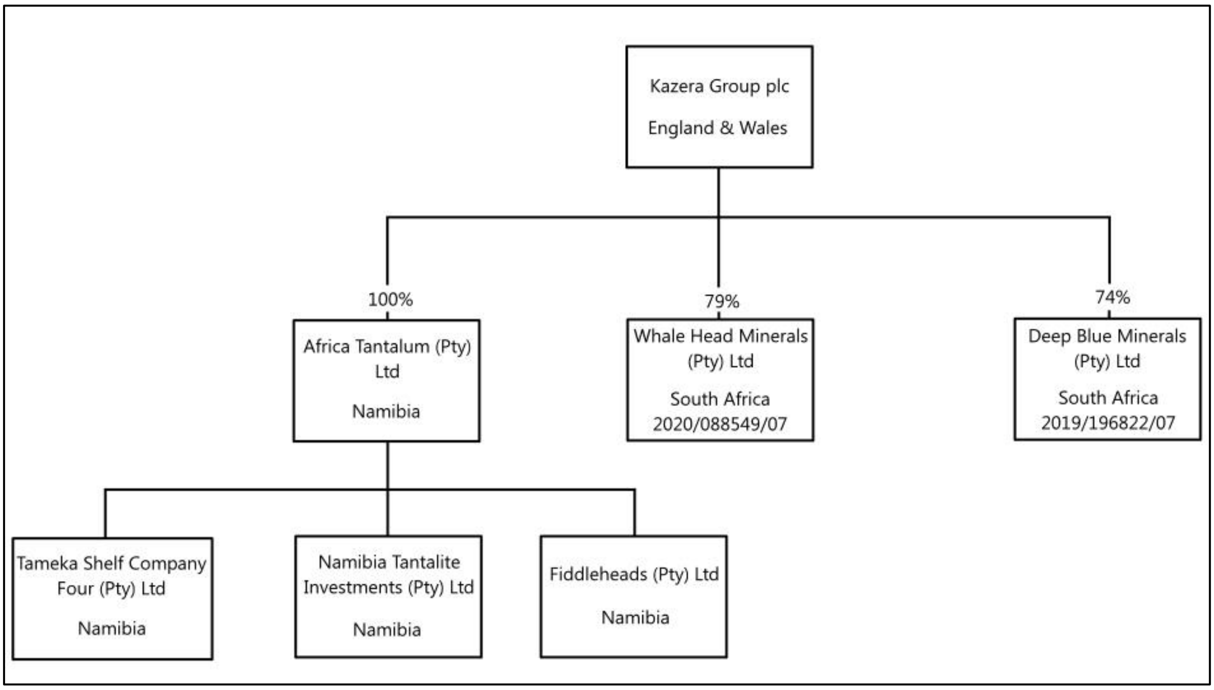

Figure 3: Kazera Group PLC Group Structure Chart.

4.2. Company Details

Whale Head Minerals (Pty) Ltd ("WHM") is a South African company with company registration number 2020/088549/07 and the sole owner of the Sea Concession 2A project. The company is a 79% owned subsidiary of Kazera Global Plc, a company listed on AIM in London.

4.3. Mineral Tenure

Creo's Qualified Person (QP) has reviewed the mineral tenure for the WHM project area, specifically Sea Concession 2A. This review included independent verification of the legal status and ownership of the underlying property and mining agreements associated with the heavy mineral Mining Right application (Reference: NC 30/5/1/2/2/ (10244) MR). The application has been submitted to the South African Department of Mineral Resources and Energy (DMRE); while the environmental authorization has been granted, the Mining Right is currently pending issuance.

The total legal tenure over the Alexkor mine covers an area of 84 583 ha, in the form of a mining right issued by the Department of Mineral Resources and Energy in December 2000. This mining right issued to Alexkor covers the main areas, namely Farm 1 (State Land) and Farm 155 (State Land), representing approximately 98% of the area, and 8 smaller properties. Alexkor also holds marine mining rights on Sea Concessions 1A, 1B, 1C, 2A, 3A, 4A and 4B (Figure 4). The Alexkor mining licence was issued for the mining of diamonds only. The Mining Right of WHM is limited to heavy minerals only.

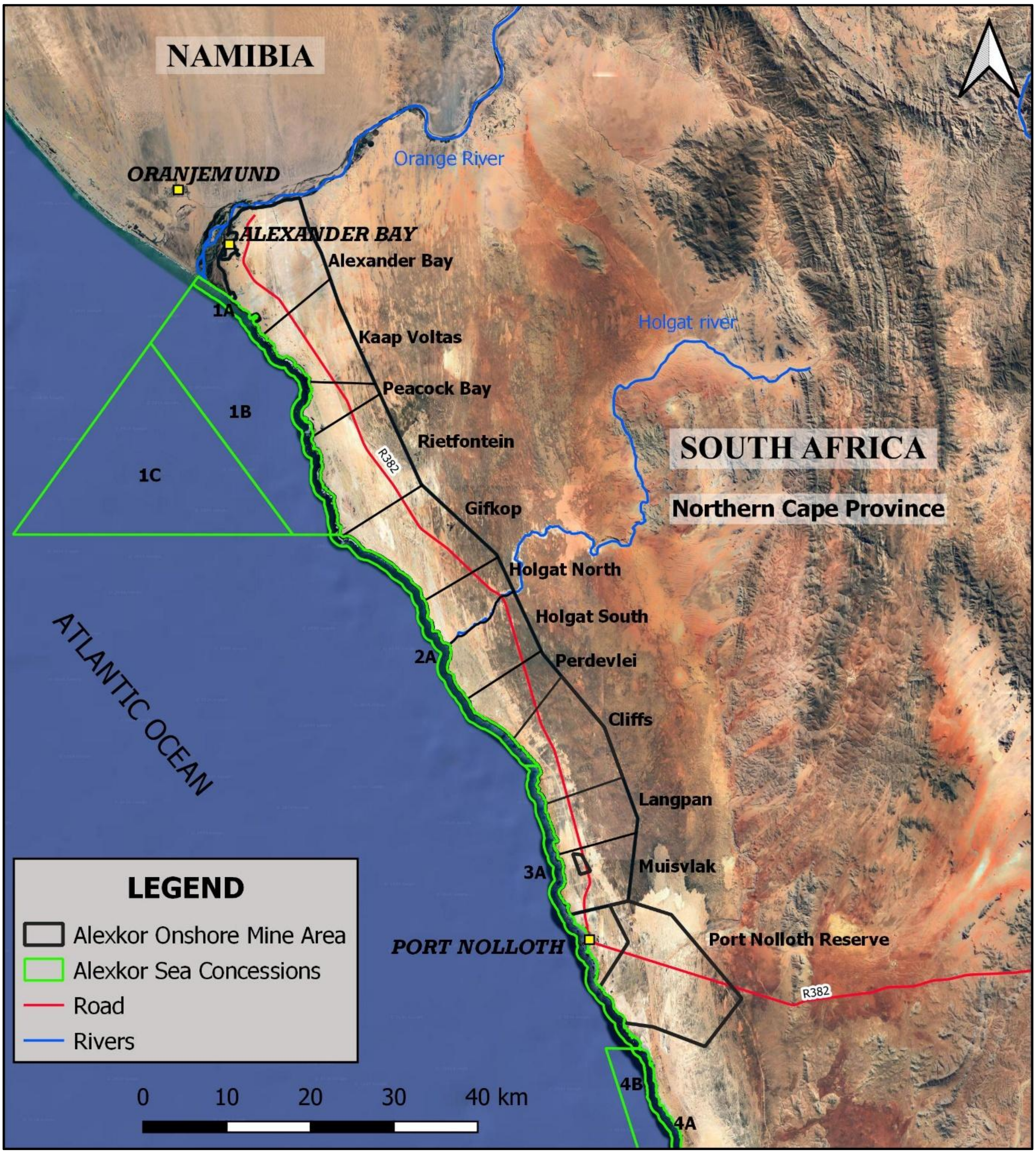

Figure 4: Location and extent of the Alexkor onshore mining areas and offshore concessions, with the Whale Head Minerals heavy mineral Mining Right application area located within Alexkor offshore concession 2A

Ownership in terms of surface rights of the largest part of the property, Farm 1 and Farm 155, is held by the Richtersveld Sida Hub Communal Property Association, following a land claim settled in court. Alexkor administers the area on the association's behalf. Portion 8 of Farm 1, the harbour area, and Portion 9 of Farm 1, just north of the harbour belong to Alexkor.

Alexkor is a state-owned company ("SOC") incorporated in terms of the Alexkor SOC Limited Act No 29 of 2001. In addition to the founding legislation, Alexkor being an SOC, is governed by the Public Finance Management Act ("PFMA") of 1999 as amended from time to time as well as the Treasury Regulation passed in terms of the PFMA and the Companies Act No 71 of 2008. Alexkor's primary objective has been to undertake diamond mining operations in its lease area.

Alexkor was established as a commercial diamond mining company in terms of the Alexkor Limited Act, No. 116 of 1992, and amended by the Alexkor Amendment Act, No. 29 of 2001. Alexkor's predecessor, Alexander Bay State Alluvial Diggings, has been mining diamonds on this concession area since 1928. Alexkor is a listed schedule 2 public entity, wholly owned by the South African Government through the Minister of Public Enterprises being the shareholder representative. The company has two divisions or business units, which are the Alexander Bay Mining (Alexkor RMC JV) and the Alexkor corporate unit. The mining division is the core business of the company, exploiting a large land-based diamond resource and extensive offshore diamondiferous marine deposits. The core business of Alexkor is the mining of diamonds on land, along rivers, on beaches and in the sea by means of contract mining.

4.4. Land Use Agreement

WHM negotiated a general access and land use agreement with Alexkor RMC JV in 2020, before mine activities commenced at its Walviskop Mine Permit area. This agreement also covers the 2A Sea Concession and adjacent onshore areas.

4.5. General

The information mentioned in the above sections was sourced from scans and electronic files of official documents, which has been supplied by WHM. The author is not responsible for the accuracy of any mineral tenure or related data and does not make any claim or state any opinion as to the validity of the property disposition described herein.

For the preparation of this report, the author has relied on maps, documents, and electronic files generated by the WHM management and in-house experts and exploration teams, contributing consultants, and service providers working under their supervision. The data has been verified regarding the material facts, relating to the prospectiveness of the property reviewed in this report, to the extent possible under the mandate of a JORC review.

5. Accessibility, Climate, Infrastructure and Physiography

5.1. Accessibility

Access to the Alexkor Mine from Cape Town is via the tarred N7 northwards via Springbok to Steinkopf, some 700 km north of Cape Town. At Steinkopf the R382 road to Port Nolloth and Alexander Bay turns off to the west just north of the town. The R382 road from Steinkopf to Port Nolloth is tarred all the way to Alexander Bay. The distance from Steinkopf to Port Nolloth is 84 km, and from Port Nolloth to Sea Concession 2A another 24 km. The first 10 km is tarred to the gate of WHM loading area and offices, from where an unpaved road gives access to the mining areas of WHM. The mine areas are within a restricted high security diamond area, with strict access control and fences enclosing the protected area.

5.2. Topography

Along the approximately 30 km shoreline of the Perdevlei-, Holgat South-, Holgat North- and Giftkop areas, a prominent rocky cliff shore is the predominant feature, interrupted by several long open beaches. These cliff faces flanking the beaches can be as high as 9 m above mean sea level (amsl) in places. Within 300 m inland from the shore, surface elevations increase rapidly to 20 m amsl. The coastal platform is overall broadly concave, with a narrow convexity along its seaward edge (Figure 4). A low, undulating relief is superimposed on the overall profile. Unconsolidated surface sand of about a metre thick but locally thickens into elongate lenses (up to 8 m thick), represents stabilised, degraded palaeo-dunes, which contribute to the low relief of the coastal platform.

The Sea Concession 2A coastline consists of two long sandy beaches and some smaller embayment's, separated and flanked by rocky cliffs. The inland side of the beaches consist of dunes and in places diamond prospecting trenches and overburden dumps occur. The two long beaches are respectively 2.6 km and 6.1 km in length. Water depth ranges between ~1 m low tide and ~4.5 m low tide in the surf zone. Seabed slope very gently averages at 0.01. Beyond the surf zone sea floor bathymetry shows a steady decline of sea floor elevation, with the deepest parts of 2A reaching some 22m below surface.

5.3. Drainage

The entire area of Sea Concession 2A falls in the near shore surf zone of the Atlantic Ocean, with only a narrow strip of the extreme eastern parts being exposed during spring tide low stands. Surface water is totally absent throughout the year on the bordering onshore areas, consequently there is no surface drainage systems developed in the area.

5.4. Climate, Vegetation and Wildlife

Rainfall in the Northern Cape is generally low and highly variable. Alexander Bay receives about 20 mm rain per year, and it falls within the Mediterranean climate zone of Southern Africa, due to a winter rainfall. It receives the lowest rainfall (0 mm) in January and the highest (6 mm) in June. Here the average annual evaporation rate is measured at 2 524 mm, and the combined effect of low rainfall and high evaporation rates result in extremely dry conditions. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Alexander Bay range from 20.6°C in July to 27.5°C in January. The region is the coldest during July when the mercury drops to 8.3°C on average during night-time.

From September to early April a prevailing south-westerly wind can reach gale force conditions. Fog in the late afternoon till late morning is a common occurrence and occasional hot berg winds in winter can result in very hot conditions during these events.

The Sea Concession 2A coastal area are predominantly sandy beach areas with rocky outcrops along its inland boundary. Much of the back shore areas are covered by sand and calcrete, supporting sparse coastal dune vegetation cover, occasional karoo-type shrubs consisting principally of succulents, comprising mainly coastal xerophytic vegetation of Namaqualand. These plants grow profusely in the white sandy soil and do flower after the winter rainfall months (August-October). Despite the absence of surface water in the area, this desert environment supports a very diverse ecology that adapted to local conditions by finding ways to collect and use water brought to the coastal zone in the form fog banks.

5.5. General Infrastructure

5.5.1. Water

Alexkor sources potable water from the Orange River. Process water is pumped from the sea. Wastewater, together with the slimes, are pumped to the slimes dams at the operating plants.

5.5.2. Power

Power is provided to the Alexkor Mine area via a 22 kV Eskom line linked to the national grid. Voltage is decreased to 400 V and distributed as required to the various processing plants.

5.5.3. Telecommunications

Telkom telephone communication is available via a microwave tower and land link. Cellular telephone reception is available throughout most of the mine.

5.5.4. Accommodation and Offices

Alexander Bay and Port Nolloth provide accommodation in the form of houses or single quarters for permanent staff and contractors, as well as shops, schools and a hospital. The mine complex, comprising several office buildings and workshops, forms the centre of the infrastructure for the Alexkor Operations.

This complex is used for:

- a security office;
- offices in the geology and survey sections;
- offices in the administration block;
- workshops and associated offices and ablutions; and
- mine stores.

5.5.5. Mining Equipment and Plants

Mining equipment will be standard hydraulic excavators, ADT's and front-end loaders. Processing equipment includes screening and gravity separation equipment, with magnetic separation done in the final recovery plants.

5.5.6. Security

Security at the Alexkor mine is of paramount importance to the company due to the diamond mining activities and as a result is of a high standard. Security is divided into the physical aspects and the electronic surveillance systems. The physical security comprises a 24-hour service, utilising well-trained staff carrying out the following:

- access control for personnel, vehicles and equipment;
- surveillance and patrolling of the mine area;
- surveillance and patrolling of the processing and final recovery plants;
- escorting and safeguarding the concentrate during transport to the final recovery plants; and
- escorting and safeguarding the product off the site.

5.5.7. Roads

All roads in and around the mine are gravel and well-maintained when in use. Water bowsers are utilised to spray water onto the roads to protect the road surface and to limit dust entrainment into the atmosphere. Graders are used to level the road after watering the road surface.

5.5.8. Waste and Sewage

Septic tanks and French drains provide sewage disposal. Solid waste disposal will take place in cooperation and consultation with the Alexkor EMP. A contractor removes used oil, grease and related pollutants. Any other hazardous waste is transported to a registered hazardous waste site and in full compliance with the WHM 2A and Alexkor EMPs.

6. Geological Background

The regional substrate geology of the Namaqualand coast between Kleinzee and Alexander Bay comprises crystalline Precambrian basement overlain by unconsolidated to semi-consolidated Cenozoic sediments. The basement is dominated by the Neoproterozoic Gariep Supergroup, part of the arcuate north-northwest-trending Gariep Belt, along the South Atlantic coast from Lüderitz to Kleinzee. The Gariep Supergroup unconformably overlies the Palaeo- to Mesoproterozoic Namaqua-Natal Metamorphic Province and comprises metavolcanic-sedimentary successions, well exposed in the Richtersveld and sporadically along the Namaqualand coast (Germs and Gresse, 1991).

In the Sea Concession 2A area, the Gariep Supergroup includes the Grootderm-, Oranjemund-, Stinkfontein- and Holgat Formations (Figure 5).

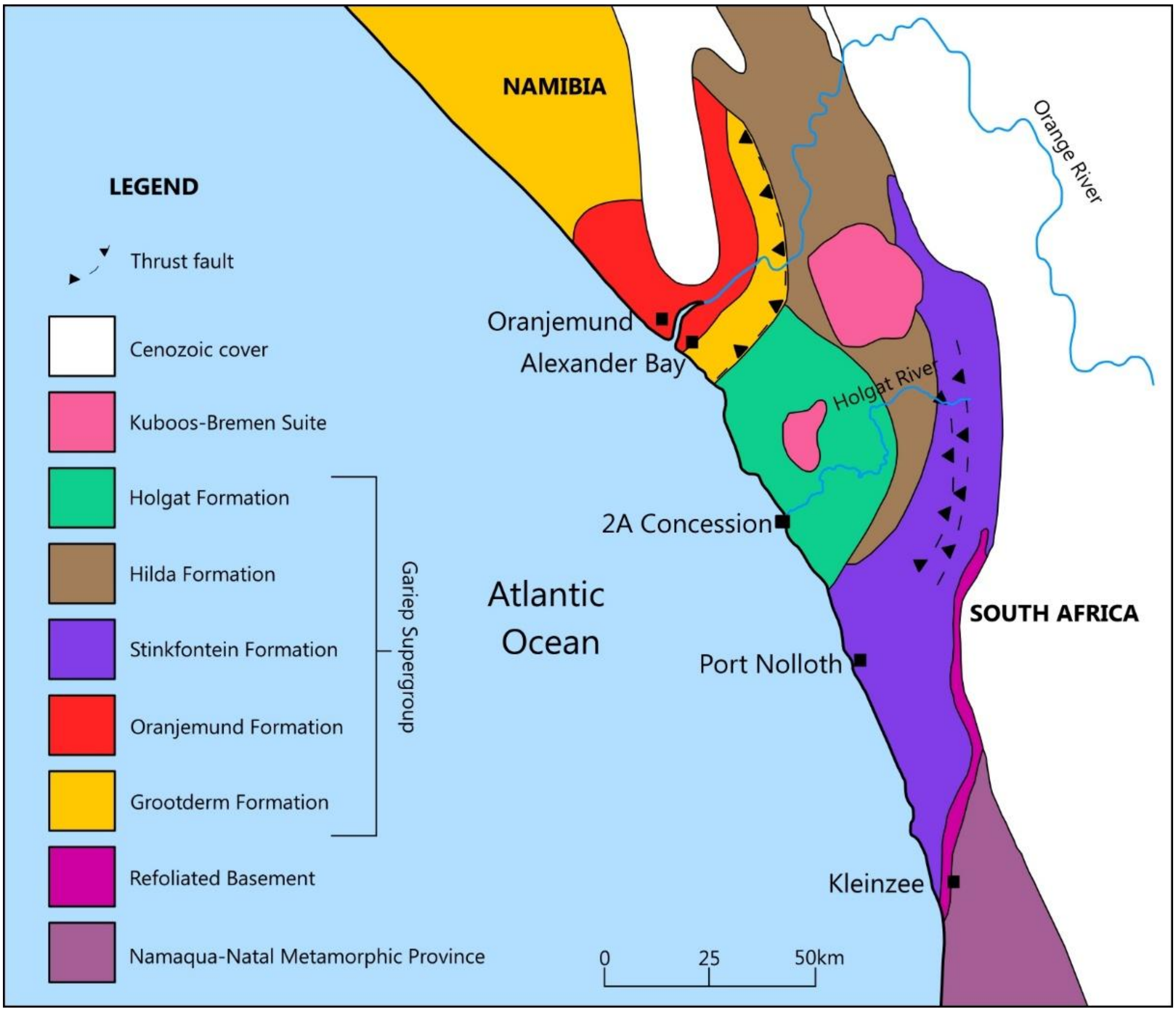

Figure 5: The bedrock geology within the Alexkor area, comprising the Gariep Supergroup with the Sea Concession 2A area underlain by the Holgat Formation.

The Grootderm Formation, the oldest of these, occurs north of the Holgat River and consists of basaltic to andesitic volcanics, with associated volcanic breccia, agglomerate and tuff. North of Kaap Voltas, it contacts the Oranjemund Formation, which is exposed along the coast and Orange River and comprises tightly folded phyllite, schist, quartzite and basal dolomite. The Stinkfontein Formation extends from Kleinzee to about 16 km north of Port Nolloth, where it is overlain by the Holgat Formation, and consists mainly of gritty and feldspathic quartzite with conglomerate. The Holgat Formation underlies Sea Concession 2A north and south of the Holgat River and comprises greenish-grey massive quartzite, grit and greywacke, locally sheared into schistose quartzite, quartz-sericite schist and phyllite. About 18 km north of Wreck Point, the Grootderm Formation is thrust over the Holgat Formation. Before the final deformation phase, small lamprophyre and hornblendite dykes and sills intruded the Oranjemund Formation and were later strongly sheared and metamorphosed.

Post-Karoo dolerite dykes and sills crop out along the Perdevlei coast. The Gariep Supergroup was intensely deformed during multiple phases of Pan-African folding and faulting. The main compressional phase produced tight isoclinal folds and penetrative, low-angle NW-dipping foliation that largely obliterated primary stratification. Later deformation formed gentle NW-trending open folds and associated faults. South of Holgat Point, rocks generally dip E to NE at 10°–30°, while north of Holgat Point they dip W to NW at 8°–50°. NW–SE and NNE–SSW conjugate joint sets, together with quartz veins of variable scale, are exposed along the coast. These structural and lithological features influence coastal morphology and trap-site development for diamond placer formation.

Cenozoic deposits discordantly overlie the Precambrian basement. Tertiary to Pleistocene diamondiferous and heavy-mineral raised beach deposits are rarely exposed, because dune fields cover the marine terraces. Diamond mining along South Africa's north-western coast shows that these raised beach deposits form transgressive-regressive complexes, separated by terrestrial sediments, with individual units ranging from a few centimetres to more than 10 m thick. Pleistocene dune sands overlie the terrace sequence and adjacent bedrock (Pulfrich, 2020). The West Coast alluvial deposits, comprising fluvial and marine gravels, are regarded as the world's largest secondary diamond deposit and have produced approximately 18 million carats since mining began in 1928 (Corbett, 1996). Heavy mineral placers form through the same transport and depositional processes as alluvial diamond placers, controlled by hydraulic equivalence (Hattingh, 1990), selective entrainment and differential settling (Hattingh, 1993). In southern Africa, alluvial diamonds and heavy minerals occur in four main settings: fluvial palaeo- and modern valley deposits, including karstic traps, modern beaches and raised or drowned marine terraces, loose sea-floor gravels, and aeolian surface deposits (Van der Westhuizen, 2012).

Late-Miocene/post-Africa tectonic and eustatic uplift renewed erosion in westward-draining river source areas, reworking pebble- to cobble-sized gravels in meandering systems linked to modern drainage. These proto-gravels consist mainly of cobble-sized vein quartz, with Nama quartzite clasts present in the lower Buffels River. River incision into the western edge of the African Plateau during this degradational phase, promoted heavy mineral erosion and transport to the coast. Later uplift sustained heavy mineral supply to West Coast beaches, where wave action and longshore drift reworked nearshore sediments, winnowing quartz and feldspar from placer deposits through selective entrainment and differential deposition.

Onshore and surf-zone exploration for marine alluvial diamonds and heavy minerals shows that certain depositional settings have higher potential. These include gullies, potholes and bedrock depressions at the micro scale, and log-spiral bays with well-developed headlands on macro scale. Palaeo-drainage channels, the southern sides of headlands and wave-abraded beaches are also favourable. Diamonds and heavy minerals generally concentrate near bedrock in high-energy pebble-, cobble- and boulder-bearing sediments, commonly formed by storm events along cliff-base beach deposits at the landward ends of wave-cut terraces, because they are denser than common minerals such as quartz. Heavy mineral placers accumulate on these wave-abraded surfaces and are redistributed northward by wave action during sea-level stillstands, with distribution closely linked to wave-refraction-controlled depositional environments.

Since the Pleistocene, southern Atlantic weather patterns have created conditions favourable for diamond and heavy mineral placer development along the Namaqualand West Coast. Winds strongly influence sea conditions and seabed sediment movement. Summer southwesterlies periodically exceed 70 km/h and generate swells up to 10 m, while winter north-westerlies accompany cold fronts and storms that drive high-energy wave conditions and sediment transport. Hot, dry, easterly bergwinds between winter cold fronts can also move large volumes of sediment onto the continental shelf, exposing nearshore heavy mineral lag deposits, otherwise buried beneath thick fine-grained overburden.

Studies by De Wit (1993) and Van der Westhuizen (2012) indicate that the Palaeo-Orange River, draining as far inland as western North-West Province and Lesotho, shifted at the Prieska junction, from a northward to a southward course, during the humid Late Cretaceous, reaching the present Olifants River Mouth. From the Oligocene to early Miocene, the system migrated along the relic Koa River Valley and again exited at the present Orange River Mouth. The Orange River System and other westward-draining rivers are widely recognised as major suppliers of heavy minerals to the West Coast (Gurney et al., 1991; De Wit, 1993; Van der Westhuizen, 2012). When the mid-Orange River shifted north at the Prieska junction during the mid-Pliocene, it left extensive heavy-mineral-bearing deposits on the Boesmanland interior above the Great Escarpment. Westward-draining coastal rivers later incised into these Oligocene to Miocene terrace deposits, explaining the widespread heavy minerals along the South African West Coast between the Olifants and Orange Rivers. The main heavy-mineral-bearing rivers are the Orange-, Buffels-, Swartlintjies-, Spoeg-, Groen- and Olifants Rivers (Figure 6).

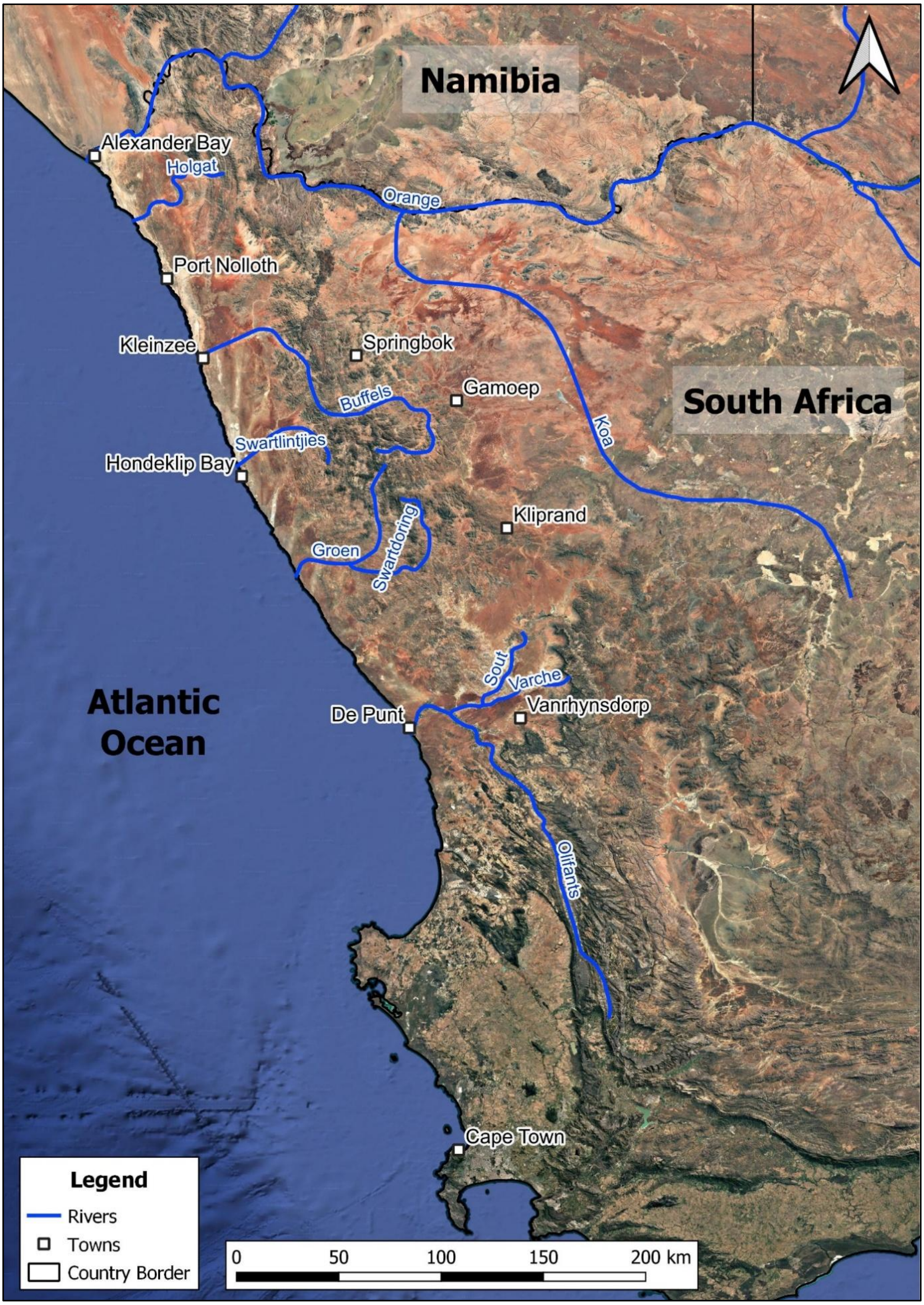

Figure 6: Drainage systems on the West Coast that acted as main heavy mineral supply routes.

The Swartlintjies- and Spoeg Rivers are bordered by high-grade onshore marine terraces and palaeo-river channels, formerly mined by De Beers Namaqualand Mines at Koingnaas and Mitchells Bay, south of Hondeklip Bay. At Kleinzee, the Buffels River mouth is flanked by the well-known Buffels Marine Complex diamondiferous terraces and deposits (Philander, 1999). These rivers supplied heavy minerals to the coast, where longshore drift redistributed them northward. Keyser (1972) showed that river mouths are important point sources for diamond and heavy mineral enrichment in adjacent marine deposits, particularly on the northern, down-current side.

6.1. Depositional environment

6.1.1. Climate

The Namaqualand Sandy Namib, between the Orange and Olifants Rivers, forms the southern Namib Desert and receives limited winter rainfall (Pether, 1994). Onshore aridity is controlled by the marine South Atlantic Anticyclone (SAA) (Figure 7).

Anticyclonic conditions develop near 30°S within the Atlantic subtropical high-pressure zone, while eastward-moving cyclonic cells form between 35°S and 40°S (MacHutchon, 2015). These systems shift seasonally by about 3° poleward or equatorward.

In austral summer, the SAA lies near 31°S and is strengthened by continental heating, producing strong equatorward winds along the West Coast. Daytime heating and coastal-plain thermal lows draw cool marine air inland. Coriolis deflection turns this sea breeze equatorward, intensifying the longshore wind. In winter, the SAA shifts about 5° north, allowing cyclonic lows in the westerlies to affect the West Coast directly, bringing rainfall and north-westerly winds.

West Coast climate is also influenced by warm offshore berg winds and coastal low-pressure cells. Berg winds commonly occur from autumn to spring, when air descends anticyclonically from the interior plateau under a large southern high-pressure system. This adiabatically warmed airflow can carry substantial dust, forming offshore plumes up to 150 km long and contributing sediment to the shelf (Pether, 1994).

The SAA restricts the northward movement of westerly cyclones, contributing to West Coast aridity. Cold upwelled coastal water cools the overlying air, reducing its moisture capacity and strengthening the inversion. Namaqualand's arid climate is reflected in low, undulating ancient linear dunes, stabilised by xerophytic strandveld scrub, indicating persistent strong southerly winds. Active and semi-active dune plumes occur north of ephemeral river mouths and south-facing bays. Rivers such as the Buffels rise in the dissected escarpment and cross the coastal plain in entrenched channels formed under wetter climates, while the sandy coastal plain itself has little significant drainage.

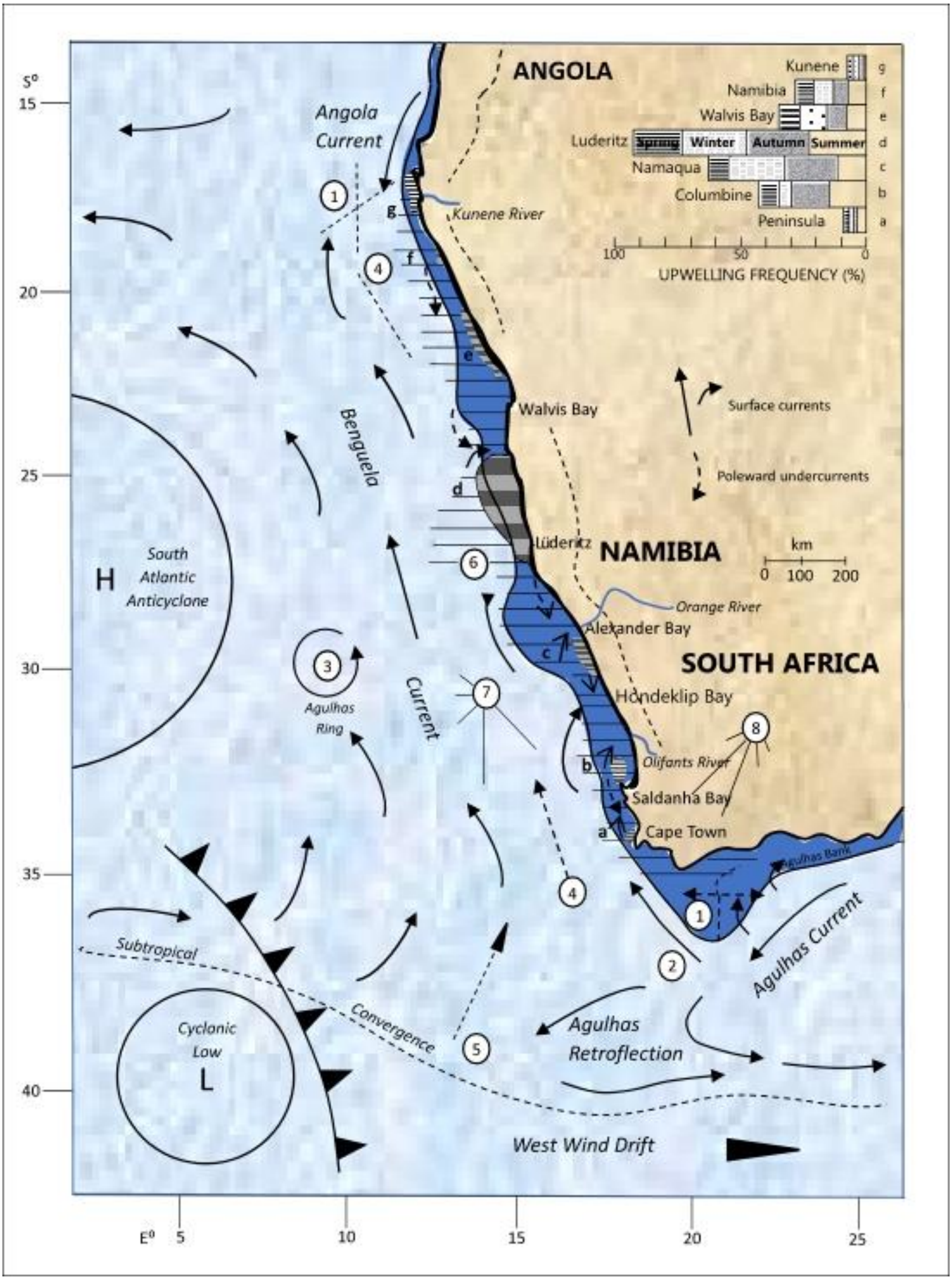

Figure 7: Illustration of the main weather systems and its influence on the Benguela System.

6.1.2. Oceanography and Wave Regime

The South Atlantic Oceanographic regime is dominated by the Benguela Current, an eastern-boundary current that flows equatorward and drives upwelling of cold, nutrient-rich water that supports abundant marine biota (Pether, 1994). The Benguela forms part of the South Atlantic

Gyre and is underlain by a poleward compensatory flow of oxygen-poor water. At its northern boundary, it interacts with the poleward-flowing Angola Current, forming a persistent east-west front near 16°S, marked by strong temperature and salinity gradients (Pether, 1994). This front shifts about 2° seasonally, moving farthest north in winter and farthest south in summer. Episodic Benguela Niño events occur when warm tropical water invades the northern Benguela, sometimes reaching 25°S, displacing cool-water fauna southward and entraining tropical fauna. At the southern boundary, Agulhas Current and Antarctic Circumpolar Current waters interact with the Benguela in the complex Agulhas Retroflection Zone. Leakage from the Agulhas Bank introduces warm mixed water into the southern Benguela, influencing upwelling, while persistent Namaqua upwelling keeps warm water offshore. The Namaqua upwelling cell occurs about 60% of the time and is affected by the thermal regime of southerly winds. Southerly winds drive surface waters offshore through Coriolis deflection, drawing cool Central Water from depths of about 200–500 m up along the coast. Near-shelf temperatures of 8–12°C limit strong thermocline development. Frontal jets form where cold upwelled coastal water meets warmer offshore surface water (Figure 7). Seasonal wind changes control upwelling intensity, while shelf bathymetry influences the movement of upwelled water, creating distinct upwelling zones along the West Coast.

West Coast tides are semi-diurnal, with a mean spring tidal range of about -0.2 m to 1 m and an absolute range of 1.55 m, placing the coast in a micro-tidal regime (<2 m) (MacHutchon, 2015; Pether, 1994). Sediment transport on the inner shelf is controlled mainly by high-wave energy rather than tides, although tidal processes influence shelf-water movement and fine-grained sediment transport (De Decker, 1986). South-westerly waves drive strong northward longshore drift, with median wave heights decreasing from about 2.5 m at Cape Town to 1.75 m at Oranjemund. These waves occur about 25% of the time in summer and 40% in winter. North-westerly waves are rare, occurring about 1% of the time, mainly in spring and winter. De Decker (1988) indicated that average waves can move very coarse sand to 30 m depth and medium pebbles to 15 m, while storms can mobilise medium pebbles at 30 m and small cobbles at 15 m.

The inner- to middle-shelf wave and current regime strongly affects sediment supplied by the Orange River. North of the river mouth, bedload sediment transported by the Orange River extends from the mouth bar to beaches in the Namib Sand Sea. The fully submarine delta consists mainly of very fine sand and clay and shows a clear seaward-fining trend. It represents the wave-dominated end of the deltaic spectrum: the delta front is characterised by fine sand near the -40 m isobath, while the pro-delta comprises silt and clay. In the absence of strong equatorward winds, discharge from West Coast river mouths is expected to turn southward.

6.1.2.1. The Continental Shelf

The Namaqualand shoreline is predominantly rocky, with scattered gravelly, sandy and shelly pocket beaches, comprising about 33% of the coastline. It lacks major embayments and is largely backed by dune deposits. Bedrock cliffs capped by truncated Pliocene marine deposits, occur on both sides of the Olifants River mouth (Figure 8) and north of Port Nolloth (Pether, 1994). The inner shelf is narrow and rocky, underlain by Late Precambrian bedrock with thin, patchy sediment cover. Nearshore sediment patches are generally only a few metres thick, although palaeochannel fills may exceed 20 m; De Decker (1986) recorded 14 m of inner-shelf sediment south of the Orange River delta. The outer shelf consists of Pliocene limestones deposited on the shelf (Figure 8).

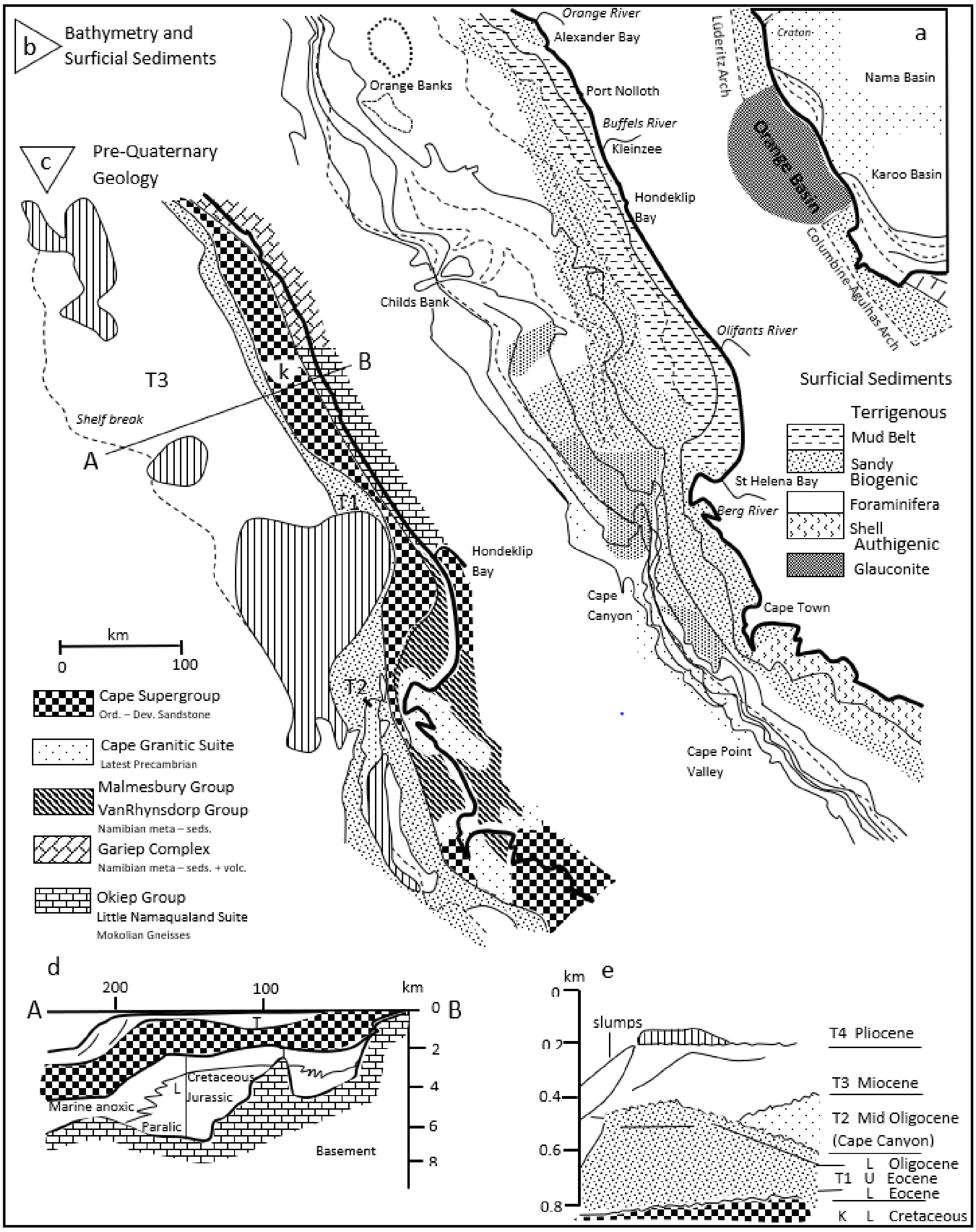

Figure 8: Geology and bathymetry of the western continental shelf, South Africa.

During the Tertiary, terrigenous sediment supply to the margin and subsidence rates generally declined, increasing the relative importance of biogenic sedimentation and mineralisation (Pether, 1994). Late Cenozoic upwelling promoted widespread phosphatic and glauconitic authigenic mineralisation on the shelf, as well as extensive phosphatisation of Tertiary limestones exposed on the seabed. Natural processes add sediment to rocky coasts, where it is redistributed according to sediment properties, seabed profile and hydrodynamic conditions.

6.1.2.1.1. Natural processes

Sediments on rocky coasts, including clay, silt, detritus and sand, are supplied by natural processes such as river discharge, cliff erosion, and re-suspension and transport from nearby soft-bottom areas (Airoldi, 2003).

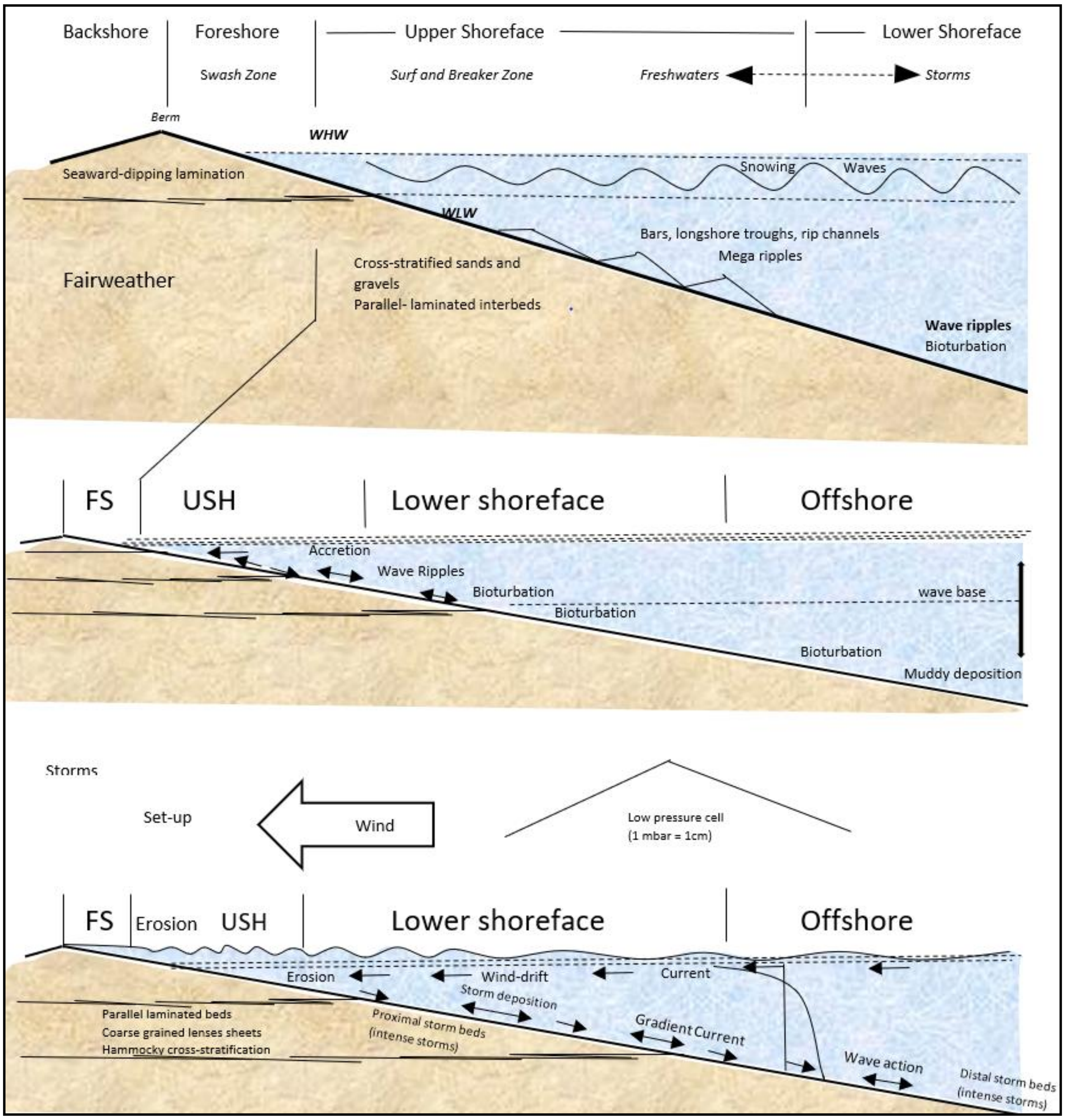

Figure 9: Summary of shallow-marine environments and processes.

Fluvial sediment from catchment erosion and runoff is a major coastal input, especially during storm-related floods, when sediment loads may greatly exceed normal levels. Although flood deposition is rare, rain, wind and wave erosion of cliffs provide more frequent local sediment inputs. The most common natural source, however, is the re-suspension and movement of sediment from adjacent soft-bottom environments.

6.1.2.1.2. Shallow marine processes and deposits

During major storms, beach run-off and the water table rise flood the backshore landward of the beach crest for extended periods and, during severe events, erode the entire beach crest. Backshore zones are generally absent on high-wave-energy beaches (Figure 9).

On the foreshore, swash and backwash dominate, producing changes in beach slope. In the upper shoreface, the shallow subtidal zone seaward of low tide, asymmetric oscillatory wave currents transport sediment through the breaker and surf zone (Figure 9), forming three-dimensional lunate bedforms. Larger composite bedforms can develop under varied wave conditions (Pether, 1994). As bars, troughs and rip channels migrate with changing conditions, the upper shoreface commonly contains abundant trough cross-bedding and coarse sediment. At Sea Concession 2A, the surf zone comprises up to 6 m of medium-grained silica sand with fine-grained heavy mineral sand, which makes up about 20% to 80% of the sand material.

Wave conditions shift the upper-shoreface boundary seaward during storms and landward during fair weather. Its lower contact is marked by a distinct facies contrast with underlying fine-grained sands. The lower shoreface, just seaward of the breaker zone, is associated with larger bedforms and is influenced by fair-weather oscillatory wave currents. Storms control erosion and deposition in this zone, forming thin to thick beds with erosive bases overlain by parallel-laminated sand. These beds may contain basal lags and grade upward into wave-rippled and bioturbated intervals, with bioturbation increasing in the lower shoreface.

In some shelf settings, residues from earlier transgressions occur along the outer edge of the prograding shoreface wedge as relict or palimpsest deposits, such as boulder lags, cobbles or abandoned transgressive sand sheets. During fair weather, eroded upper-shoreface sand moves onshore and accumulates on the foreshore, forming a berm and steep reflective beach. During stormier conditions, the foreshore erodes and sediment accumulates in the upper shoreface, contributing to bar formation before being transported seaward through rip channels to the lower shoreface, where thin storm sequences form. During rare, severe storms, the foreshore, upper shoreface and lower shoreface may all erode, depositing large volumes of sediment farther offshore. This repeated reworking promotes beach placer development by selectively entraining light minerals (SG <2.9 g/cm^3) and preferentially depositing heavy minerals.

6.1.2.1.3. Wave Regime of the West Coast

Since the South Atlantic Anticyclone became the dominant West Coast weather system during the Tertiary, prevailing winds and waves have generally approached from between the south and west, mainly from the south-southwest to west-southwest.

Wave currents move sediment mainly north-eastward and upslope across the West Coast shoreface, while gravity backwash returns it westward downslope, producing a net northward zigzag transport pattern. Nearshore wave-induced bottom currents regularly move coarse sediment and, during winter storms, sand-sized material; occasional north-westerly storms can also drive gravel southward. Overall, wind, waves and currents control beach and nearshore sedimentation, with wave power, sediment supply, beach slope and backwash velocity shaping beach morphology. Wave height is the main control on beach form, while surf-zone wave-energy variations determine local sedimentation regimes. During summer, lower-energy reflective beaches at Sea Concession 2A develop medium-scale landward-dipping cross-lamination, formed by asymmetrical oscillation ripples. Cusps are short-lived crescent-shaped accumulations of coarse sand between the swash zone and just below the berm crest, commonly a few centimetres to more than 3 m high and only a few metres wide. They enclose finer-grained depressions and migrate along the beach with longshore drift. Cusps form where edge waves, moving at right angles to incoming waves, create rhythmic swash patterns that promote rip currents. These currents rapidly return swash to the sea and scour the bays between cusp horns (Figure 10).

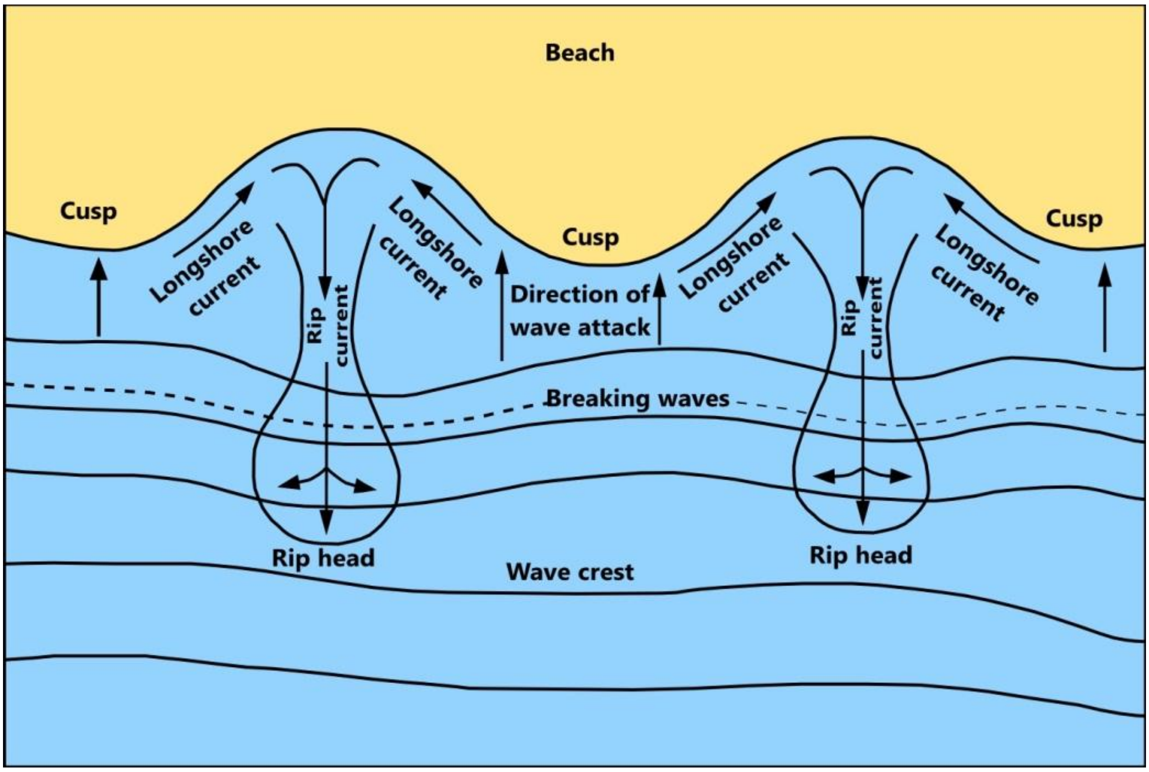

Figure 10: Cusp formation is caused by interactions between longshore and rip currents (after Illgner, 2008).

Cusps are common on mixed-sediment beaches, especially where heavy minerals and quartz sand occur together. At Sea Concession 2A, beach cusps indicate rip currents that transport sediment from the swash zone to at least the breaker zone. These currents are probably the main mechanism returning sediment, mainly selectively entrained quartz sand, from the beach into the bay.

A key feature of shallow-marine sedimentation is the frequent alternation of deposition and erosion along the same coastline over short geological timescales. Marine sediments also tend to remain unconsolidated longer than subaerial deposits, allowing high mobility under continuous wave energy.

In shallow-marine settings, heavy mineral placer formation is driven by hydrodynamic boundaries that control sediment transport and deposition. These boundaries reflect interactions between uniform deep-water wave fronts and coastal bathymetry, which create variations in wave energy.

6.2. Sedimentation and Placer Development at Sea Concession 2A

At Sea Concession 2A, surf-zone wave-energy variations control beach sedimentation. Wave action moving with longshore drift, generates edge waves that travel at right angles to the main onshore waves, creating a rhythmic swash line. This uneven swash promotes rip currents that rapidly return water to the sea and scour the bays between cusp horns (Figures 10 and 11).

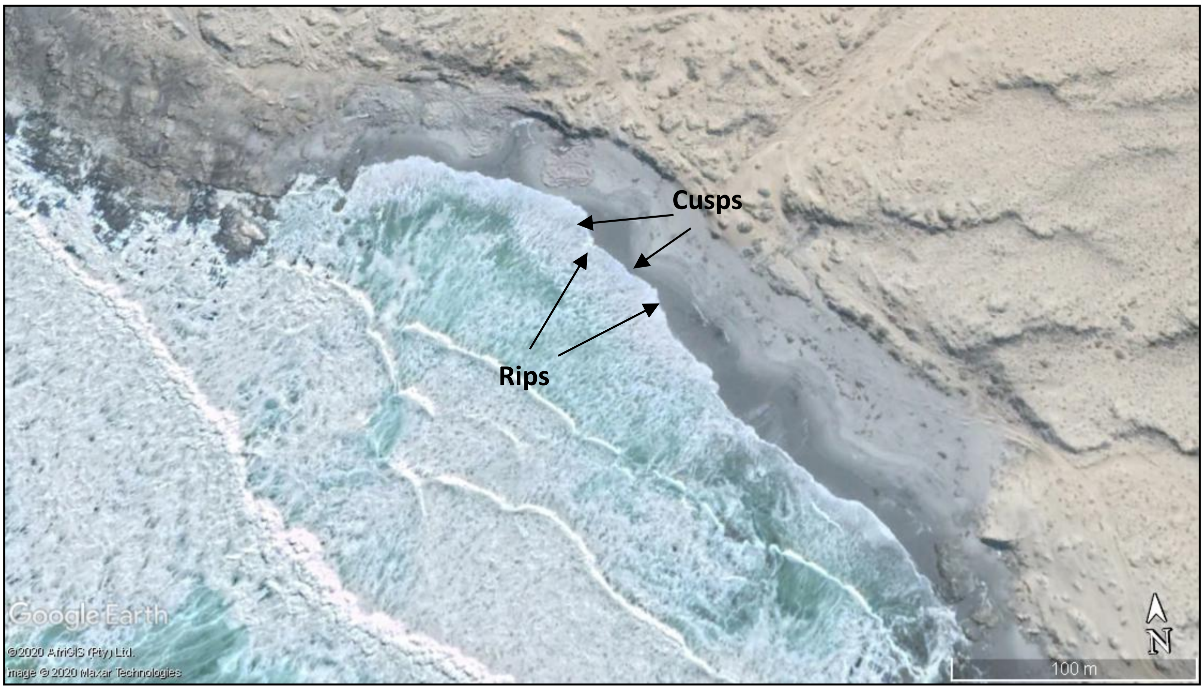

Figure 11: A satellite image of Walviskop beach showing the alternating cusps and rip current locations.

Rip currents, indicated by beach cusp formation, play a major role in reworking sediment from the swash zone to at least the breaker zone. They are probably the main mechanism returning selectively entrained light sediment, especially quartz sand, from the beach into the bay, leaving denser heavy minerals behind. This selective entrainment enriches heavy minerals on the beach and supports placer development.

Frequent depositional and erosional cycles across the Sea Concession 2A beach and surf zone promote high sediment mobility over short timescales. Continuous wave-energy fluctuations enhance placer-development potential, where heavy mineral supply is sufficient. During storms, heavy minerals, quartz, feldspar sand and shell fragments are washed into the bay; subsequent selective entrainment removes lighter grains offshore, enriching heavy minerals on the log-spiral bay beach.

Nearshore sediments at Sea Concession 2A comprise a marine gravel layer on a gently seaward-sloping bedrock platform, overlain by medium- to coarse-grained beach sand. Heavy mineral mineralisation occurs mainly in the beach sand and, to a lesser extent, in the gravel layer (Figure 12 & 13).

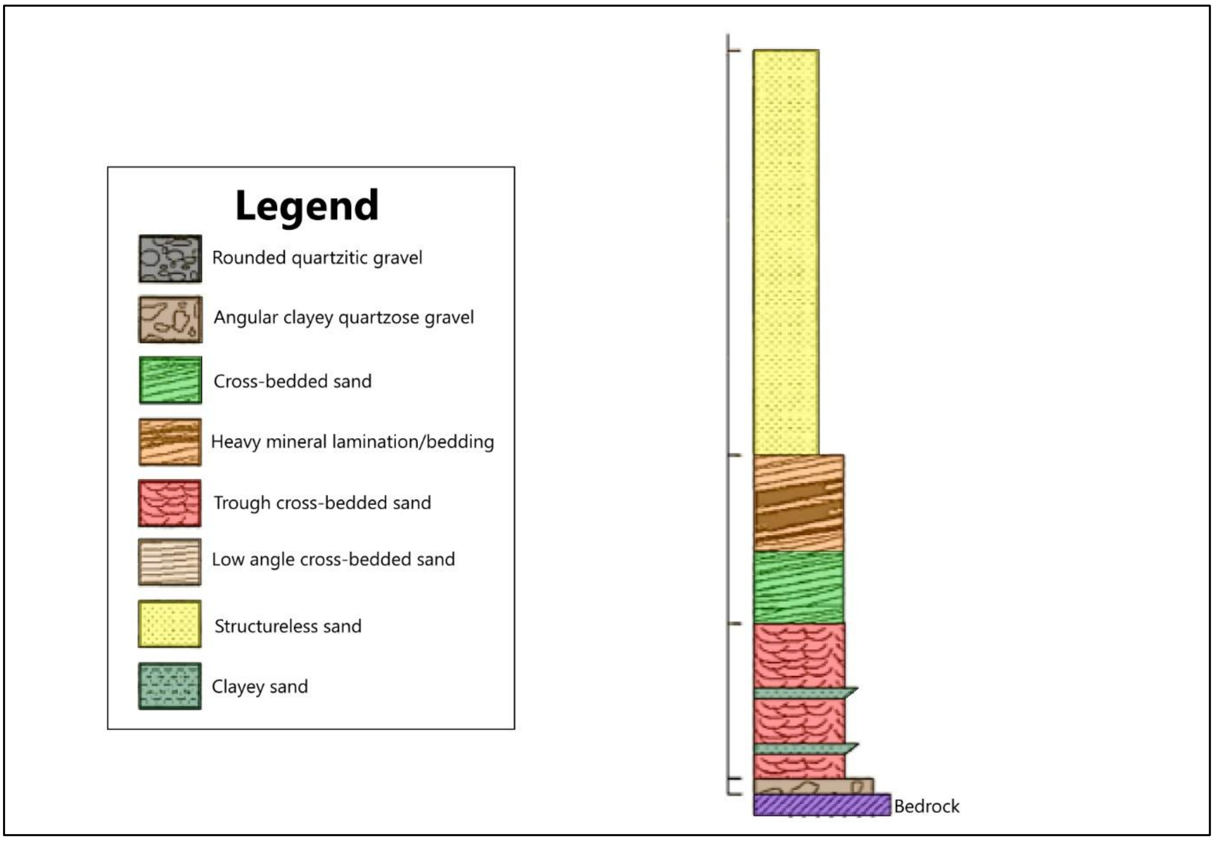

Figure 12: A typical surf zone sediment profile at Sea Concession 2A.

The bedrock platform is highly irregular, with gullies, potholes and local boulders exceeding 400 mm in diameter. A 100–500 mm thick gravel layer rests on this surface and comprises gravel clasts in a sandy matrix of silica sand, shell fragments and heavy minerals. Clasts range from >100 mm (8%) to 100–2 mm (92%) and consist almost entirely of vein quartz and quartzite. The overlying beach sand averages 4–6 m thick but may become very thin or absent after severe winter storms. It consists of an approximately equal mix of course- to medium-grained quartz sand, broken shell material and heavy minerals, forming a compact, well-packed sand layer that is continuously reworked by bottom currents, especially during storms.

Figure 13: The beach at Sea Concession 2A, showing heavy mineral placer development in the foreground.

Valuable heavy mineral mineralisation is concentrated mainly in sandy beach deposits, where garnet-, rutile- and monazite resources developed in well-formed south-facing log-spiral bays, such as neighbouring Walviskop Bay. Longshore drift is likely the main source of heavy mineral sand at Sea Concession 2A, transporting material flushed from Walviskop, after enrichment in its favourable placer setting. Walviskop Bay appears to overfill with heavy minerals, which then spill into the Sea Concession 2A surf zone and beaches. The main minerals of economic interest are rutile and ilmenite (TiO_2), zircon ($ZrSiO_4$), monazite ((Ce,La,Nd,Th)(PO_4, SiO_4)), a source of valuable, rare earth elements, and garnet.

Heavy mineral suites along this coast are diverse and include variable proportions of ilmenite and alteration products, leucoxene, haematite, magnetite, rutile, zircon, garnet, amphibole, pyroxene, epidote, aluminosilicates, titanite, monazite, staurolite, collophane and glauconite. Economically important minerals — ilmenite, rutile, garnet, monazite and zircon — make up most of the total heavy mineral suite, commonly an order of magnitude greater than gangue minerals. The suite is generally dominated by ilmenite (50–73 wt%), with garnet (6–12 wt%), zircon (5–7 wt%), monazite (2–3 wt%) and rutile (about 1 wt%) forming the remainder of the economic fraction.

Titanium-bearing minerals include pure ilmenite and a complex suite of commonly intergrown Fe-Ti oxides. Single-grain analyses show ilmenite averages 51% TiO_2, with only trace impurities. About 8% of the ilmenite fraction is altered, generally insufficient to significantly increase titanium content. These results are consistent with previous studies from other West Coast localities.

Zircon sand contains zirconium as a silicate. Zircon populations are heterogeneous, showing varied physical, geochemical, cathodoluminescent and radiometric characteristics.

Heavy mineral grains range from 75 to 280 µm, while gangue minerals such as quartz are mostly 250 to 600 µm.

6.3. Mineralization

Diamond mineralisation on the present-day Alexkor beaches has been known since diamonds were first discovered in 1926. Beach and terrace deposits have been mined continuously for about 95 years, developing Alexkor into a large alluvial diamond operation with seven processing plants, treating approximately 1 500 000 t of gravel annually. By contrast, Alexkor historically placed little emphasis on heavy mineral placer exploitation or resource development.

Heavy minerals have densities greater than quartz, and economic concentrations are termed placer deposits. Mineral sands are commonly identified by the presence of zircon, rutile, ilmenite, garnet, thorium-bearing minerals and rare earth-bearing monazite. Diamond, with a specific gravity of 3.15 g/cm^3, is also a heavy mineral, but is reported in the gravel fraction.

Unlike diamond deposits at Alexkor, heavy mineral deposits are not confined to basal beach and terrace gravels; they also occur in high concentrations in finer beach sands and aeolian deposits. The primary sources are igneous and metamorphic rocks in the Namaqualand hinterland (Dill & Skoda, 2017; Philander, 1999). Major economic concentrations of rutile, zircon and ilmenite typically occur in young detrital shoreline or beach placer deposits, mostly Pliocene or younger, after minerals are eroded from crystalline source rocks, transported to the coast by fluvial systems, and sorted by waves, currents and wind.

Only some heavy minerals in a deposit are economically valuable and are classified as valuable heavy minerals (VHM), in contrast to total heavy minerals (THM). The main VHM are ilmenite ($FeTiO_3$), rutile (TiO_2), leucoxene, garnet, monazite ((Ce, La, Nd, Th) (PO_4)) and zircon ($ZrSiO_4$). Garnet became economically important with its use in waterjet cutting and as a safer sandblasting medium than silica sand. Monazite, formerly mined for thorium and later commonly discarded, has regained value because of rare earth demand, especially for praseodymium and neodymium used in advanced electronics.

South Africa's heavy mineral industry is driven mainly by two product groups: ilmenite and rutile as feedstocks for TiO_2 pigment, titanium metal and welding electrodes; and zircon for ceramics, foundries, refractories and chemicals. Low-grade titanium ores can also be upgraded to titanium slag, with pig iron recovered as a major by-product.

Zircon is generally the most valuable component of mineral sands, followed by rutile and ilmenite. Valuable components seldom exceed 30% of a deposit. Commercial products vary widely in TiO_2 content and impurities, from about 40% in some ilmenites to 96% in natural rutile. Pricing depends on grade and end use: ilmenite is currently about US$300–350/t, rutile about US$1 200–1 400/t, and zircon, after rising sharply over the past decade, has stabilised at about US$1 400–1 500/t in June 2026, for material containing at least 65% ZrO_2. The value of mineral sand deposits is influenced by:

- grade, which affects mining cost;
- assemblage, which determines relative product value;
- available upgrading technology, such as slag or synthetic rutile production;
- deposit depth and associated overburden; and
- location relative to infrastructure and markets.

Optimal heavy mineral placer development requires:

- suitable source rocks;
- drainage systems capable of transporting eroded minerals to the coast;
- high-energy fluvial processes and periodic high-discharge floods;
- energetic nearshore processes, including tides, longshore drift and wave action, to winnow light minerals;
- strong winds that generate high-energy waves and help remove light minerals from beaches; and
- effective trap sites, including rough bedrock surfaces and well-formed log-spiral bays with prominent headlands.

Modern marine placers show the greatest enrichment during storm events energetic enough to entrain most of the sediment load, preferentially removing lighter minerals. Economic heavy mineral accumulation requires sediment supply to exceed removal from the trap site; therefore, not all heavy-mineral-bearing beaches develop economic concentrations. Most marine placer deposits form through repeated, storm-driven, selective entrainment and winnowing. Log-spiral bay beaches provide favourable HMS trap sites, by creating low-energy zones that retain sediment transported by longshore drift and reworked by wave action.

Log-spiral, or headland-bay, beaches form a seaward-concave curve in plan view. They develop where waves approaching obliquely from one dominant direction are refracted, diffracted and reflected around a prominent headland into a sheltered "shadow zone", producing a J-shaped beach, or J-bay (Philander & Rozendaal, 2015). Such bays can strongly influence strandline provenance, by forming effective heavy-mineral trap sites. The Geelwal Karoo deposit, about 20 km south of Brand-se-Baai, and the Namakwa Sands deposit at Brand-se-Baai, are modern examples of strandline-dune systems developed in J-bays. The 30 km long log-spiral bay at Brand-se-Baai is linked to Early Cretaceous break-up of West Gondwana (Dill & Skoda, 2017; Philander & Rozendaal, 2015).

Weathering of intrusive dykes in the Gariep Supergroup contributed to the log-spiral bay morphology. Before Namakwa Sands mineralised, barren dune fields covered the West Coast. In the early Pliocene, tectonic uplift along a Miocene axis elevated northern South Africa relative to the south, rejuvenating dense palaeo-drainage systems across the western interior and delivering large sediment volumes from the hinterland to the Atlantic Ocean.

Heavy mineral assemblages along these areas are broadly uniform, although mineral abundances vary spatially and temporally. The main contributors to this variation are opaque minerals, zircon, garnet, pyroxene, hornblende and epidote, while monazite, staurolite, titanite, apatite and aluminosilicates are minor because of their lower abundance and inconsistent shoreline distribution (Pether, 1994).

Heavey mineral suites typically reflect differences in mineral density and chemical stability: opaque minerals, garnet and zircon are dense and chemically stable, whereas hornblende, clinopyroxene and epidote are less stable and less dense (Table 1). Stable minerals dominate stratigraphic successions, while unstable minerals occur more sporadically. Heavy mineral maturity therefore relates directly to the relative proportions in the suite and host sediments (Pether, 1994). Depositional conditions described by Philander (1999) are expected to be similar to those at Sea Concession 2A, where high-energy diamond-bearing gravels are also associated with high heavy mineral concentrations.

6.3.1. Mineralogy

Heavy mineral suites are diverse and include ilmenite varieties, haematite, magnetite, rutile, zircon, garnet, pyroxene, epidote, titanite, monazite, staurolite, collophane, glauconite, aluminosilicates and amphibole. Economically viable minerals — rutile, zircon, ilmenite, monazite and garnet — make up a large proportion of the THM suite. These minerals have specific gravities of about 2.9–5.5 g/cm^3 and are generally chemically stable, abrasion-resistant and resistant to diagenetic alteration, except for ilmenite. Magnetic susceptibility and specific gravity are the main properties used to separate them from silica sand during processing.

Table 1: Common heavy minerals and their characteristics.

Mineral	Economically valuable	Magnetic susceptibility	Electrical conductivity	SG	Chemical formula
Ilmenite	Yes	High	High	4.5 - 5.0	$FeTiO_3$
Rutile	Yes	Low	High	4.2 - 4.3	TiO_2
Zircon	Yes	Low	Low	4.7	$ZrSiO_4$
Monazite	Yes	Semi	Low	4.9 - 5.3	(Ce,La,Th,Nd,Y) PO_4
Garnet	Yes	Semi	Low	3.4 - 4.2	$(Fe,Mn,Ca)_3.Al_2(SiO_4)_3$
Leucoxene	Yes	Semi	High	3.5 - 4.1	Fe. $TiO_3.TiO_2$
Staurolite	No	Semi	Low	3.6 - 3.8	$Fe_2Al_9Si_4O_{22}.(OH)_2$
Kyanite	No	Low	Low	3.4 - 4.2	Al_2SiO_5
Quartz	No	Low	Low	2.7	SiO_2

6.3.1.1. Fe-Ti-Oxides and their derivatives

Iron-titanium oxide minerals and their derivatives comprise a diverse group whose compositions reflect eutectic phases formed during crystallisation (Figure 14).

- Rutile – tetragonal TiO_2 with minor impurities.
- Anatase – tetragonal, essentially pure TiO_2.
- Brookite – orthorhombic, essentially pure TiO_2.
- Ilmenite – trigonal $FeTiO_3$ with >45 wt% TiO_2 and <6% Fe_2O_3 in solid solution.
- Ferrian-ilmenite – rhombohedral ilmenite containing >6 wt% Fe_2O_3 and 3–4 wt% excess TiO_2 in solid solution.
- Hematite – trigonal, approaching 100 wt% Fe_2O_3 with <5 wt% Ti_2O_3.
- Titanohematite – Fe-Ti phase containing at least 50 wt% hematite and >5 wt% TiO_2, usually as FeO-TiO_2 in solid solution.
- Hemo-ilmenite – Fe-rich ilmenite with ferrian-ilmenite and titanohematite and/or ilmenohematite intergrowths.
- Ilmenohematite – Fe-rich hematite comprising titanohematite and/or hematite with ferrian-ilmenite or hemo-ilmenite intergrowths.
- Magnetite – cubic, approaching 100 wt% Fe_3O_4 with <5 wt% TiO_2.
- Titanomagnetite – R_3O_4-type oxide recalculable as Fe_3O_4, $2FeOTiO_2$ or $FeOTiO_2$, with Fe_3O_4 dominant (Buddington and Lindsley, 1964).
- Ulvöspinel – spinel-structure mineral approaching Fe_2TiO_4.
- Pseudobrookite – orthorhombic phase with >50 mol% Fe_2TiO_5.
- Ferropseudobrookite – similar to pseudobrookite but with <50 mol% Fe_2TiO_5.
- Titanite (sphene) – monoclinic mineral with the general formula $CaTiSiO_4$.

- Ilmenite alteration products – ranging from hydrated ilmenite at about 53 wt% TiO_2 to leucoxene at >70 wt% TiO_2.

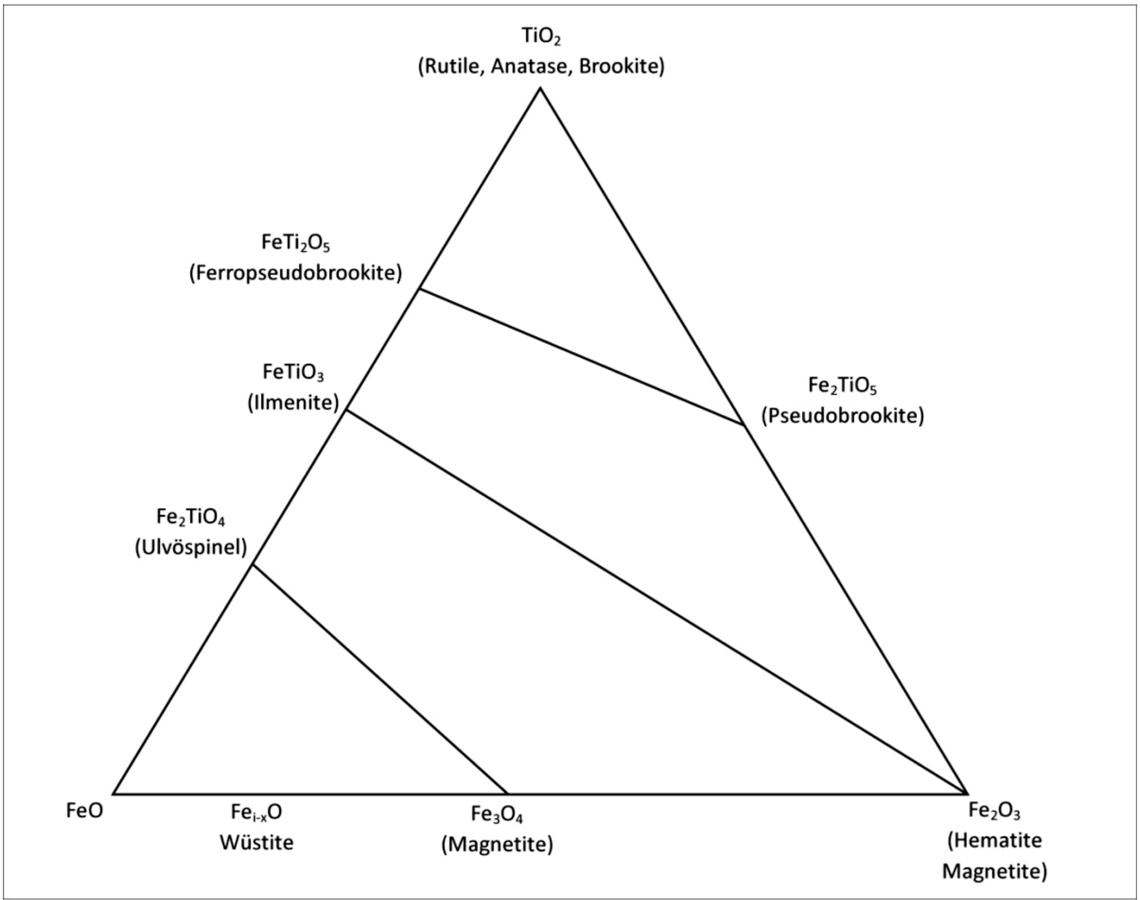

Figure 14: Illustration of the relation of the iron-titanium oxides in the TiO_2-FeO-Fe_2O_3 system.

6.3.1.2. Ilmenite

Ilmenite is the most common titanium-bearing mineral in the Earth's crust. It's ideal formula is $FeTiO_3$, although Mn, Mg and Fe^{3+} commonly substitute for Fe^{2+}, and minor to trace Ca, Al, Cr, Si, V, Cu and Zn may also occur. Ilmenite typically contains 46.0–53.9 wt% TiO_2 and 33.1–46.5 wt% FeO. It occurs in igneous and metamorphic rocks (Klein & Dutrow, 2007), can be distinguished from hematite by its streak and weak magnetism, and may occur in gabbro, diorite, anorthosite, pegmatite and vein deposits, commonly with magnetite were formed by magmatic segregation.

The opaque ilmenite fraction is usually dominated by Fe-Ti oxides ranging from 75–250 µm, although grains up to 500 µm occur in some stratigraphic successions. Sub-rounded to rounded ilmenite grains are most common; platy grains are less common, and well-rounded grains are rare (Pether, 1994). Unaltered ilmenite is typically pinkish brown, while ferrian-ilmenite may be darker pink with stronger pleochroism. Inclusions generally show no preferred orientation and commonly include pyrite, sphene, pyroxene, feldspar, biotite, apatite and other silicates.

Ilmenite and hematite form a solid-solution series, so multiple generations of exsolution commonly occur as hematite blebs in ilmenite or vice versa. Samples from the area show an almost continuous gradation between hemo-ilmenite and ilmenohematite. Most ilmenite grains in the study area are homogeneous and unaltered.

Altered ilmenite generally has higher TiO_2 content than unaltered ilmenite. In this material, alteration products are mainly hydrated ilmenite (53–61 wt% TiO_2), with only minor pseudorutile or leucoxene. Compositions range from the pure ilmenite endmember toward intermediate phases near pseudobrookite (Figure 14). Alteration results from oxidation and removal of iron from the ilmenite lattice, producing relatively TiO_2-rich phases along grain boundaries, structural weaknesses and basal planes. The process is enhanced by elevated temperatures and corrosive fluids. Hydrated ilmenite contains minor crystalline water, generally 53–60% TiO_2 and is distinguished from unaltered ilmenite by its grey-blue colour and weaker anisotropism. Pseudorutile, an alteration product approaching $Fe_2Ti_3O_9$, contains 61–70% TiO_2 and is also known as arizonite (Palmer, 1909). It is nearly isotropic, blue-grey and slightly more reflective than ilmenite.

Leucoxene is strongly altered ilmenite, containing more than 70 wt% TiO_2. It is recognised optically by white to yellow internal reflections and a characteristic sugary texture, with colour varying according to TiO_2 content. Leucoxene becomes more abundant upward in the sedimentary sequence, indicating formation mainly in the upper soil or sediment layers. Evidence suggests the altered ilmenites formed *in situ*.

Ilmenite alteration is generally considered to occur in two stages, during which about one-third of the iron is removed. The first stage is represented by:

$$3Fe^{2+}TiO_3 + H^+ + \frac{1}{2}O_2 \rightarrow Fe_2^{3+}Ti_3O_9 + 2Fe^{2+} + Fe^{2+}(OH)$$

Ilmenite → pseudorutile + dissolved iron

During the second stage, both iron and titanium dissolve, but titanium re-precipitates while iron is leached from the grain. Cryptocrystalline rutile, or leucoxene, is the final product:

$$Fe_2^{3+}Ti_3O_9 + 4H^+ \rightarrow 3TiO_2 + 2Fe^{2+} + \frac{1}{2}O_2 + 2H_2O$$

titanium dioxide

This alteration typically occurs near the surface under acidic conditions, generated by humic acids. Under these conditions, pseudorutile is unstable and readily transforms to leucoxene. Temperate atmospheric conditions and abundant fluid are thought to accelerate the process (Philander, 1999).

Ilmenite/leucoxene and rutile are the main commercially important titanium minerals. Pure ilmenite contains a theoretical maximum of 53% TiO_2, but iron leaching in older tropical beach sands can raise TiO_2 contents to about 70%. Ilmenites in the Sea Concession 2A surf-zone and beach placers, contain elevated manganese and about 48% TiO_2. This may limit their suitability as high-grade titanium feedstock, but they are well suited for pig-iron production.

6.3.1.3. Rutile

Rutile is virtually absent from igneous rocks, so detrital rutile in sediments usually indicates a high-grade metamorphic source terrain (Philander, 1999). It occurs in granites, gneisses, mica schists, metamorphic limestone and dolomite. In the study area, rutile is consistently present as a rare constituent, typically 75–90 µm in size and is most likely derived from granite-gneisses. Grains may be red, brown, black or yellow and commonly occur as well-rounded to sub-elongate prismatic forms, often with terminated ends.

Rutile in the area is chemically very pure TiO_2, with stoichiometric TiO_2 contents of 96–99%. Although some studies report notable Fe^{2+}, Fe^{3+}, Nb and Ta, the only trace impurities recorded here, up to 10%, are FeO and vanadium oxides, with no clear correlation to TiO_2 content. Ti, Si, Al, Cr, Fe, Mn, Mg and Ca generally occur below detection limits.

6.3.1.4. Magnetite

Magnetite ($Fe^{3+}[Fe^{3+}Fe^{2+}]\ O_4$) occurs as an accessory mineral disseminated through most igneous rocks and is also common in metamorphic rocks, locally forming large beds and lenses. It is a common component of sedimentary and metamorphic banded Precambrian iron formations and, where chemically sedimentary in origin, also occurs in black sands and shore deposits. Magnetite forms a solid-solution series with spinel-group minerals, particularly ulvöspinel, and can incorporate variable Al, Cr, V, Mg, Ca and Fe. In reflected light under oil immersion, it is grey with dark-brown tints and is characteristically isotropic. It commonly occurs as angular to sub-rounded grains, and fragmented grains with well-developed crystal forms are frequent (Philander, 1999).

In the study area, magnetite occurs in small amounts but is widespread. Grains are commonly smaller than 150 µm, although larger grains occur in younger stratigraphic sequences. Most grains are homogeneous, with only sparse rutile or ilmenite lamellae. Ilmenite exsolution lamellae parallel to the (111) plane are rare, while unoriented ilmenite inclusions forming composite grains are more common. Some grains show a woven or cloth texture, interpreted as ulvöspinel exsolution in magnetite (Ramdohr, 1980).

Magnetite alteration to hematite occurs as lamellae parallel to the (111) magnetite planes and is known as martitisation. Although martitisation mainly develops in source rocks under high fO_2 conditions above 550°C during late-stage metasomatism, it may also form through atmospheric weathering in sedimentary environments. Most magnetites are Ti-rich, and some contain enough TiO_2 to be classed as titaniferous magnetite. Many grains remain unoxidized and near stoichiometric, reflected by the strong TiO_2–Fe_2O_3 correlation. Mn, Mg, Al, Cr, Si and Ca occur only in trace amounts.

6.3.1.5. Monazite

Monazite is a rare earth phosphate, commonly expressed as (Ce, La, Y, Th) (PO_4), with ThO_2 contents ranging from trace levels to nearly 20% (Klein & Dutrow, 2007). Silicon may occur at several percent as SiO_2, either through thorite ($ThSiO_4$) admixture, or substitution of SiO_4 for PO_4.

Monazite occurs in granites, aplites, pegmatites and many metamorphic rocks, and as rounded sand grains derived from their weathering. Its high specific gravity and resistance to chemical attack concentrate it in mineral sands, commonly with magnetite, ilmenite, rutile and zircon. Monazite is radioactive because it contains thorium and, less commonly, uranium.

Monazite grains are typically colourless, although coarser grains may show pale yellow to greenish-yellow colours. They display distinctive interference colour bands and cross-fracturing, with brown staining and severe surface pitting along fractures that help distinguish them from zircon. Most grains lack inclusions, although larger grains may contain some. High grain roundness indicates abrasion during sedimentary cycling. Despite its phosphate composition, monazite can withstand extensive transport and is relatively resistant to weathering. In the study area, monazite occurs as a minor component, with well-rounded oval to round grains.

6.3.1.6. Zircon

Zircon occurs mainly as rounded to spherical grains, with fewer idiomorphic crystals. Zircon populations differ between marine and fluvial sediments. West Coast marine sediments contain mixed pink, clear and yellow zircons, with stronger colours commonly linked to uranium. Heterogeneous, strongly coloured populations, with abundant cracked and unstable U-Th-enriched metamict grains, indicate immature sediments close to source. Palaeochannel zircons are mainly pink, with minor colourless and yellow varieties, while fluvial zircons are dominated by yellow to yellow-brown grains. These colour relationships support Fielding's (1970) view that strong zircon colours are associated with uranium and Matumura and Koga's (1962) conclusion that radiation-induced reduction of Zr^{4+} produces colour centres.

Many zircons show radiating or concentric fractures, commonly crossing opaque inclusions from the grain centre, typical of metamict zircon. These fractures are linked to Th and U substitution in the zircon lattice, which creates vacant sites, internal stress, lattice expansion and eventual crystal shattering (Speer, 1980), although some fractures may also result from external physical processes. Growth zones enriched in Hf, U and Y commonly fill fractures. Zircon inclusions include spherical and tabular gas or fluid inclusions, transparent crystals, opaque phases and mixed inclusions. Common mineral inclusions are ilmenite, rutile, biotite, muscovite, titanite, apatite, monazite, xenotime, allanite, sillimanite, feldspar, quartz and smaller zircon grains; ilmenite is generally the largest and most common, followed by apatite.

Zircon has the formula $ZrSiO_4$, but numerous trace elements can enter the lattice by coupled substitution. Zr^{4+} may be replaced by Hf^{4+}, U^{4+}, Th^{4+}, Y^{3+}, REE^{3+}, Nb^{5+}, Ta^{5+}, Ti^{4+}, Pb^{4+}, Pb^{2+}, Fe^{3+}, Fe^{2+}, Ca^{2+} and K^{+}, while Si^{4+} may be replaced by Al^{3+}, P^{5+} and S^{6+}. Hafnium is the closest analogue of zirconium and the main substitute, typically occurring at about 1 wt%, with higher concentrations in some growth zones. The average Hf/Zr ratio is about 0.02 and appears to increase with differentiation, alkalinity, volatile content and silica saturation of the parent melt.

Yttrium dominates the Y-REE group in zircon, and total REE_2O_3 is generally below 1 wt%. Zircon colour types reflect distinct trace-element chemistry. SEM data show that strongly coloured zircons are relatively enriched in Fe and Al, whereas colourless to clear types contain high Hf and very low U, Th and total REE compared with zoned, colourless and metamict varieties. Brown and metamict zircons are enriched in Y-REE and may contain U and Th at percentage levels. Pink zircons have REE contents similar to colourless grains but higher U and Th, while yellow zircons contain variable LREE, Al, Fe, P, U and Th.

Heavy rare earth elements generally dominate zircon, because Zr^{4+} more readily accommodates HREE than LREE. Zircons typically show HREE-dominated profiles, weak to moderate LREE patterns and a well-defined negative Eu anomaly. LREE-enriched inclusions, such as allanite, apatite, sphene and monazite, may occur, and some zircons display a positive Ce anomaly with a negative Nd anomaly.

Zircon is chemically stable and abrasion-resistant, so its geochemistry and radiometry can indicate host-sediment maturity. Heterogeneous zircon populations with abundant cracked, U-Th-enriched metamict grains suggest immature sediments close to source. Marine sediments are generally more mature than fluvial derivatives, which contain less stable zircon populations. Population heterogeneity therefore reflects sediment evolution (Philander, 1999). With increasing metamictisation, zircon density decreases and radioactivity increases (Garnar, 1994).

Theoretically, zircon consists of 67.2% ZrO_2 and 32.8% SiO_2 and commonly contains natural uranium and thorium. Sea Concession 2A zircons average 66.36% ZrO_2, exceeding the 65% threshold required for optimal market pricing. Zircon occurs throughout the study area, with grains ranging from 75 to 180 μm.

6.3.1.7. Garnet

Garnet is widespread, occurring abundantly in metamorphic rocks and as an accessory mineral in some igneous rocks. It is commonly recognised by its isometric crystal form, colour and hardness (Klein & Dutrow, 2007). Garnet may alter to talc, serpentine and chlorite, with chlorite pseudomorphs after garnet being common. The group includes isostructural species such as pyrope, almandine, spessartine, grossular, andradite, uvarovite and hydrogrossular. In Pether's (1994) study area, garnet forms only a minor part of the coarse sand fraction, except where eroded surfaces, basal gravels and channel lags are enriched. These garnets are angular, pale pink pyralspite-group grains, with some pale red varieties, probably mainly almandine.

The Buffels River, which drains granite and gneiss of the Namaqualand Metamorphic Complex, supplied substantial garnet to beaches north of Kleinzee. Garnets between the Buffels- and Orange River mouths have high relief and isotropism and range from 300–1 000 µm. Internally, they are commonly structureless and contain small, randomly distributed quartz, rutile, feldspar and gas/fluid inclusions. They are generally Fe- and Mg-rich, indicating almandine-pyrope compositions (Philander, 1999). A rare Mn-bearing garnet reflects the compositional range between spessartine and almandine in the pyralspite group. Grossular, andradite and uvarovite occur only in trace amounts, and no consistent relationship was found between colour and chemistry.

The garnet suite is compositionally uniform, comprising almandine (59–83 mol%), pyrope (15–35 mol%), grossular (0–6 mol%) and spessartine (0–9 mol%). Its high almandine content is typical of garnets from peraluminous rocks. Although chemical zoning is common in metamorphic garnet, microprobe analysis detected no significant zoning. All three garnet fractions show a narrow REE range of 479–485 ppm and low LREE/HREE ratios of 0.04–0.05, characteristic of igneous and metamorphic garnets.

6.3.1.8. Other heavy minerals

These minerals are mainly non-economic or occur only rarely in small proportions. Local pyroxenes are clinopyroxenes, mostly Ca-Mg-rich augite and Mg-pigeonite and are highly altered. Amphiboles belong mainly to the calcic amphibole group, dominated by ferroan pargasitic hornblende. Clinozoisite and epidote are the only epidote-group minerals identified and commonly contain fluid and solid inclusions. Aluminosilicates are mainly kyanite and sillimanite; kyanite is more common and may form large grains of about 500 µm. Titanite, or sphene, occurs frequently, but is unstable in marine settings and is generally weathered, commonly altering to leucoxene and giving grains a dusky appearance. Staurolite occurs as irregular sub-angular to sub-rounded grains, is metastable, and shows minor compositional variation. Glauconite is detrital, recycled from older glauconitic sediments, rather than formed *in situ*. Apatite is concentrated mainly in finer grain sizes, and most grains are pitted, commonly iron-oxide pigmented and inclusion-rich.

6.4. Provenance

Heavy minerals are highly provenance-sensitive because of their diversity and distinctive parageneses, making them useful indicators of sediment source rocks (Pettijohn, 1975; Morton *et al.*, 1991). However, provenance is not the only control on heavy mineral composition. Mineral assemblages are also influenced by source-area climate, tectonic setting, depositional environment and diagenetic processes (Pettijohn, 1975; McLane, 1995).

Mineral assemblages generally reflect source-rock composition, and differing assemblages between sedimentary successions may indicate different source areas. However, assemblages are also strongly affected by depositional conditions and post-depositional alteration. Heavy mineral suites are therefore controlled mainly by source-rock mineralogy, hydraulic conditions during deposition and diagenesis. Stable minerals such as zircon, tourmaline, rutile and garnet are the most reliable provenance indicators, while less stable minerals, including ilmenite, amphibole and pyroxene, can still provide useful provenance information (Philander, 1999).

The dominance of opaque minerals, garnet and zircon, indicates source rocks relatively enriched in these minerals, while their consistent distribution suggests a uniform source area. In northern Namaqualand coastal sediments, rutile indicates a metamorphic source, whereas zircon, monazite and Fe-Ti oxides suggest igneous or metamorphic origins. Overall, the heavy mineral assemblage points to predominantly metamorphic source lithologies, with subordinate igneous contributions. Fe-Ti oxide and zircon chemistry indicates felsic to mafic igneous sources, while the remaining assemblage reflects diverse metamorphic rocks. Epidote indicates low-grade greenschist facies; staurolite, titanite, green hornblende and aluminosilicates indicate medium-grade amphibolite facies; and almandine-pyrope, Fe-Ti oxides, augite and brown hornblende may be stable from amphibolite to lower granulite facies (Philander, 1999).

Mineral behaviour during deposition is controlled by grain size, density and shape (McLane, 1995). Changes in hydraulic regime therefore alter heavy mineral proportions. Minerals with similar shapes, such as equant opaques and garnet, tend to be hydraulically equivalent and deposited together, while bladed minerals such as hornblende are deposited under different conditions. Dense minerals such as garnet and zircon settle more readily than lighter minerals such as hornblende, pyroxene and epidote, explaining the relative abundance of garnet and zircon in the area.

Diagenetic processes, especially chemical dissolution, gradually modify sediment mineralogy and texture. As diagenesis increases, chemically unstable minerals are progressively removed, increasing sediment maturity. Even highly stable minerals such as zircon may show chemically induced alteration. Ilmenite is particularly susceptible to alteration; therefore, the low degree and limited proportion of altered ilmenite indicate that chemical dissolution has not been extensive. Although diagenetic alteration is evident, it played only a minor role in shaping the present heavy mineral assemblages in the study area (Philander, 1999).

Zircon chemistry is a strong provenance tool because it reflects variations in temperature, pressure, oxygen fugacity and magma composition, while zircon remains highly stable during transport, diagenesis, metamorphism and anatexis. Hafnium is particularly useful because it is immobile and unaffected by sedimentary processes. Zircons from West Coast heavy mineral mines and prospects show unimodal Hf frequency distributions, indicating a single regional source. Given the extent of these deposits, from the West Coast mines north to the Orange River mouth, the zircons were probably derived mainly from a uniform terrain, most likely the Namaqua Metamorphic Complex. Although this source terrain contains diverse lithologies, zircon Hf signatures suggest a regionally uniform source-rock suite.

The consistent dominance of Fe-Ti oxides across all stratigraphic successions supports a uniform source area, as does the absence of minerals restricted to any single succession. Variations in heavy mineral proportions and assemblages mainly reflect source-rock mineralogy and hydraulic conditions during deposition, with post-depositional weathering playing a subordinate role. The Swartlintjies- and Buffels Rivers are considered the main source rivers, because their mineral suites closely match those of the studied sediments, indicating a similar, if not common, provenance area (Philander, 1999).

The source rocks supplying the heavy mineral sands control the economic mineral assemblage. In the Namaqualand hinterland, these rocks are mainly granites and metamorphic lithologies. Granite is the principal source of zircon, monazite, rutile and some ilmenite, while ilmenite is derived mainly from metamorphic rocks, especially amphibolite schists. Rivers draining to the Namaqualand West Coast have catchments underlain almost entirely by granitic and metamorphic rocks, including amphibolite schists of the Namaqua-Natal Metamorphic Province (Figure 15).

The heavy minerals in the study area were therefore most likely derived from terrain where metamorphic and associated igneous rocks were extensively exposed. Given the proximity of the extensive Namaqua Metamorphic Complex (NMC), its diverse lithologies are interpreted as the principal original source of the heavy minerals. NMC lithologies are consistent with the sand composition and the regional geological and physiographic setting. Several studies in western Namaqualand reported similar detrital mineral suites, supporting a close link between the study-area minerals and NMC source rocks (Jack, 1980; Theart, 1980; Zelt, 1980; Albat, 1984). Nama Group metasediments along the escarpment margin and Gariep Supergroup lithologies may also have contributed, but their limited exposure suggests a relatively minor input.

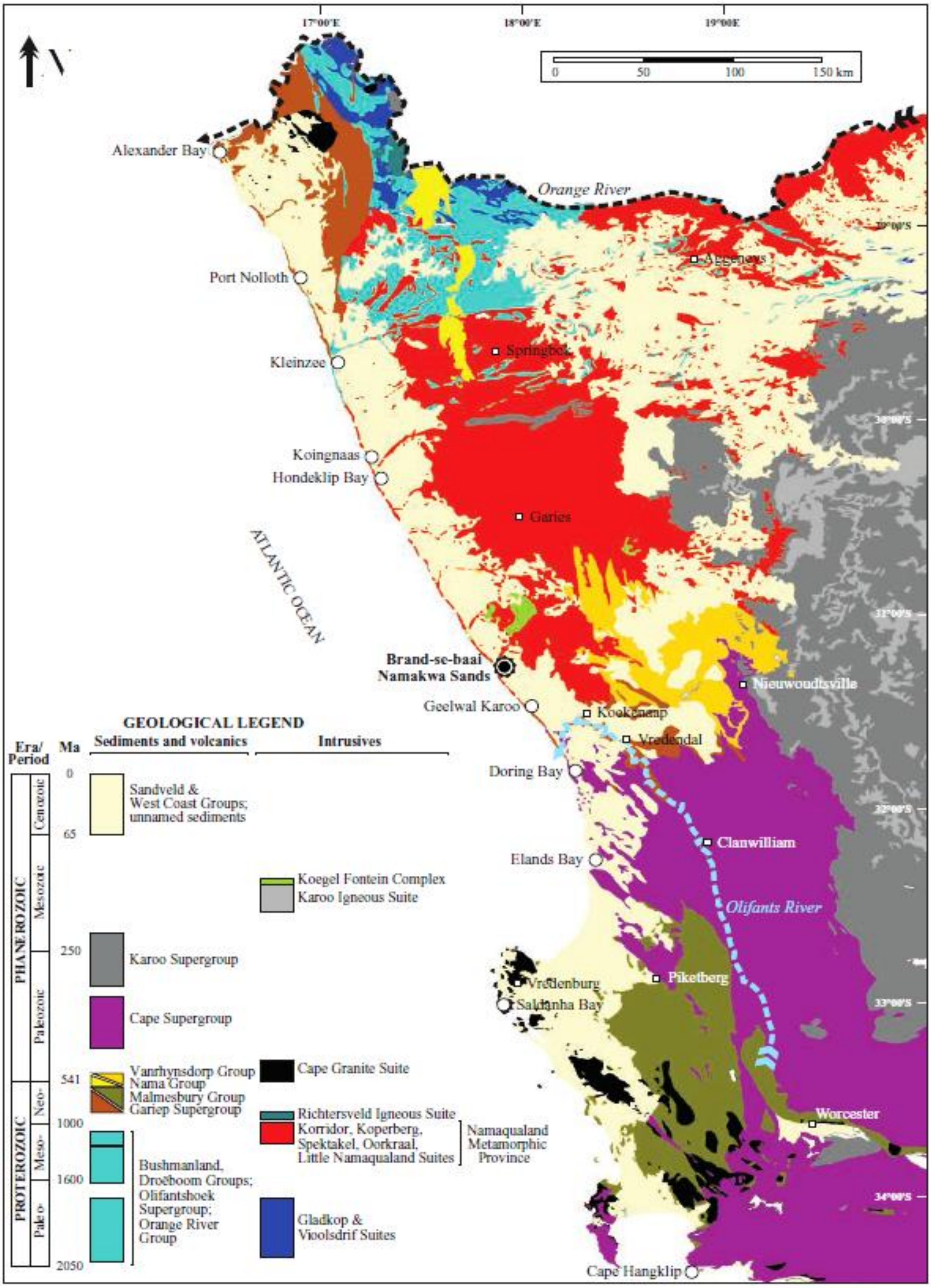

Figure 15: Geological map of the western part of the West Coast hinterland, showing the substrate units drained by westward flowing rivers. The main lithological unit of interest is the Korridor, Koperberg, Spektakel, Oorkraal and Little Namaqualand Suites of the Namaqua Metamorphic Province, underlaying the most prominent drainage basins of rivers draining into the 2A area.

Garnets from the Kleinzee-Alexander Bay area show REE patterns identical to those from Geelwal Karoo, indicating a similar source rock. Comparable major- and REE-element chemistry across the study-area garnets, suggests a common high-grade metamorphic source terrain.

7. Historical Background

Interest in the area's mineral potential began in 1837, when Captain James Edward Alexander visited the Orange River Mouth and Richtersveld while prospecting for copper, helping initiate regional mining activity. Diamonds were discovered near Lüderitz in southern Namibia, then German South West Africa, by Dr Bernard Dernburg in 1908, after which the Lüderitz–Oranjemund area became known as the *Sperrgebiet*. The first Namaqualand diamond was found by Jack Carstens on 15 August 1925, 10.5 km south of Port Nolloth. Prospecting soon expanded between The Cliffs, north of Port Nolloth, and the Orange River estuary, with limited activity farther south toward Kleinzee. In November 1926, Dr Ernst Reuning, appointed by Dr Hans Merensky, discovered the rich Alexander Bay diamond deposits. Merensky advised the Government to take control of the area to prevent an uncontrolled influx of fortune seekers into an uninhabitable desert lacking infrastructure. The South African Government subsequently prohibited further diamond prospecting on state-owned land in Namaqualand.

In 1928, the South African Government began mining the Alexander Bay beach placer deposits immediately south of the Orange River Estuary through the State Alluvial Diggings ("SAD"), which gradually expanded southward. SAD was originally managed by the Department of Mineral and Energy Affairs, the only case in South Africa where the Government directly conducted mining operations. In 1992, SAD became Alexkor, established as a commercial diamond mining company under the Alexkor Limited Act, No. 116 of 1992, later amended by the Alexkor Amendment Act, No. 29 of 2001.

West Coast heavy mineral beach sands were first investigated in the mid-1950s and again in the late 1960s, when the Geological Survey of South Africa conducted an airborne radiometric survey along the coastline from Alexander Bay to Lambert's Bay (Wipplinger, 1998). Several heavy mineral deposits were identified between the Groen River and Alexander Bay, including Alexander Bay, Wallekraal, Soutfontein and Roode Heuvel. These areas were active diamond mining zones, where access for non-diamond prospecting was restricted until the 2004 Minerals Act created the opportunity for separate heavy mineral and diamond rights over the same land.

In 1992, the Alexander Bay Development Corporation investigated the potential to recover heavy minerals from Alexander Bay marine diamond placers. The survey assessed unmined marine terraces, including Rietfontein-Grobler, Rietfontein-Higher, Gifkop-Grobler and

Langpan-Grobler; tailings dumps at Noordsif, Muisvlak, Gifkop, Rietfontein, Kaap Voltas and related older dumps; and the Alexander Bay beaches. Its aim was to quantify the resource, evaluate the material and assess exploitation feasibility.

The area was estimated to contain about 324 000 t ilmenite, 7 000 t rutile, 13 000 t zircon and 5 000 t monazite. The different deposits contained approximately 200 000–250 000 t of combined mineral concentrate on the terraces, including about 3 500 t monazite, 7 500 t zircon, 215 000 t ilmenite and 3 500 t rutile; 75 000–90 000 t in the silt dams, including about 1 300 t monazite, 4 000 t zircon, 75 000 t ilmenite and 3 000 t rutile; and about 40 000 t on the beach, including 500 t monazite, 1 500 t zircon, 37 500 t ilmenite and 500 t rutile. The terraces had the greatest potential, with the Rietfontein-Grobler terrace containing about 110 000–130 000 t of combined mineral concentrate. However, the occurrences were considered of doubtful feasibility because of their limited size, scattered distribution and ilmenite dominance, although Wipplinger (1998) recommended assessing heavy mineral recovery in conjunction with diamond mining.

8. Exploration and Data collection

8.1. Introduction

WHM's most recent exploration programme was designed to sample as much of the Sea Concession 2A surf-zone area as practicable using a systematic grid layout. This approach was intended to provide an unbiased sampling program design and improve confidence that the results are representative of the deposit.

8.2. Sampling

WHM's April–May 2026 sampling programme was designed to cover as much of the Sea Concession 2A surf-zone area as practicable. Ten sampling lines were established perpendicular to the water's edge across two beach sections, with lines spaced about 450–500 m apart. Three evenly spaced sample locations, about 30 m apart, were marked on each line. This created an unbiased 450 m × 30 m grid in the southern section and a 500 m × 30 m grid in the northern section (Figures 16–18). Sample locations were surveyed, with particular attention to collar elevations.

Sampling was undertaken with a hydraulic excavator during spring low-water conditions in the late April to early May 2026 full-moon lunar cycle. At each sample point, a pit was excavated through the surf-zone sandy substrate and basal gravel layer to bedrock, as far seaward as practicable.

Figure 16: Sea Concession 2A mining right boundary, with the sample locations within the southern and northern sections.

A representative composite sample of about 20 kg was collected from the excavated material, and pit depth was measured using depth measurement markings labelled on the boom of the excavator. The sampling campaign collected 30 samples: 18 from the southern section (L1S1–L6S3) and 12 from the northern section (L14S1–L17S3). Pit depths ranged from 4.5 m to 8.9 m (Table 2).

Each composite sample was bagged and tagged on site, then prepared at the site laboratory for dispatch to the external laboratory under WHM's sampling and sample-custody Standard Operating Procedures.

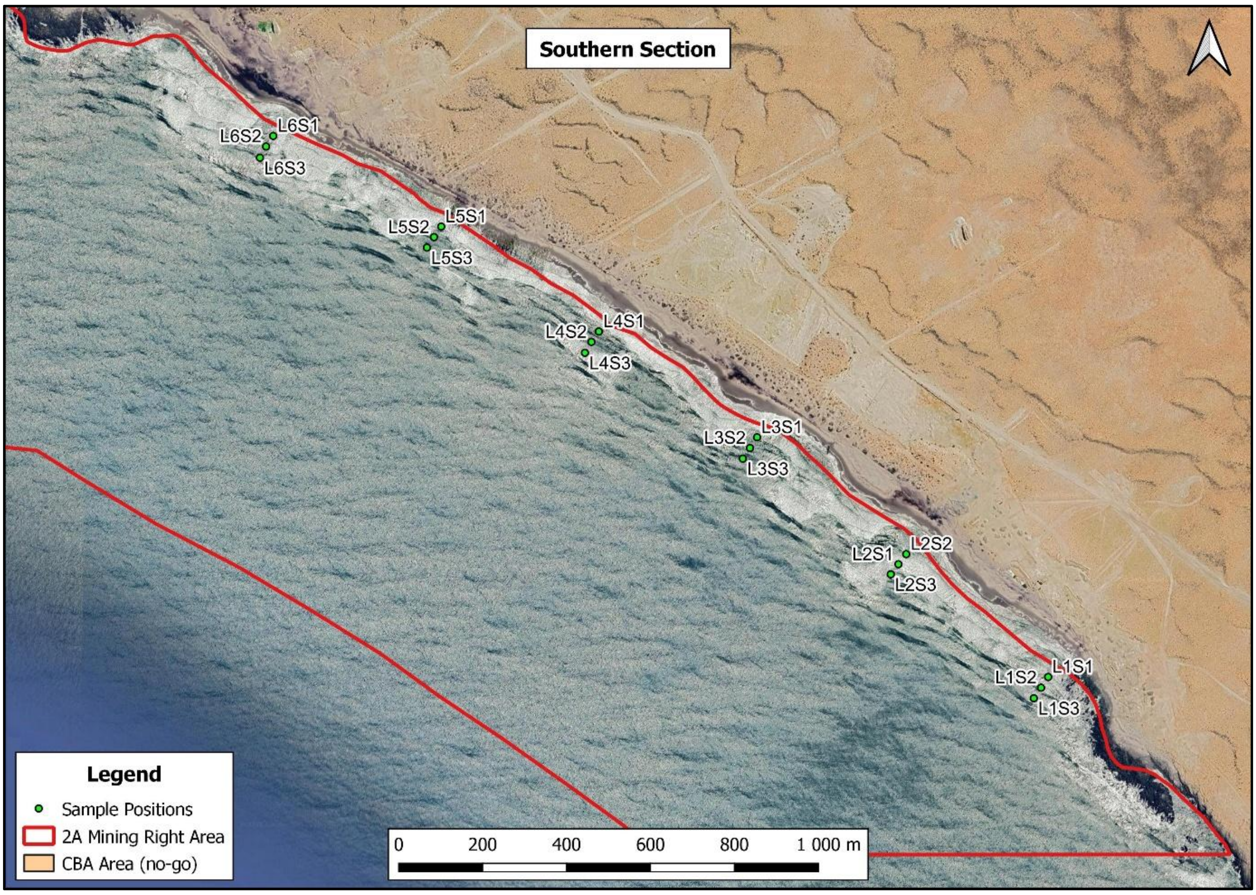

Figure 17: Locations and distribution of samples L1S1 to L6S3 in the southern section.

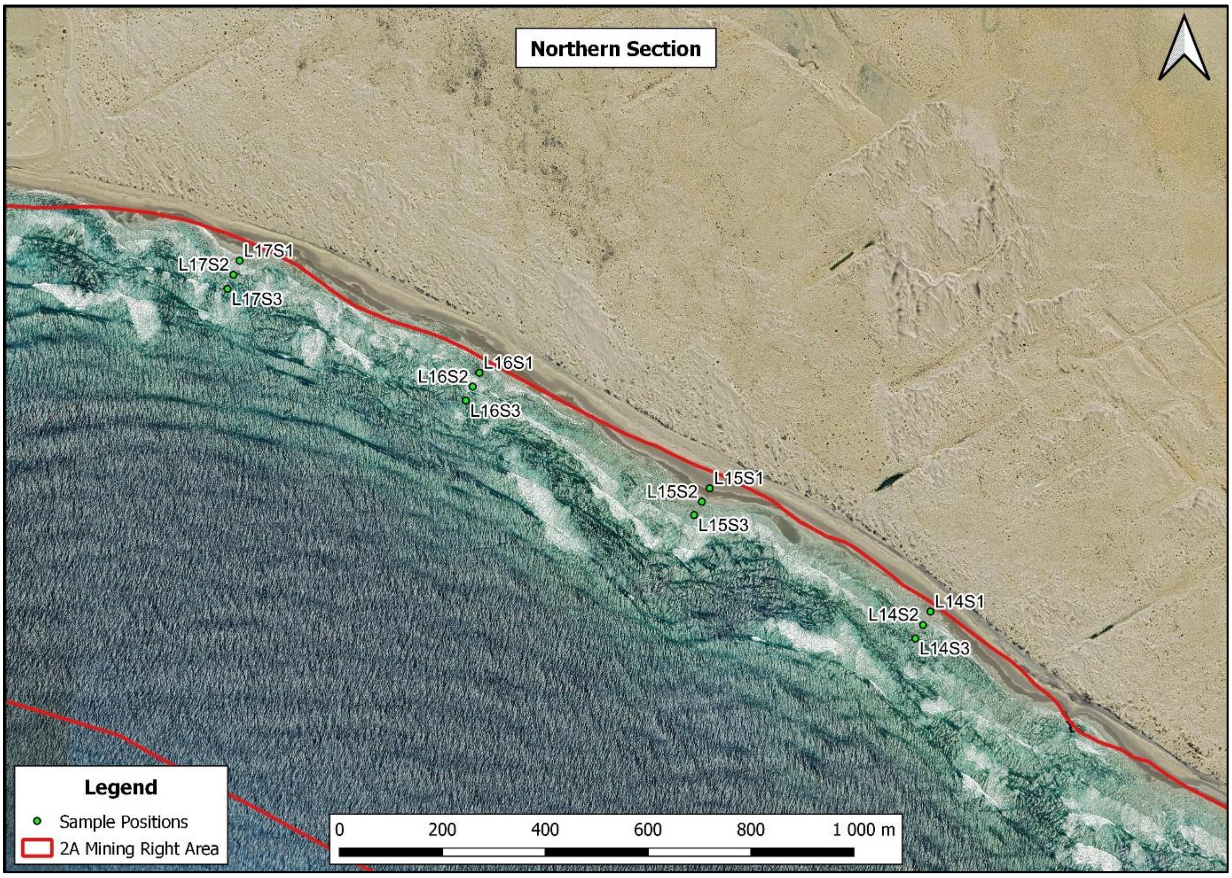

Figure 18: Locations of sampling lines and distribution of samples L14S1 to L17S3 along the lines in the northern section.

Table 2: List of samples collected along with the collar elevation and pit depth.

No.	Sample ID	Easting (m)	Northing (m)	Collar Elevation (m.a.s.l)	EOH (m)
1	L1S1	673579.89	6783869.91	-1.30	6.0
2	L1S2	673562.95	6783844.33	-2.98	6.5
3	L1S3	673545.69	6783819.33	-4.66	6.8
4	L2S1	673223.12	6784138.44	-1.00	7.0
5	L2S2	673241.60	6784162.42	-2.36	6.0
6	L2S3	673204.79	6784114.43	-3.72	6.5
7	L3S1	672886.24	6784440.83	-1.15	8.0
8	L3S2	672869.37	6784415.23	-2.61	8.5
9	L3S3	672852.21	6784389.93	-4.07	8.9
10	L4S1	672509.21	6784692.56	-1.10	4.5
11	L4S2	672491.43	6784667.86	-2.35	4.7
12	L4S3	672475.97	6784642.06	-3.60	5.5
13	L5S1	672133.64	6784942.58	-1.20	5.5
14	L5S2	672116.38	6784917.58	-2.30	5.9
15	L5S3	672099.51	6784892.58	-3.40	6.5
16	L6S1	671733.19	6785158.34	-1.40	5.2
17	L6S2	671716.27	6785133.23	-3.03	5.6
18	L6S3	671701.64	6785106.64	-4.66	7.3

19	L14S1	660857.95	6802320.6	-1.25	5.6
20	L14S2	660843.56	6802294.64	-1.85	6.0
21	L14S3	660828.73	6802268.44	-2.45	6.3
22	L15S1	660428.59	6802560.07	-0.90	8.1
23	L15S2	660413.45	6802534.07	-1.73	7.8
24	L15S3	660398.29	6802508.17	-2.56	8.0
25	L16S1	659980.72	6802784.73	-0.90	8.2
26	L16S2	659967.72	6802757.64	-1.75	8.0
27	L16S3	659954.62	6802730.65	-2.60	8.1
28	L17S1	659514.56	6803002.17	-1.10	5.0
29	L17S2	659502.65	6802974.88	-2.00	5.6
30	L17S3	659491.17	6802947.53	-2.90	6.2

*WGS 84 / UTM zone 33S

9. Sample Preparation, Analysis and Security

Sample treatment started with preparation work involving drying, screening weighing, splitting and re-bagging of all sub-samples. Throughout, strict sample management and custody procedures were followed.

9.1. Sample security

All Sea Concession 2A surf-zone samples were packed on the beach into lidded 50-litre containers and loaded into the enclosed bay of a light utility vehicle. At the end of each sampling day, from late April to early May 2026, WHM personnel transported the samples under Creo exploration-staff supervision to a secure storage room at WHM's Muisvlak offices, 10 km north of Port Nolloth, for preparation in the on-site laboratory.

9.2. Field quality control measures

Quality control measures are required to ensure reliable exploration data. These measures include written field procedures and independent checks of sample excavation, surveying, sampling, assaying, data management and database integrity. Proper implementation, documentation and review of quality control data support the accuracy and precision of analytical and project data and form the basis of the exploration quality assurance programme.

The surf-zone QA/QC programme included certified reference material (CRM) standards, CRM blanks using silica, and split field duplicates. Every seventh sample included one standard and one field duplicate, with blanks inserted at regular intervals. The surf-zone sample stream included 5 AMIS0774, 43 AMIS0833, 42 AMIS0845 and 42 AMIS0794 standards.

9.3. Laboratory sample preparation methodology

Sample preparation comprised the following treatment stages.

On site dry pulps were prepared as follows:

- Dry samples at 60°C for 24 hours.
- Rifle split original 20 kg sample into two 10 kg sub-samples.
- One 10 kg sub-sample is further reduced and sent for analysis, the other is used for point count analysis and stored for reference.
- Cone and quarter the one 10 kg sub-sample to obtain an approximately 6 kg sample.
- Rifle split the 6 kg sample to two sub-samples of about 2 kg using a large splitter.
- The 2 kg samples are sent to the laboratory for analysis.

Laboratory preparation:

Rifle split the 2 kg sample to obtain 250–350 g for pulverising. The 250–350 g split was pulverised to 75 µm, with more than 85% of the material passing the 75 µm mesh. Approximately 18 g of pulverised material was then weighed for ICP-OES analysis at the primary external laboratory, Scientific Services, Cape Town.

9.4. Laboratory quality control and quality assurance measures

Scientific Services completed the following QA/QC checks to verify its internal assay procedures:

- blank insertion; and
- Certified Reference Material insertion.

A total of 35 samples, including blanks and CRMs, were inserted into the sample stream submitted to Scientific Services in Cape Town.

9.5. Umpire laboratory assay results

Light Deep Earth laboratory in Pretoria served as the umpire laboratory and performed QEMSCAN assay work on the samples. Creo also completed point-count analysis on the samples.

Point-count results are presented in Section 10.2, and the composite QEMSCAN assay is presented in Section 10.3.

10.Data Processing

10.1. Sample Analysis Results

The analysis results for the samples collected at Sea Concession 2A are presented in table 3 below and indicate the TiO_2, ZrO_2 and THM (Total Heavy Mineral) grades for each sample.

Table 3: Analysis results of the 30 samples collected.

No.	Sample ID	Easting (m)	Northing (m)	Collar Elevation (m.a.s.l)	EOH (m)	TiO_2 (%)	ZrO_2 (%)	THM (%)
1	L1S1	673579.89	6783869.91	-1.30	6.0	6.30	0.55	17.77
2	L1S2	673562.95	6783844.33	-2.98	6.5	4.10	0.21	10.13
3	L1S3	673545.69	6783819.33	-4.66	6.8	3.72	0.41	8.57
4	L2S1	673223.12	6784138.44	-1.00	7.0	5.67	0.36	15.99
5	L2S2	673241.60	6784162.42	-2.36	6.0	16.15	1.80	45.58
6	L2S3	673204.79	6784114.43	-3.72	6.5	2.86	0.29	8.07
7	L3S1	672886.24	6784440.83	-1.15	8.0	8.38	0.66	23.66
8	L3S2	672869.37	6784415.23	-2.61	8.5	5.84	0.29	12.91
9	L3S3	672852.21	6784389.93	-4.07	8.9	4.95	0.39	9.68
10	L4S1	672509.21	6784692.56	-1.10	4.5	11.94	1.32	33.71
11	L4S2	672491.43	6784667.86	-2.35	4.7	0.00	0.07	3.10
12	L4S3	672475.97	6784642.06	-3.60	5.5	2.83	0.67	13.63
13	L5S1	672133.64	6784942.58	-1.20	5.5	15.95	0.84	45.01
14	L5S2	672116.38	6784917.58	-2.30	5.9	8.69	0.62	23.16
15	L5S3	672099.51	6784892.58	-3.40	6.5	7.98	0.31	16.47
16	L6S1	671733.19	6785158.34	-1.40	5.2	21.53	2.00	60.79
17	L6S2	671716.27	6785133.23	-3.03	5.6	5.08	0.09	14.33
18	L6S3	671701.64	6785106.64	-4.66	7.3	4.19	0.37	11.83
19	L14S1	660857.95	6802320.6	-1.25	5.6	11.31	0.88	31.91
20	L14S2	660843.56	6802294.64	-1.85	6.0	7.52	0.35	15.32
21	L14S3	660828.73	6802268.44	-2.45	6.3	5.29	0.42	11.95
22	L15S1	660428.59	6802560.07	-0.90	8.1	22.00	1.13	62.10
23	L15S2	660413.45	6802534.07	-1.73	7.8	9.46	0.41	25.49
24	L15S3	660398.29	6802508.17	-2.56	8.0	8.71	0.64	22.65
25	L16S1	659980.72	6802784.73	-0.90	8.2	4.11	0.23	11.59
26	L16S2	659967.72	6802757.64	-1.75	8.0	2.16	0.09	7.85
27	L16S3	659954.62	6802730.65	-2.60	8.1	1.76	0.12	5.36
28	L17S1	659514.56	6803002.17	-1.10	5.0	5.29	0.33	14.93
29	L17S2	659502.65	6802974.88	-2.00	5.6	3.91	0.11	9.67
30	L17S3	659491.17	6802947.53	-2.90	6.2	2.89	0.19	7.92

*WGS 84 / UTM zone 33S

10.2. Point Count & Particle Size Analysis

Selected samples were submitted for particle-size analysis. The average grain-size results, shown in Figure 19, indicate relatively coarse sediment, confirming deposition in a very high-energy environment.

All Sea Concession 2A samples were also analysed by point counting. Each sand sample was examined at an appropriate magnification, in this case 250×, using a randomly positioned 10 × 10 square graticule. Mineral grains intersected by the graticule crosshairs were identified, recorded and entered into a database. Binary assemblages were recorded by first naming the mineral intercepted by the graticule and then counting it. At least 900 particles were recorded per sample. The results were converted to weight percent for each mineral and checked against the corresponding chemical assay. Point-count results are presented in Figures 20 and 21.

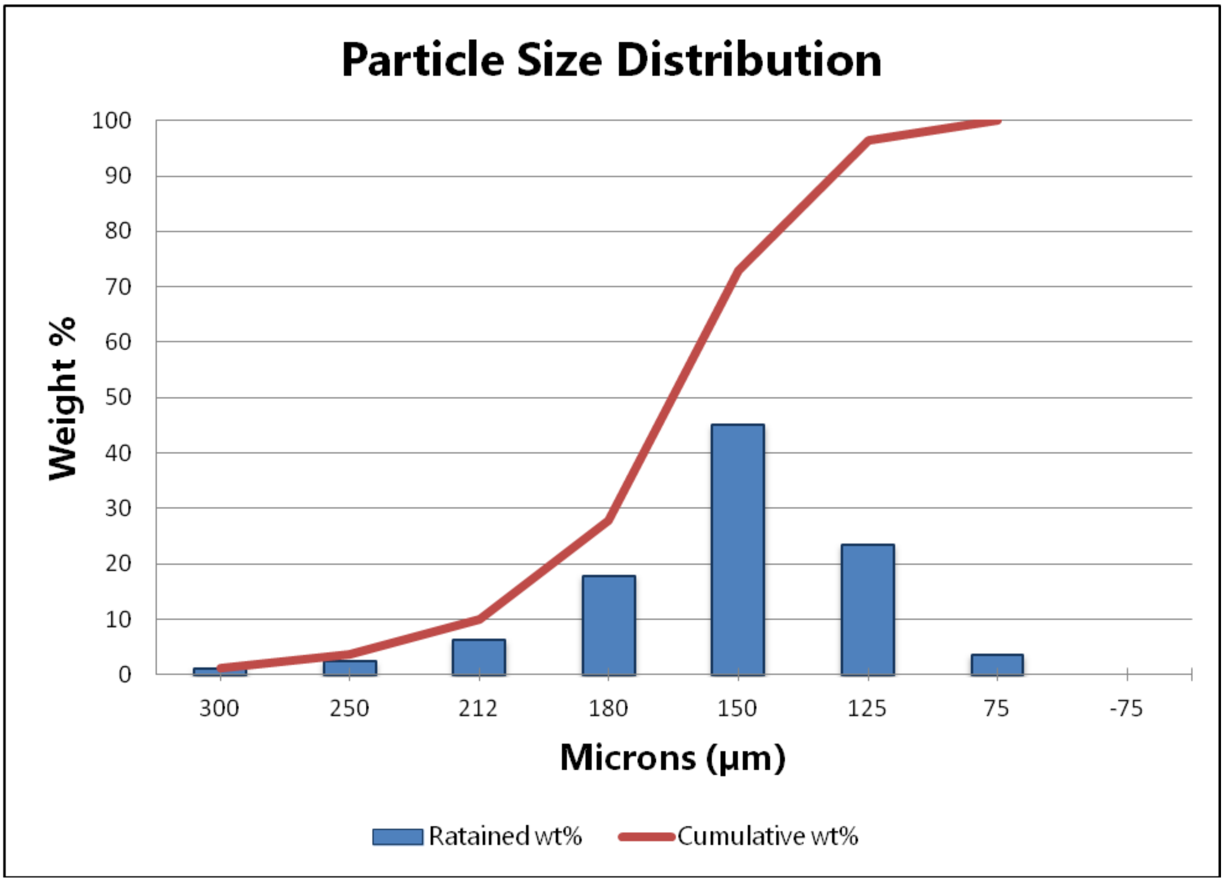

Figure 19: Particle size distribution of heavy mineral fraction from Sea Concession 2A.

Figure 20: Close-up image indicating the HM and the light minerals. Note the coarse-grained silica grains compared to the finer grained heavy mineral particles. Quartz = large whitish glassy, ilmenite = small black shiny, zircon = very small elongated translucent, garnet = large and small orange-pink-green grains.

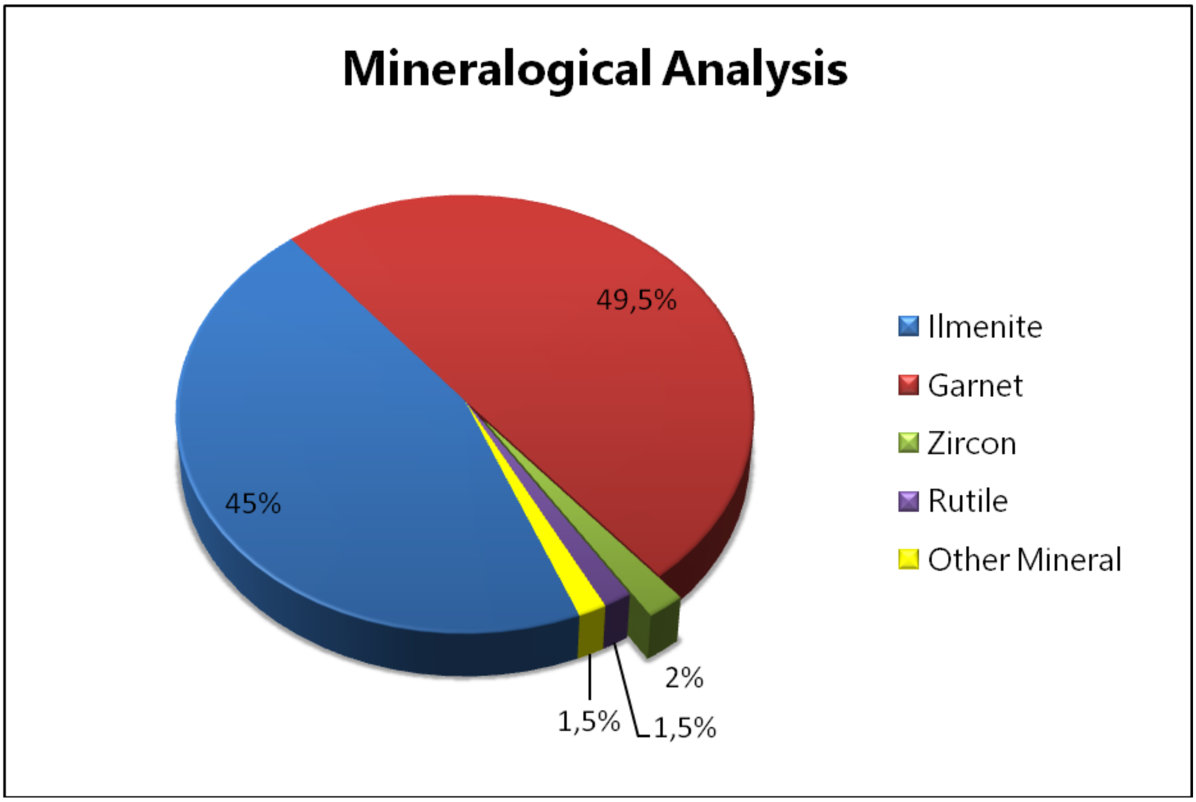

Figure 21: Mineralogical composition of the total heavy mineral assemblages from Sea Concession 2A.

10.3. QEMSCAN Analysis

QEMSCAN, or Quantitative Evaluation of Minerals by Scanning Electron Microscopy, is a registered FEI Company trademark and an automated mineralogy and petrographic system used for quantitative mineral analysis.

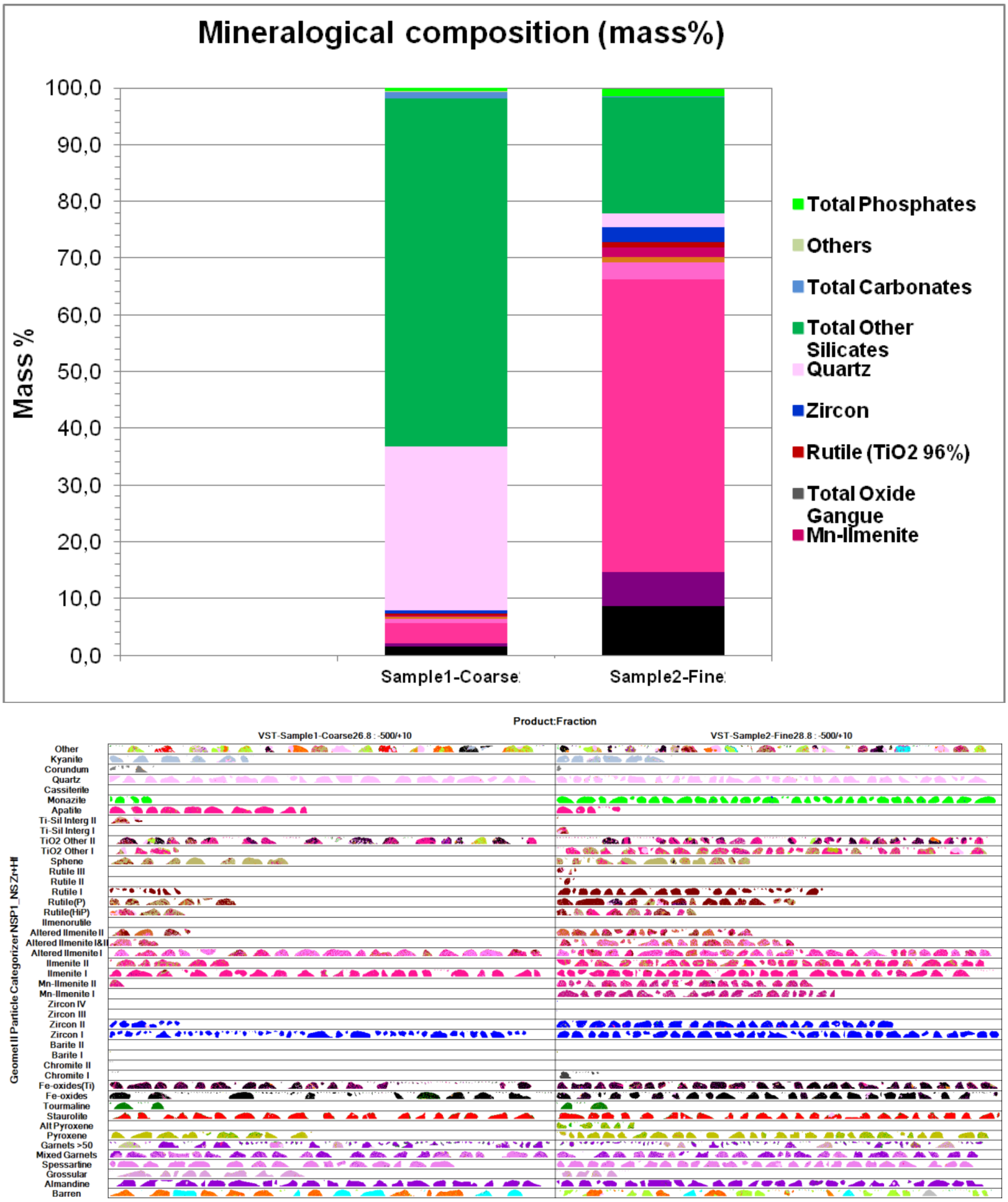

Figure 22: Mineralogical composition of the >500ųm and <500ųm fraction of a sample collected from the surf zone at Sea Concession 2A analysed using QEMSCAN.

It combines a scanning electron microscope with a large specimen chamber, up to four light-element energy-dispersive X-ray spectroscopy detectors and proprietary automated data-acquisition software (Pirrie *et al*., 2005).

Figure 22 shows the QEMSCAN analysis of a Sea Concession 2A surf-zone sample, indicating that heavy minerals predominantly occur in the <500 μm size fraction.

10.4. Interpolated maps

The maps in figures 23 to 28 below show the Southern and Northern mineral resource areas and the Geographic Information Systems (GIS)-interpolated distributions of estimated TiO_2, ZrO_2 and Total Heavy Mineral (THM) concentration values within each area.

GIS-interpolated distributions in this application employs GIS spatial mapping software using interpolation as a mathematical method to cover areas between actual sample points, creating a continuous model of mineral grades across the entire concession area. These maps are generated by importing the sample data points (X, Y, and the associated mineral percentages) surveyed in the map area into GIS software. The software uses spatial statistics to estimate values for the unsampled areas between the sample holes. The interpolation method used here was the industry-standard geostatistical method called Kriging that evaluates both the distance and the directional bias of geological trends.

The final output is a series of continuous raster or heat maps of the surf zone seafloor where areas of dark red or high intensity represent grade anomalies where heavy minerals have naturally sorted and settled in hydrodynamic zones of preferred settlement guided by energy conditions influencing prevailing conditions in certain areas, such as wave action regimes or ocean current conditions.

Areas of blue or low intensity represent lower grade deposits or even barren sand sheets.

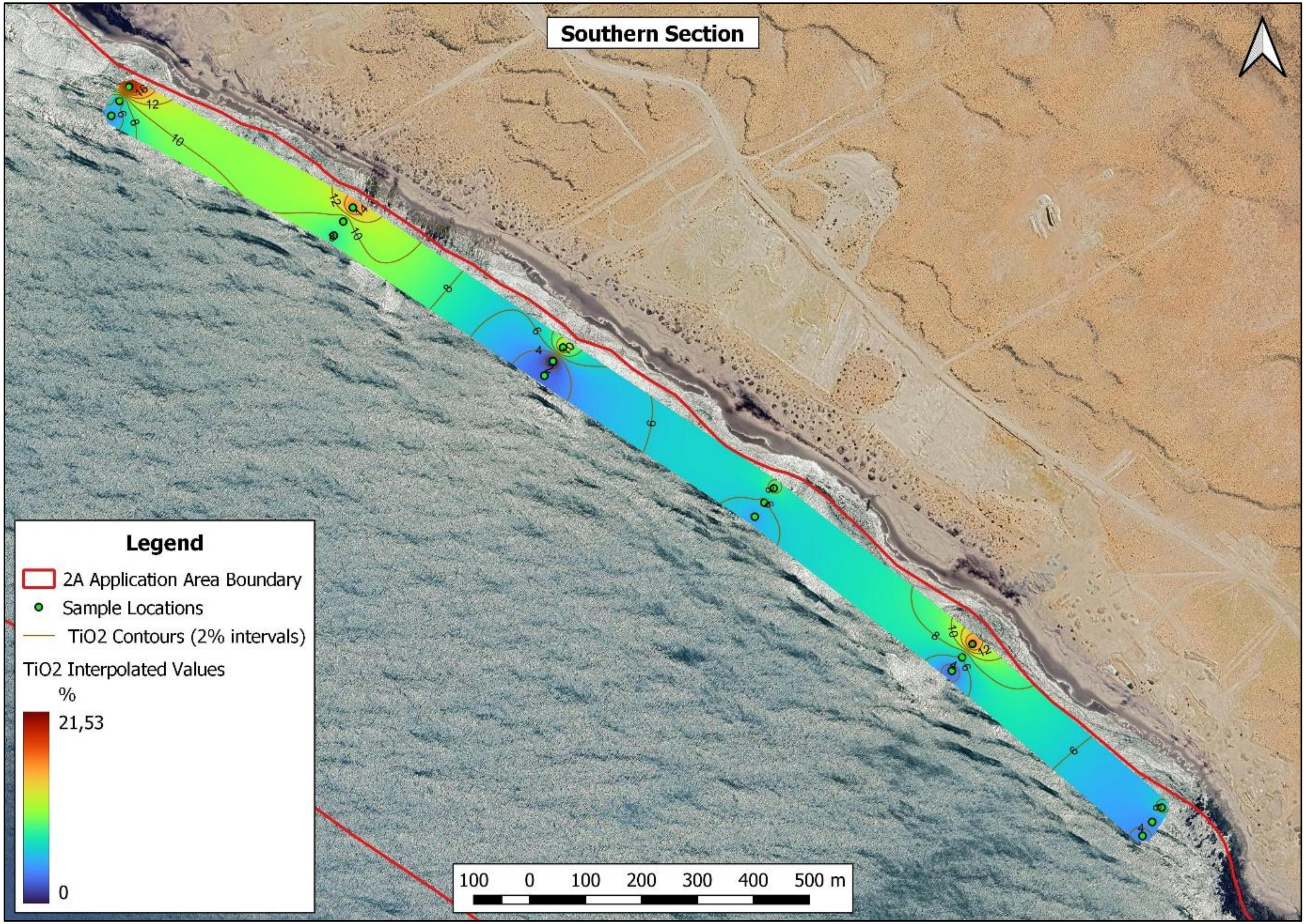

Figure 23: Interpolated map of the Southern Section indicating the estimate distribution of the TiO_2 values in the resource area.

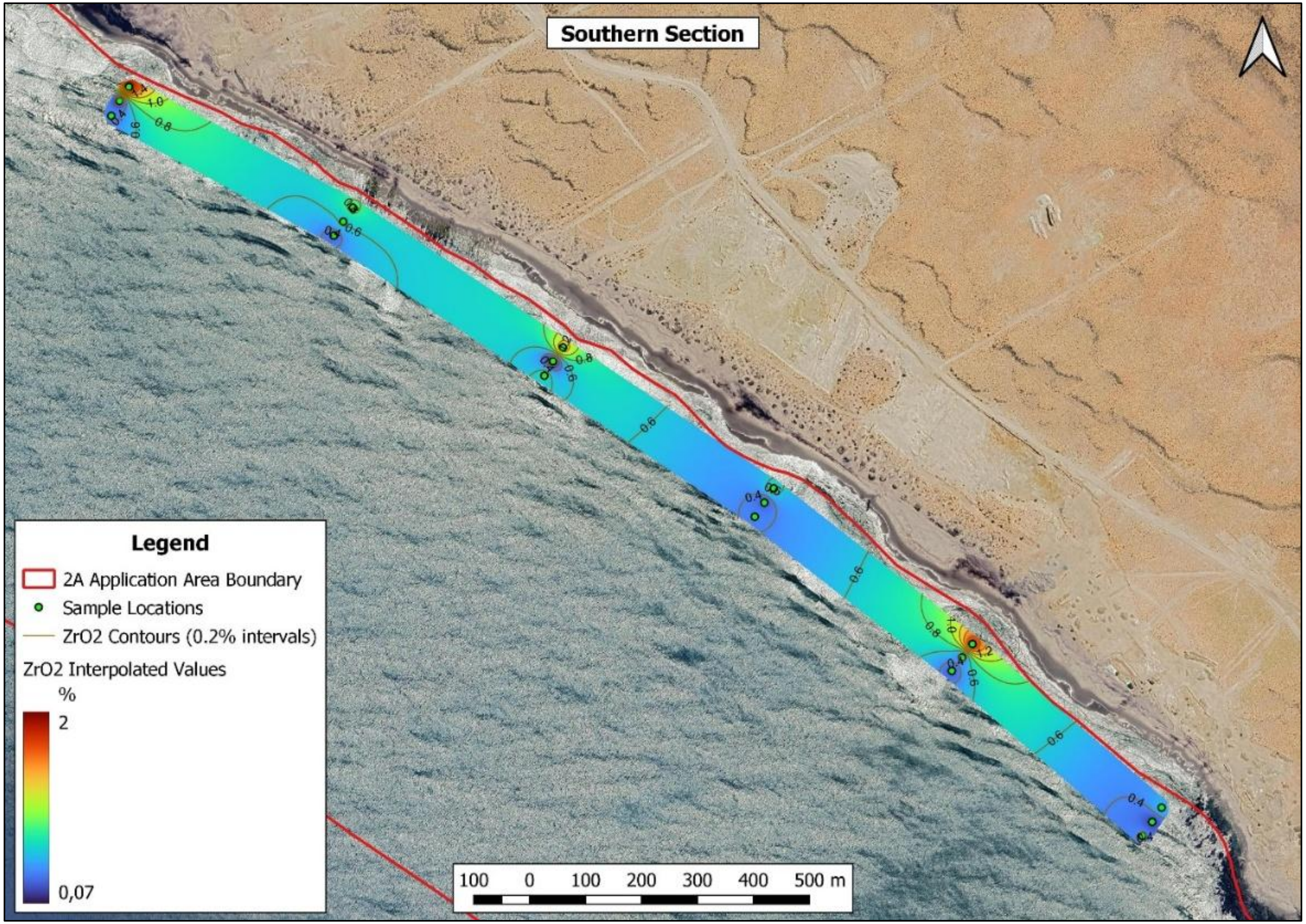

Figure 24: Interpolated map of the Southern Section indicating the estimate distribution of the ZrO_2 values in the resource area.

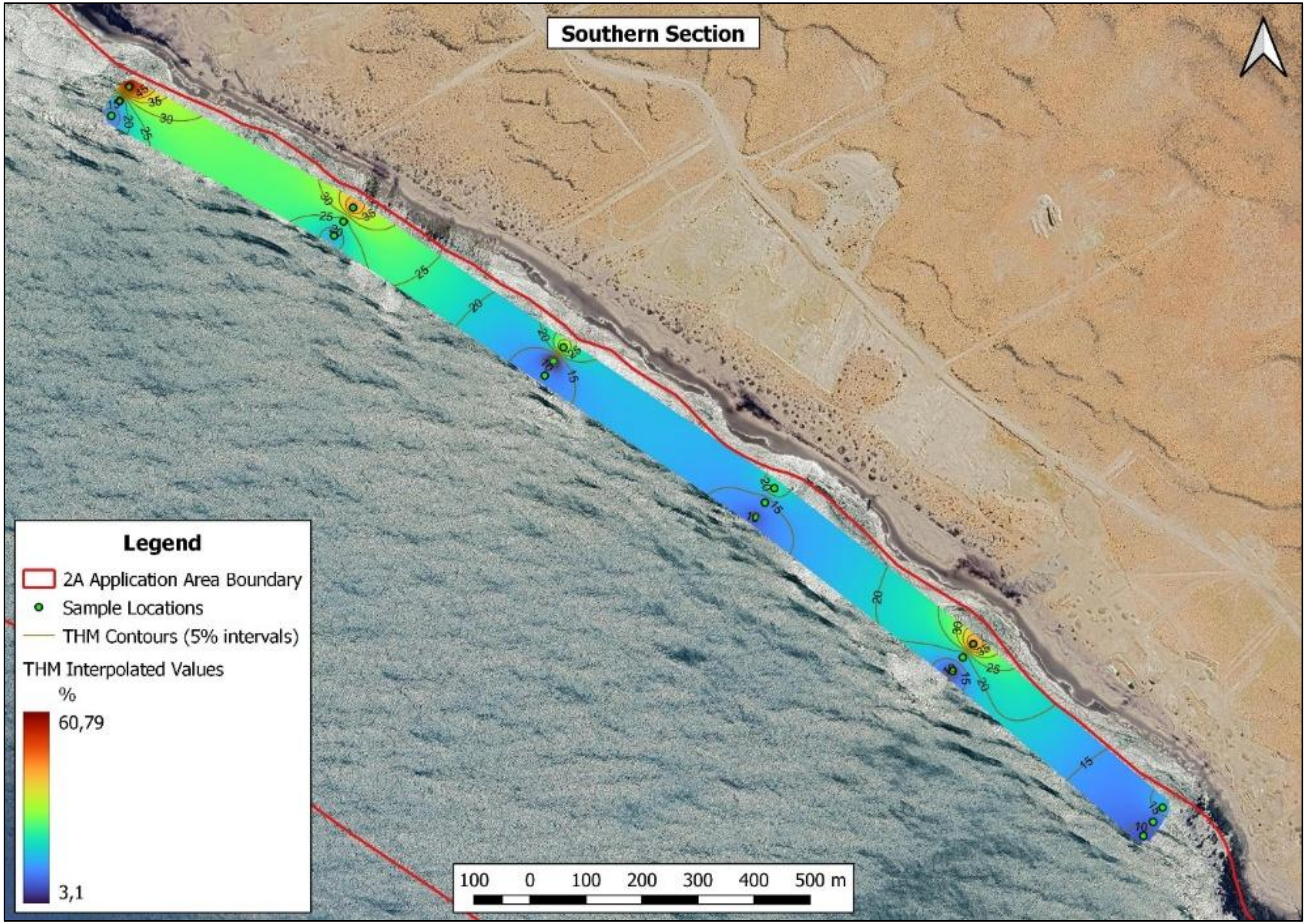

Figure 25: Interpolated map of the Southern Section indicating the estimate distribution of the THM values in the resource area.

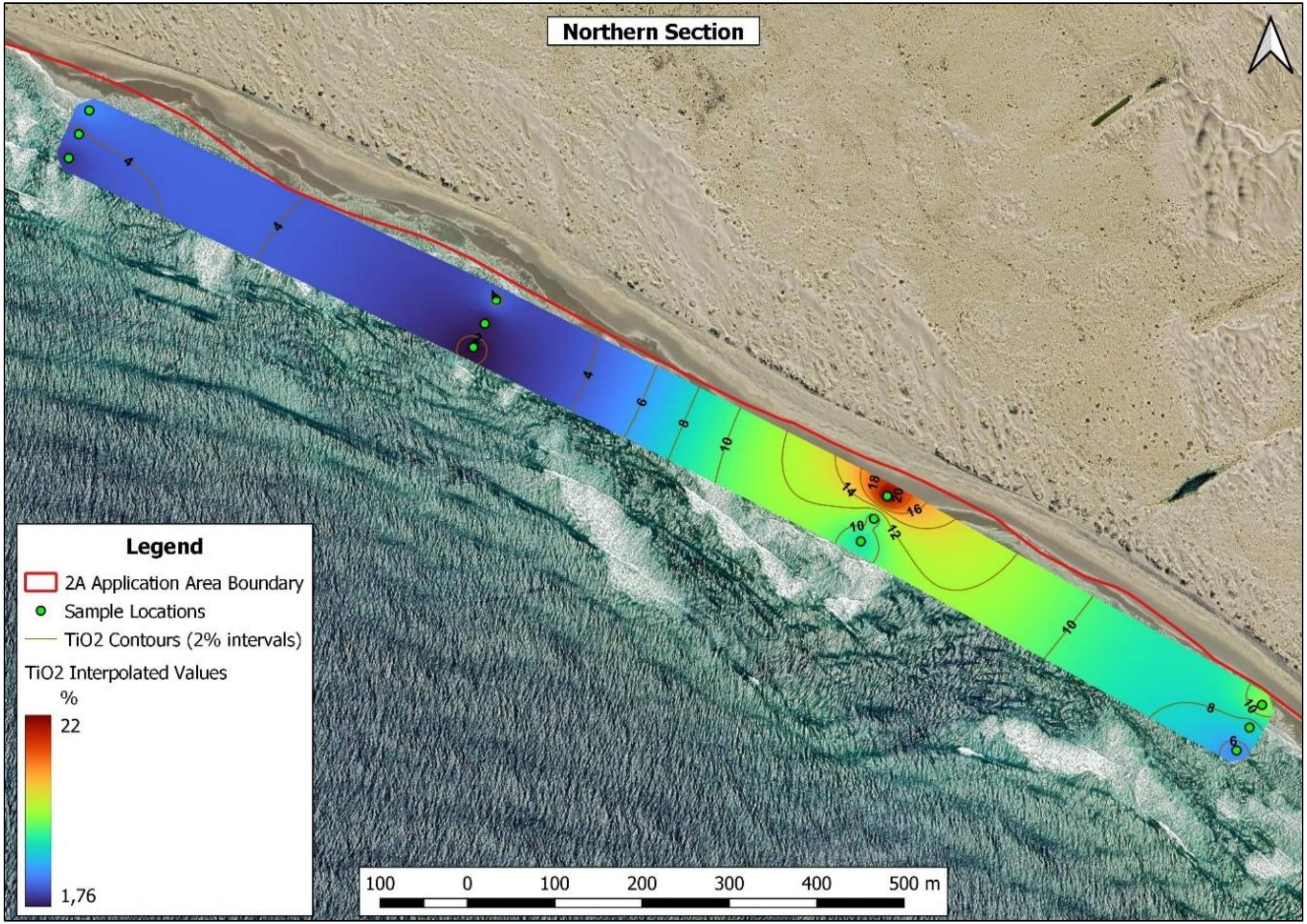

Figure 26: Interpolated map of the Northern Section indicating the estimate distribution of the TiO_2 values in the resource area.

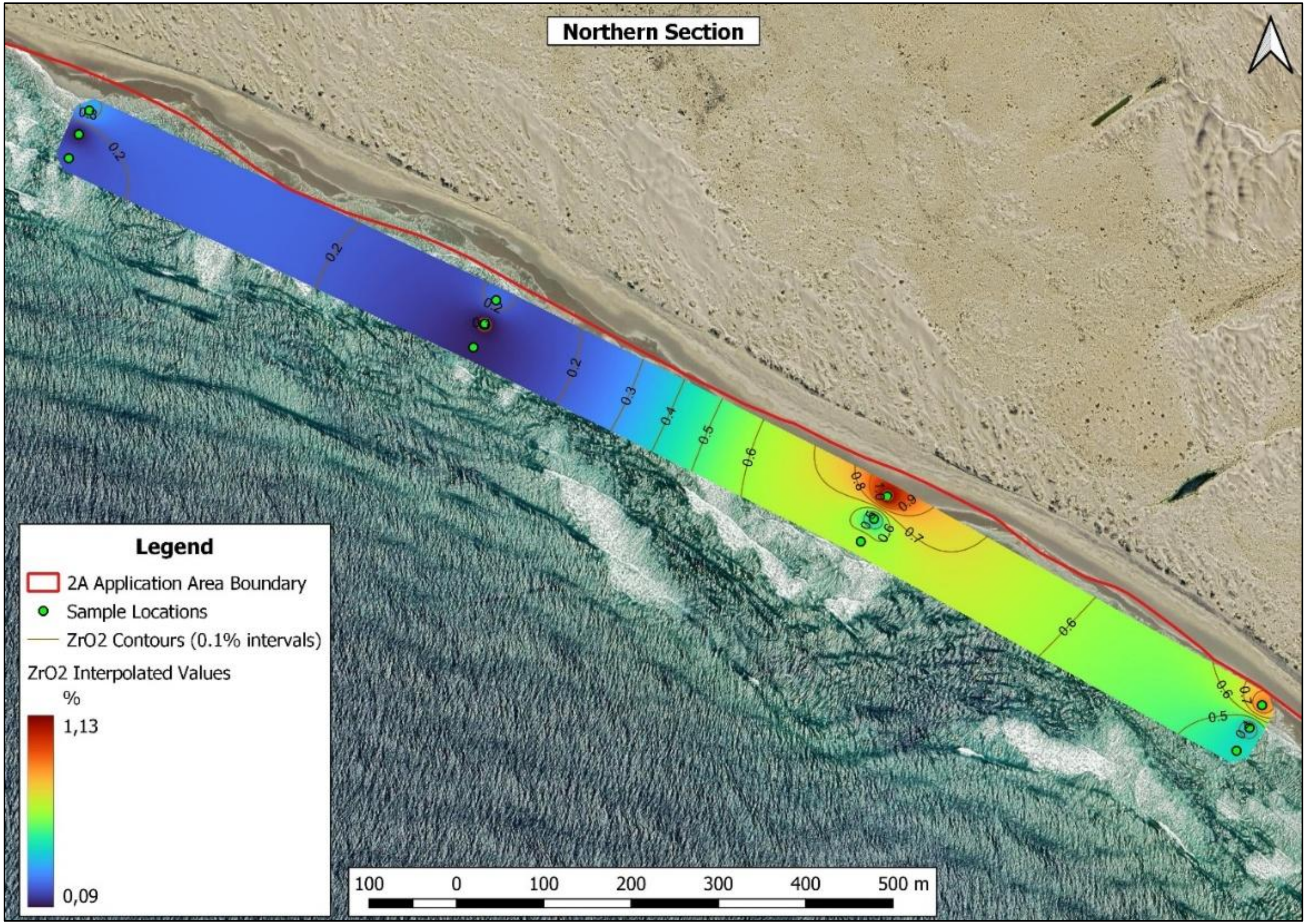

Figure 27: Interpolated map of the Northern Section indicating the estimate distribution of the ZrO_2 values in the resource area.

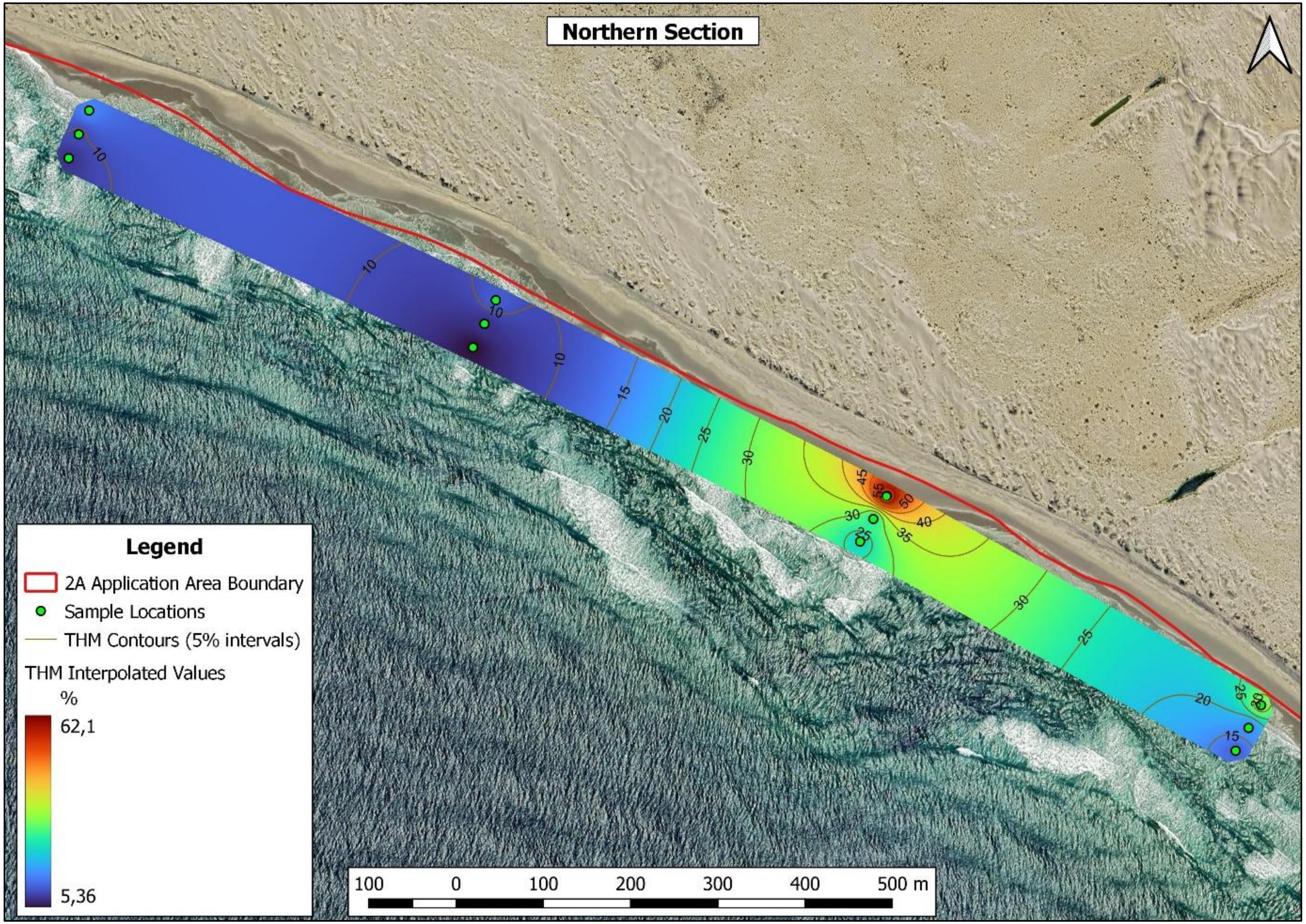

Figure 28: Interpolated map of the Northern Section indicating the estimate distribution of the THM values in the resource area.

11.Data Verification

Dr Johan Hattingh, author of this Report and responsible for all sections of the report, relied on data supplied by WHM as project owner and operator, together with information from the following public sources:

- South African Department of Mineral Resources and Energy (DMRE) Regulation 2.2 diagram for the boundary coordinates of NC 30/5/1/2/2/10244MR.

Other public information sources included:

- Council for Geoscience databases.
- Publicly available historical JORC technical reports prepared for WHM in 2020.
- Other public documents, or documents supplied by the Issuer, listed in Section 16.
- Alexkor survey office map archive and GIS database.

Subject-specific data verification is discussed in the relevant report sections; other verification outcomes are summarised here.

The Author independently verified the following:

a. NC 30/5/1/2/2/10244MR details, including submission date, licensed mineral groups and project-area size.
b. All data relating to historical heavy mineral sampling.
c. Historical survey data and GIS information.

Dr Hattingh also verified that additional data used in the Report was received from the DMRE or Mining Right holder or was generated independently by the Author through literature review or fieldwork. The Author reviewed the sample chain of custody and QA/QC procedures.

WHM cooperated fully by providing all requested information and data, and no limitations or failures affected the verification process.

The Author considers the reviewed procedures, QA/QC controls, data and information acceptable to support the Mineral Resource Estimate and adequate for the purposes of this Report.

11.1. Personal Inspections

At the Issuer's request, Dr Johan Hattingh (Pr. Sci. Nat.), Author and Qualified Person for this Report, conducted personal inspections of the Property on 24 April and 11 May 2026. The visits were undertaken to meet the Report requirements, confirm access and infrastructure, and review historical and current exploration work. During the inspections, Dr Hattingh visited the exploration area, discussed the deposit geology and inspected the established Mineral Resource area.

Dr Hattingh was satisfied that the planned sampling programme followed best-practice QA/QC procedures. Certified reference materials, blanks and duplicates were inserted at appropriate intervals. Sample custody, transport and storage procedures were clear and consistent with industry standards. Data capture and storage were also reviewed and found to be well structured and maintained, with all relevant data compiled and archived in the database.

12.Mineral Resource and Ore Reserve Estimates

12.1. Introduction

This section describes the methods used to derive and classify the latest "Mineral Resource and Ore Reserve" estimates for the surf zone portion of Sea Concession 2A. Estimation of the volume figures was done by excavating holes in the surf zone using, a hydraulic excavator and excavating test pits during spring low tide. The resource estimation was executed by Creo Geo Consulting (Pty) Ltd.

12.2. Resource Potential

Detailed investigations concerning mining-, processing-, metallurgical-, infrastructure-, economic-, marketing-, legal-, environmental-, government- and social factors ("modifying factors'; JORC, 2012) have been undertaken to a definitive feasibility stage.

Sufficient information (regarding crucial modifying factors) to estimate a Mineral Resource (e.g. JORC, 2012) were acquired through appropriate exploration techniques at the Sea Concession 2A surf zone area. Good information regarding the potential recoveries of heavy minerals from the economically prospective 2A nearshore deposits is available, compiled from detailed metallurgical feasibility work performed using a pilot spiral plant to date. Most importantly, the sampling is regarded as truly representative and covers the deposit appropriately showing clear geological continuity and grade distribution.

12.3. Data Acquisition Audit Procedure and Quality Assurance/Control

The complete set of Sea Concession 2A sample results, including sample ID and co-ordinates, lithology and related geological information, sample size, sample quality, and assay results, are stored electronically in an Excel™ database. The original sample data was captured into Excel™ and verified by the project geologist. All laboratory results and point count data were received in Excel™ format and were incorporated into the main database.

Survey data was obtained from the Alexkor surveyors and comprise of side scan sonar data, presenting sediment thickness data for the nearshore deposits of 2A. A gap in the information exists at the surf zone where survey vessels could not enter due to shallow water depth and unfavourable wave conditions. Here extrapolations from land accessed surf zone surveys had to be done as best alternative for actual survey data just beyond the surf zone.

The Excel™ database was exported into modelling software for validation purposes. This software package (Surpac™) has a series of automatic verification procedures, including checking for overlapping intervals. Preliminary modelling provides a visual check that the sample pit plot correctly on the survey plan and values are displayed correctly. Any errors identified are investigated by the responsible geologist prior to the commencement of more detailed two-dimensional modelling. Creo has verified the underlying sampling and assay data. Creo considers that given the general sampling programme, geological investigations, independent check assaying and, in certain instances, independent audits, the estimates reflect an appropriate level of confidence. The THM values were modelled and the 3 D solids generated during the modelling is presented in Appendix I. The THM volumes estimated totalled 2 626 803 m^3, which at an average specific gravity of 2,53 gives a THM volume of 6 651 065 ton in total. Table 4 presents the total heavy mineral estimate as well as the volumes of the various economic heavy minerals and non-economic heavy minerals based on the assay results.

12.4. Verification of Quality and Spatial of Data

Creo is satisfied that the correct quality assurance and quality control procedures were followed during the sample processing and that survey techniques capturing spatial data was accurate and true.

12.5. Volume estimation parameters and method

Volume estimation was applied to the prospective 2A sediments, as was excavated in shallow water surf zone areas and mapped by side scan sonar surveys in deeper water areas, logged in sample locations and which contained weighted average grades of **20,04% Total Heavy Minerals**. This estimation was taken over a representative portion of the 2A surf zone sediment covered area. The area selected for volume estimation covers the entire surf zone area at 2A underlain by sediments and excludes the rocky coastal areas. The rocky coastal areas are considered environmental sensitive areas and for that reason mining no-go areas. The total area of the Evaluation Area considered in this resource statement is 42.86 hectares and represents 1.42% of the total remainder of the Sea Concession 2A area.

Geostatistical analysis of grade variation was performed by using variography during estimations of grades and tonnages. Due to the stratiform nature, good continuity of geology and mineralization, only inverse distance weighting to the second order (IDW2 in 2D), with a 25 m cell size and an initial 100 m search radius was applied as the primary interpolation method. A search ellipsoid with an aspect ratio of 2.9 (the same as the surf zone area itself) at bearing 376°T (parallel to the long axis of the beach) was applied to the IDW2 field of search. The IDW2 was used to interpolate (1) the surf zone sediment thickness, (2) the average grade of the surf zone sediment (as based on the weighted average THM of the complete set of sample pits).

The survey area was divided into 50 m x 50 m polygon blocks, which were individually numbered and assigned the respective average interpolated values of (1) and (2) over the areas which they cover. The volume of any 50 x 50 m block is estimated based on (1). The tonnage of an estimated block is estimated on (5) *50m*50m*(average beach sediment density of 2.532 ton/m^3). The estimated contained THM content (in tonnes) for each block was calculated by tonnage.

12.6. Grade and tonnage estimation results

Grade and tonnage estimation for the Evaluation Area (surf zone area) of Sea Concession 2A is 6 651 065 tonnes @ 20.04% THM. The economic heavy mineral fraction represents 98.5% of the total heavy mineral population and the non-economic heavy minerals 1.5% of THM. This represents the tonnage and grade for the entire evaluated Sea Concession 2A surf zone area. Therefore, the **economic heavy mineral portion of the resource contains 1 312 920 tonnes of heavy minerals constituting 19.74% of the resource**. This is considered to be a reasonable estimate for the deposit, having been checked using statistics and manual verification methods.

12.7. Grade Profile

Statistical analysis of grade distribution was applied through the compilation of variograms. This was used to demonstrate the degree of variation in grade between the top and bottom units of the subsamples. In contrast grade values of neighbouring samples in the same stratigraphic horizon show very little variance. Therefore, calculations of grade for the samples could be done successfully to present a global grade figure for the resource by completing a combined grade from the individual polygon blocks as outlined above.

Grades as weighted averages determined during analysis of the samples collected at the surf zone at Sea Concession 2A, were used to determine average representation of the heavy mineral populations and is shown together with the tonnages represented in table 4.

Table 4: Tonnages and grades of the heavy minerals in the surf zone at Sea Concession 2A.

Unit	Total Tonnage	THM Contained	Econ HM Contained	Ilmenite	Garnet	Zircon	Rutile	Other
%		20,04	19,74	45	49,5	2,0	1,5	1,5
Tonnes	6 651 065	1 332 873	1 312 920	590 814	649 895	26 258	19 694	19 694

Although the surf zone portion of Sea Concession 2A heavy mineral deposit occurs in a very dynamic depositional environment, it should not be treated as an immediately renewable resource for mine-planning purposes. Natural coastal processes continue to replenish the surf-zone heavy mineral deposit, but the replenishment rate is expected to be too slow to replace heavy minerals at the pace required during intensive mining.

Mining may create additional accommodation space for future heavy mineral accumulation in the 2A surf-zone area. However, grade recovery is likely to occur over decades rather than within the short to medium term.

12.8. Mineral Resource Classification

12.8.1. Introduction

This section describes the status of the Evaluation Area at Sea Concession 2A Project in terms of its classification into an appropriate resource category.

12.8.2. Resource Statement

12.8.2.1. Mineral Resource

For the Whale Head Minerals (Pty) Ltd Mining Right area or any portion thereof to be considered a Mineral Resource it must be an occurrence of heavy minerals of economic interest in such form, quality and quantity that there are reasonable and realistic prospects of heavy minerals extraction for the heavy minerals market. Here, location, quantity, grade, continuity and other geological characteristics of this mineral resource should be known, estimated from specific geological evidence and knowledge.

Heavy mineral mineralisation demonstrates an inherent high variability in the distribution of economic extractable heavy minerals. Sampling this type of deposit requires a large number of samples comprising excavations covering the deposit. Standard excavation sampling techniques are able to provide sufficient sample volumes and, therefore, the required data to enable estimation of tonnages and grades. Conventional excavation sampling as was employed here provides sufficient information to determine the volume of the mineralisation zones, and its relationship to geological features. Therefore, for a deposit to be considered a Mineral Resource, it is highly dependent on the availability of the results of appropriate spatial distribution and number of samples.

12.8.2.2. Classification

Whale Head Minerals (Pty) Ltd has conducted an unbiased sampling programme representative of the area, with the samples sufficient in numbers and spacing density to be considered spaced close enough to demonstrate geological continuity. This allows the exploration area in the Sea Concession 2A surf zone area to be considered for classification in terms of the JORC reporting code.

The Mineral Resource classification is based on sample distance spacing, to determine the various radius distances applied to define each resource class. The radius distances were used to determine the mineral resource classification. Based on the sample spacing and variography results, Sea Concession 2A is considered a resource where continued mineralisation can be demonstrated, with great certainty by appropriately spaced sample points in at least two dimensions at the sample sites.

The quantity, grade and mineral content of this mineral resource have been estimated with a moderate level of confidence, based on limited geological evidence such as trench and pit samples. Because geological continuity has been assumed but not fully verified, the deposit is classified as an **Inferred Mineral Resource**.

12.8.2.3. Whale Head Minerals Mineral Resource and Ore Reserve Statement

No audited Mineral Resource and Ore Reserve statement for Sea Concession 2A Heavy Mineral deposit was previously issued.

This statement presents the total estimated resources and reserves for the surf zone portion of Sea Concession 2A heavy mineral deposit, with a total Inferred Mineral Resource of 1 312 920 tonnes of economic heavy minerals.

Table 5: Whale Head Minerals (Pty) Ltd Mineral Resource and Ore Reserve statement for the surf zone part of Sea Concession 2A Heavy Mineral deposit at a zero-cut-off grade (03 July 2026).

	Mineral Resource Category							
Classification	**Tonnage**	**Classification**	**Total Resource Tonnage**	**Econ HM Tonnage (t)**	**Grade (%) Ilmenite**	**Grade (%) Garnet**	**Grade (%) Zircon**	**Grade (%) Rutile**
Total Probable	**0**	**Total Indicated**						
		Total Inferred	**6 651 065**	**1 312 920**	**45%**	**49,5%**	**2,0%**	**1,5%**
Total Reserves	**0**	**Total Resources**	**6 651 065**	**1 312 920**	**590 814**	**649 895**	**26 258**	**19 694**

Based on geological evidence and knowledge of the local mineralisation styles, including heavy mineral placer formation on submerged strandlines on 2A, it can be safely assumed that the remainder of the 98.58% of the surface area of 2A can be considered a heavy mineral geological target. Even on an assumption that only 50% of Sea Concession 2A is mineralised to the extent seen in the evaluated surf zone, it can be assumed the **Geological Target at Sea Concession 2A contains an additional 265 200 000 ton of heavy mineral ore** at grade yet to be determined.

13.Commodity Prices and Macro-Economics

13.1. Introduction

Heavy mineral sands mines in general have both lower capital and operational cost requirements than most other mining operations (Tyler and Minnitt, 2004). The very favourable return on capital employed ratio for heavy mineral sand mining projects, is evident when compared to similar analysis performed on other commodities (Figure 29).

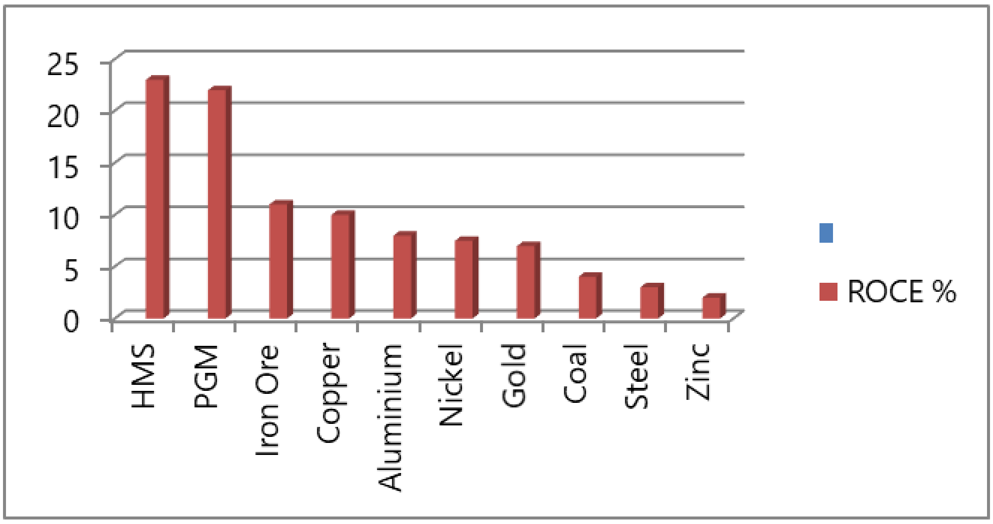

Figure 29: Return on capital employed (ROCE – percentages) for a number of commodities.

The mineral sands industry consists of two principal product streams; titanium dioxide minerals in the form of rutile (TiO_2), ilmenite ($TiFeO_3$), and zircon ($ZrSiO_4$). Garnet was recently added to this list following the replacement of silica sand with garnet, as sand blasting media following stricter health and safety regulations implemented in most developed countries. These minerals constitute the primary valuable heavy minerals (VHM). The mineral sands industry is relatively consolidated (Figure 30), but is characterised by relatively low capital expenditure requirements despite the specialised technologies, and the importance of quality and continuity of supply to customers.

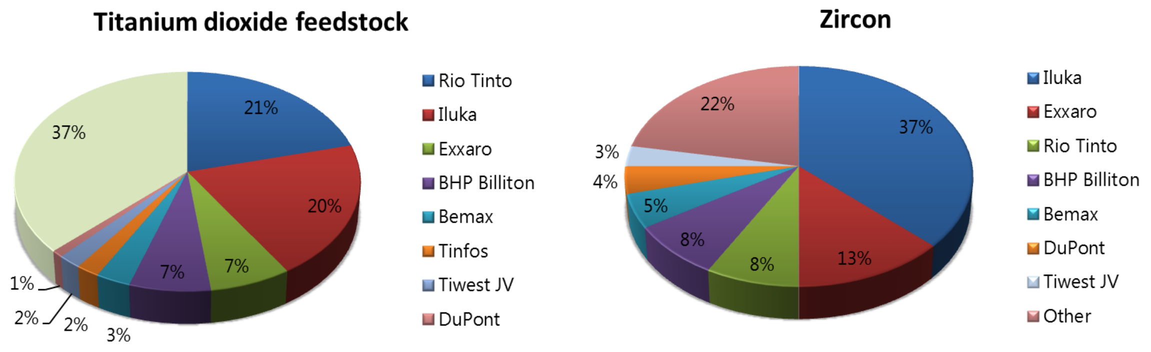

Figure 30: Consolidated mineral sands industry (Source: TZMI).

Mineral sands deposits have differing grades of HM and assemblage characteristics which can influence the relative cost and value stream of product produced from any specific deposit. As such, the co-product revenue stream is very important to feedstock industry performance. Co-products include zircon and, in the case of some slag producers, high purity pig-iron produced as a by-product from slag operations.

13.2. Global Market Size and Outlook

The broader heavy mineral sands market is estimated at approximately US$12–13 billion in 2025 and is forecast to exceed US$18 billion by 2033. (dataintelo.com)

Structural Growth Drivers:

- Urbanization and infrastructure expansion
- Paints and coatings demand
- Ceramic tile production
- Aerospace titanium demand
- EVs and permanent magnets
- Defence and strategic stockpiling

Cyclical Growth Drivers:

- Chinese construction activity
- Global manufacturing PMI
- Pigment inventory cycles
- Commodity shipping rates

13.3. Mineral-Specific Market Analysis

13.3.1. Ilmenite Market

Market Structure

Ilmenite represents over 40–50% of total HMS market value and remains the dominant titanium feedstock globally. (dataintelo.com). Its primary use is titanium dioxide pigment production through sulphate and chloride processing routes.

Demand Fundamentals

Key demand sectors include:

- Titanium dioxide pigment production
- Paints and coatings
- Plastics
- Paper
- Construction materials
- Consumer goods
- Titanium metal

Global TiO_2 demand remains closely tied to:

- Construction activity
- Automotive production
- Consumer goods manufacturing

China dominates sulphate-route pigment production, while chloride-route capacity is concentrated in Western economies. Global ilmenite pricing is strongly linked to Chinese pigment production and industrial activity.

Supply Dynamics

Major producing regions:

- Australia
- South Africa
- Mozambique
- India
- Sierra Leone
- The ilmenite market has shifted from structural oversupply toward tighter balance because of:
- Depletion of high-grade deposits
- Reduced investment in new mines
- Environmental closures in Asia
- Increasing demand for chloride-grade feedstocks

African producers are increasingly price competitive because of lower mining costs and large scalable deposits.

Demand Outlook

Long-term ilmenite demand remains favourable due to rising titanium dioxide pigment consumption in emerging markets. Growth in urbanization and infrastructure spending in Asia, Africa, and the Middle East supports consumption.

Aerospace recovery also supports titanium sponge demand, indirectly benefiting high-grade titanium feedstocks.

The major risk to ilmenite demand is substitution and pigment recycling efficiency improvements.

Pricing

2025 benchmark pricing:

- Chloride ilmenite: ~US$300/t CIF
- Sulphate ilmenite: ~US$255–265/t CIF (sec.gov)

13.3.2. Zircon Market

Market Structure

Zircon is the highest-value mainstream HMS product and often determines overall project economics.

Primary applications include:

- Ceramic tiles
- Sanitaryware
- Foundry sands
- Refractories
- Zirconium chemicals
- Nuclear applications

The ceramics industry consumes the majority of global zircon production.

Supply Constraints

The zircon market faces persistent structural tightness because economically recoverable deposits are relatively rare. Premium zircon assemblages are becoming increasingly difficult to discover.

High-quality zircon production is concentrated among a small number of producers, particularly in Australia and South Africa.

Supply constraints include:

- Declining grades
- Resource depletion
- Long permitting timelines
- ESG scrutiny
- Limited greenfield discoveries

Pricing Environment

Zircon pricing historically demonstrates lower volatility than titanium feedstocks, because of concentrated supply and specialized applications.

Premium zircon products command substantial pricing differentials based on:

- Radioactivity profile
- TiO2 contamination
- Grain size
- Colour and brightness

Long-term pricing remains constructive due to constrained supply growth.

Premium zircon prices:

- Approximately US$1,700–2,000/t in 2025 (zircomet.com)

Strategic Outlook

Zircon is expected to remain one of the strongest HMS commodities over the next decade, because barriers to entry are high and demand remains resilient.

Demand growth is emerging in:

- advanced ceramics,
- electronics,
- zirconium chemicals,
- nuclear technologies.

13.3.3. Rutile Market

Market Position

Natural rutile is the highest-grade naturally occurring titanium mineral and is prized for chloride pigment production and titanium metal manufacturing.

Natural rutile is the premium titanium feedstock due to its:

- very high TiO_2 content (95–96%),
- low impurities,
- suitability for titanium metal production.

Demand Drivers

Applications include:

- Aerospace alloys

- Welding electrodes
- Pigment feedstock
- Titanium sponge production

Aerospace Influence

The recovery of commercial aviation and defence spending is increasing demand for titanium metal feedstocks. This trend is supportive for natural rutile pricing, because titanium sponge producers prefer high-grade feedstocks with low impurities.

The transition toward lighter, fuel-efficient aircraft also supports long-term titanium demand intensity.

Market Tightness

The rutile market is structurally constrained, because natural rutile deposits are geologically uncommon.

Major supply originates from:

- Sierra Leone
- South Africa
- Australia
- Kenya
- Mozambique

Natural rutile competes directly with synthetic rutile and titanium slag products.

Pricing

2025 premium rutile pricing:

- ~US$1,180–1,300/t (dataintelo.com)

Market Outlook & Risks

Rutile is expected to outperform ilmenite over the next decade because:

- natural supply is limited,
- aerospace demand is resilient,
- titanium metal demand is expanding

Key risks include:

- Synthetic rutile substitution
- Chinese demand cyclicality
- Political instability in producing regions

- Energy-intensive upgrading costs

Despite these risks, natural rutile is expected to maintain strategic importance because of feedstock quality advantages.

13.3.4. Garnet Market

Industry Characteristics

Garnet differs from other HMS commodities because its principal uses are industrial abrasives and waterjet cutting rather than titanium or ceramic applications.

Major end markets include:

- Abrasive blasting
- Water filtration
- Waterjet cutting
- Surface preparation
- Industrial polishing

Competitive Environment

The garnet market is fragmented and regionally competitive. Key producing countries include:

- Australia
- India
- South Africa
- United States
- China

Synthetic abrasives compete aggressively with natural garnet in some applications, placing pressure on margins.

Demand Trends

Waterjet cutting growth in manufacturing and infrastructure sectors continues supporting garnet demand. Environmental regulations are also encouraging substitution away from silica sand blasting toward garnet abrasives because of health considerations.

Premium almandine garnet products maintain favourable pricing due to superior hardness and recyclability.

Strong demand centres:

- China
- India

- United States
- Australia

Outlook

The garnet market is expected to grow steadily but at lower margins than zircon or rutile. The sector benefits from industrial diversification and relatively stable demand characteristics. The projected CAGR is approximately 4–5%.

13.3.5. Monazite Market

Strategic Importance

Monazite has become increasingly important because of its rare earth element content, particularly the REE's:

- Neodymium
- Praseodymium
- Lanthanum
- Cerium

These elements are critical for permanent magnets used in:

- Electric vehicles
- Wind turbines
- Defence systems
- Robotics
- Electronics

Regulatory Complexity

Monazite contains thorium and uranium, creating significant regulatory and handling complexity.

Many jurisdictions historically stockpiled or discarded monazite concentrates, because of radioactive permitting requirements. However, rising strategic concern regarding rare earth supply security is changing industry attitudes.

Emerging Opportunities

China currently dominates rare earth refining, magnet manufacturing and downstream processing. Therefore, governments in the United States, Australia, India, and Europe are increasingly supporting monazite processing initiatives to reduce dependence on Chinese rare earth refining.

Monazite recovery can materially improve HMS project economics when regulatory frameworks permit commercialization.

Pricing Dynamics

Monazite pricing is less transparent than zircon or rutile because:

- it is typically sold via bilateral contracts,
- pricing depends on REE assemblage contained and therefore basket values,
- radioactive handling costs vary.

Typical price range is approximately in line with zircon prices.

Long-Term Outlook

Monazite is likely to become the fastest-growing strategic HMS mineral and transition from secondary by-product status toward strategic co-product importance over the next decade, as magnet rare earth demand accelerates.

13.4. Sea Concession 2A Resource In-Situ Valuable Fraction Tonnage and Value

The resource estimate at the Evaluation Area of Sea Concession 2A was used to calculate the *in-situ* value of the valuable heavy mineral fraction of the contained heavy minerals at the Evaluation Area. Here the most recently published FOB prices as presented above was used to calculate the values. These values are presented in Table 6.

Table 6: In situ value of the contained valuable heavy minerals at the Evaluation Area of Sea Concession 2A based on Q2 FOB prices.

	Ilmenite	**Garnet**	**Zircon**	**Rutile**
In-Situ ton	590 814	649 895	26 258	19 694
Price/t	$295	$200	$1 500	$1 300
In-situ value	$174 290 130	$129 979 000	$39 387 000	$25 602 200
Total Value	**$369 258 330**			

Typical head grade of operating heavy mineral mines globally is in the range of 8 to 12% total heavy minerals, containing some 50 to 60% valuable heavy minerals. The Evaluation Area of Sea Concession 2A resource is shown to have 20.04% total heavy minerals, with a 98.5% valuable heavy mineral fraction. Considering the resource of 1 312 920 ton and the in-situ value of $369 258 330 the in-situ yield works out to be $281.25 per ton, an exceptional value compared to not only other heavy mineral deposits but also other high yielding commodities, such as precious or base metals.

The in-situ values presented in Table 6 are merely indicative as many factors such as price fluctuations and on-going marine erosional and depositional processes are impacting on a continuous basis on the fundamental parameters used in this estimation.

14. Creo Comments

Creo considers the quality of sampling, sample preparation, and sample handling to be of a high standard. Consequently, the sampling density, sample quantity, and spacing are sufficient to delineate a Mineral Resource to the level of confidence required by the JORC Code.

Work conducted by Whale Head Minerals (Pty) Ltd (WHM) at the Evaluation Area of the Sea Concession 2A surf zone, provides the necessary confidence in grade and geological continuity to classify the surf zone area as an **Inferred Mineral Resource**. Based on this supporting data, any quoted range of tonnages and grades, including THM and economic Heavy Minerals, relating to known mineralisation within this geological setting can be reported under this classification.

Exploration Methodology & Deposit Nature

- Near shore deposits are characteristically known for their lateral continuity and vertical zoning.
- The exploration approach used by WHM to collect data and define the resource is appropriate for this deposit type and aligns with industry-accepted norms and standards.
- The resource estimate in this report applies strictly to the sediment within the 2A surf zone area.
- While the physical footprint of the 2A surf zone area resource is small, this is heavily compensated for by exceptionally high-grade values.

2A remainder Exploration Target

In contrast to Walviskop, the remaining 98.58% of the surface area of 2A can be considered a heavy mineral geological target and have not been subjected to the same level of rigorous exploration. Due to insufficient data, a definitive volume and grade cannot be quantified. Consequently, **the remainder of Sea Concession 2A cannot be classified as a JORC-compliant Mineral Resource or Ore Reserve** at this stage and is categorised strictly as a **Geological Target**.

This conservative classification is a direct result of complex heavy mineral distribution controls, which limit the ability to accurately predict deposit extent and grade even over short distances.

However, Creo considers there to be fair potential to delineate higher-confidence Mineral Resources and Ore Reserves at Sea Concession 2A, in particular in the deeper water areas as ongoing exploration and development progress.

15.Conclusions and Recommendations

The Evaluation Area at the Sea Concession 2A deposit represents an exceptional heavy mineral resource. When compared against peer heavy mineral sands projects along the West Coast of South Africa, and globally, it distinguishes itself through two critical metrics: a remarkably high Total Heavy Mineral (THM) grade and a superior proportion of high-value, economic heavy minerals within the overall assemblage.

The unique high-energy depositional environment has naturally classified and concentrated dense, valuable minerals, resulting in a grade profile that significantly exceeds typical global industry averages for shoreline or aeolian deposits.

Based on the exceptional grades and high-value mineral assemblage confirmed during the recent exploration campaign, further capital expenditure for exploration is strongly warranted.

Excellent scope exists to significantly expand the current resource footprint. Because the primary geological controls, specifically wave-driven near shore similar to surf zone deposition, operate within a highly predictable, well-understood active marine framework, the geological risk typically associated with resource expansion is substantially mitigated. Future exploration target delineation can therefore be approached with a high degree of confidence.

Due to the dynamic nature of the Sea Concession 2A deeper water surf zone and beyond areas, it should be understood as operational directive traditional terrestrial or standard marine drilling techniques are sub-optimal for advanced resource definition.

Standard terrestrial methods are ineffective for defining resources in the deeper water areas of Sea Concession 2A. The high-energy environment of the deep surf zone and surrounding areas requires specialized techniques to accurately explore deposits within these specific dynamic energy regime areas. It is recommended that future exploration and sampling campaigns transition to a purpose-designed marine dredging framework. Successful execution will require selecting specialized dredging vessels or modular platforms specifically engineered to withstand the challenging local metocean conditions. These conditions include severe wave regimes, prevailing wind conditions and engineering designs that must optimize pumping distances and head pressure constraints required to deliver dredged material safely from the surf zone to onshore processing or logging facilities.

This specialized approach will not only ensure operational safety and continuous data acquisition but will also provide improved operational conditions and continuity of processes.

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Qualified Person's Consent

Pursuant to the requirements of Listing Rules and
Clause 9 of the JORC Code 2012 Edition (Written Consent Statement)

Report name

A Technical Report on the Sea Concession 2A surf zone heavy mineral assets of Whale Head Minerals (Pty) Ltd

Released by Kazera Global Plc

On the Sea Concession 2A heavy mineral deposits on the West Coast of South Africa on which the Report is based, for the period ended 7 August 2026.

August 2026




Statement

I, Johan Hattingh

confirm that I am the Qualified Person for the Report and that:

- I have read and understood the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition).
- I am a Qualified Person as defined by the JORC Code 2012 Edition, having twenty-two years' experience that is relevant to the style of mineralisation and type of deposit described in the Report, and to the activity for which I am accepting responsibility.
- I am registered with the South African Council for Natural Scientific Professions.
- I have reviewed the Report to which this Consent Statement applies.

I am a full-time employee of Creo Geo Consulting (Pty) Ltd and have been engaged by Kazera Global Plc to prepare the documentation for Whale Head Minerals (Pty) on the Sea Concession 2A heavy mineral deposits on the West Coast of South Africa, on which the Report is based, for the period ended 7 August 2026.

I have disclosed to the reporting company the full nature of the relationship between myself and the company, including any issue that could be perceived by investors as a conflict of interest.

I verify that the Report is based on and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Exploration Targets, Exploration Results, Mineral Resources.

Consent

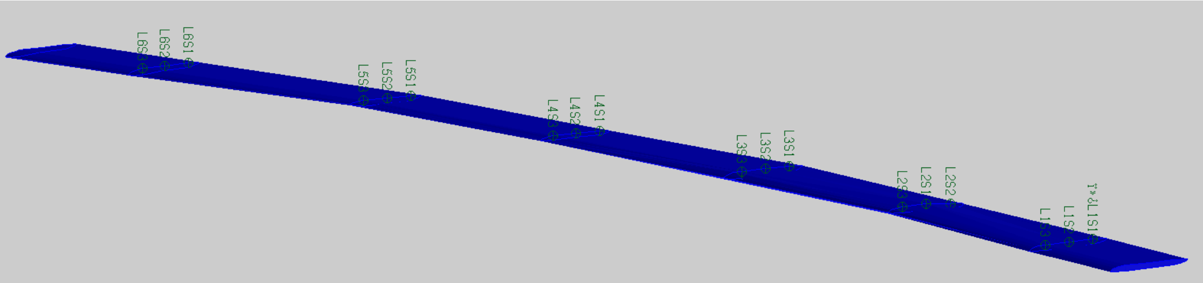
I consent to the release of the Report and this Consent Statement by the directors of:

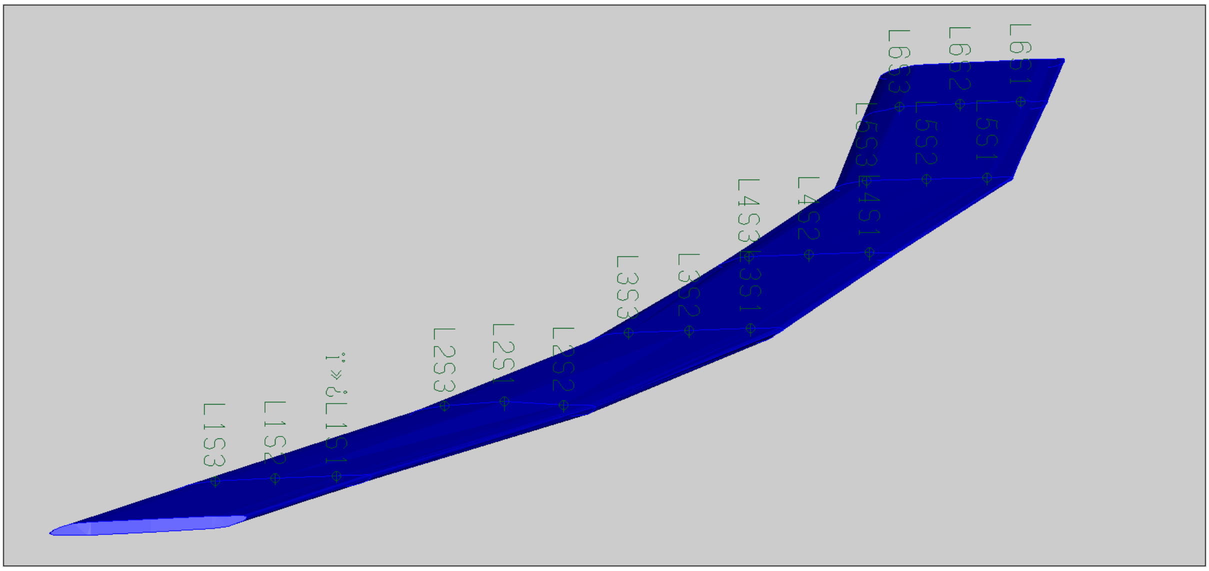
Kazera Global PLC

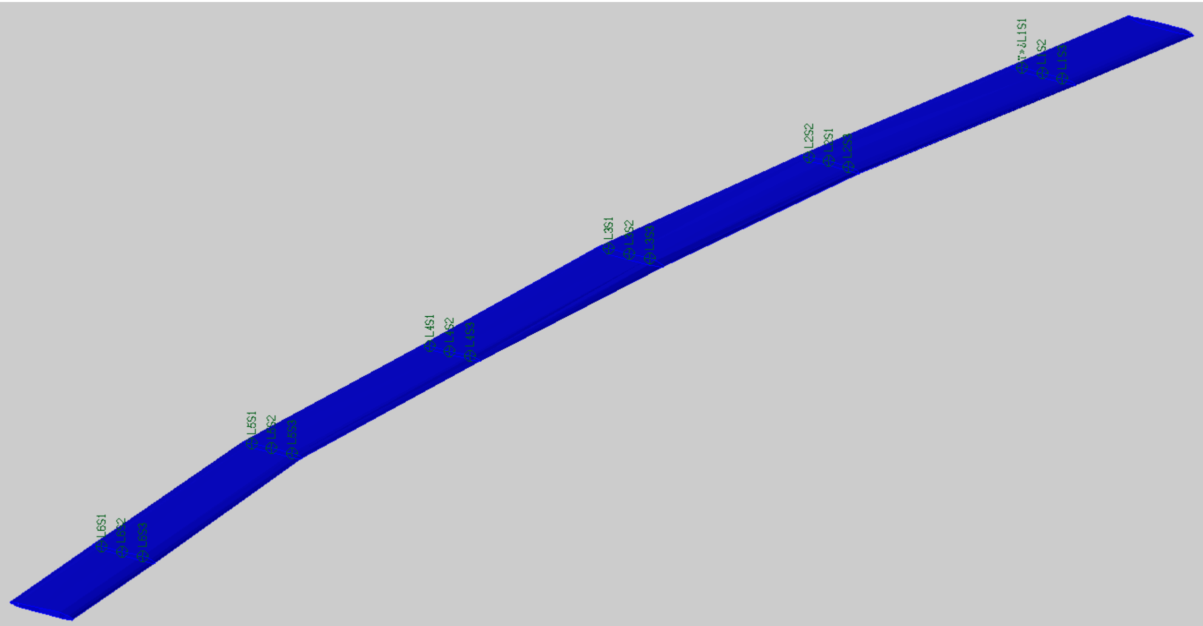
	7 August 2026
Signature of Qualified Person	Date:
South African Council for Natural Scientific Professions	#400112/93
Professional Membership:	Membership Number:
	Riaan Zeeman
Signature of Witness:	Print Witness Name and Residence:
	Robertson

Appendix I

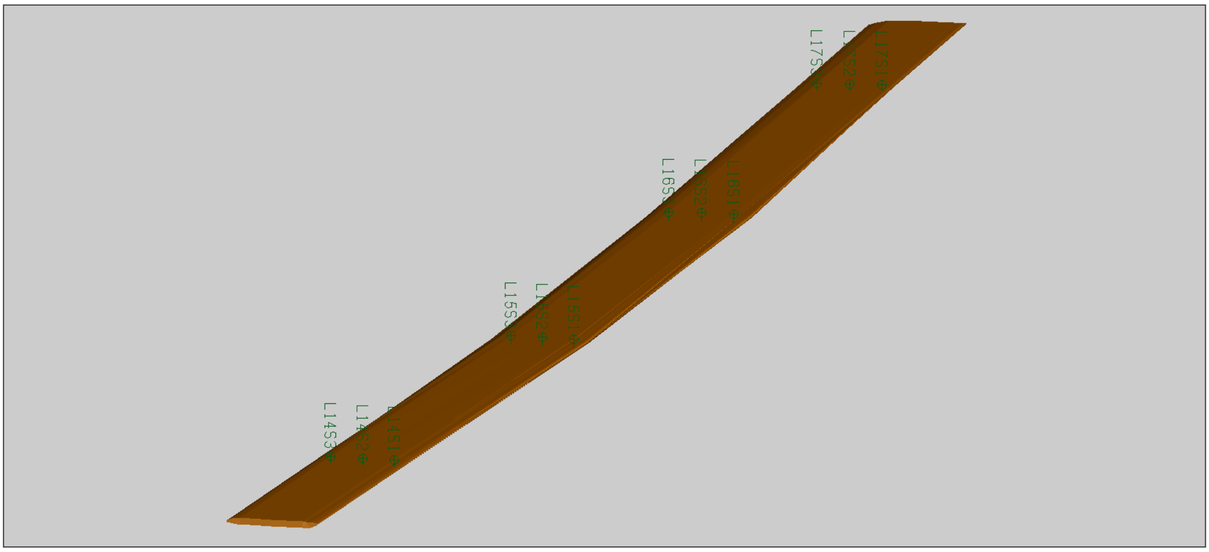
Solids modelled of the southern section of the Sea Concession 2A surf zone deposits showing sample lines and sample numbers. The volume calculations were done using the volumes of these solid models. The volume of the southern section solid is 1 480 025 m^3.







Solids modelled of the northern section of the Sea Concession 2A surf zone deposits showing sample lines and sample numbers. The volume calculations were done using the volumes of these solid models. The volume of the northern section solid is 1 146 778 m^3.



Appendix II

JORC Table

Section 1 Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases, more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	• Sampling was undertaken using industry standard practices and consist of pit sampling using an excavator by Whale Head Minerals (Pty) Ltd. during late April to early May 2026. • All pits are vertical • A total of 30 samples were collected. • Of the 30 samples, a total of 18 were collected in the southern section while 12 samples were collected in the northern section. • The sample weight is about 20 kg. • To minimize sample contamination, the collected composite sediment samples were placed on a canvas cloth, while the shovel was cleaned with a wet cloth and water after every sample. • All pit and sample locations are mapped in WGS84 UTM zone 33S.
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• Not applicable.
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• To ensure the samples are representative, the excavated material was first mixed thoroughly and was followed by numerous repetitions of cone and quartering before the final composite sample were taken. • No apparent bias was noted between sample recovery and grade.
Logging	• *Whether core and chip samples have been geologically and*	• Not applicable.

Criteria	JORC Code explanation	Commentary
	geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies. • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in-situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• Dry samples at 60°C for 24 hours. • Rifle split original 20 kg sample into two 10 kg sub-samples. • One 10 kg sub-sample is further reduced and sent for analysis, the other is used for point count analysis and stored for reference. • Cone and quarter the one 10 kg sub-sample to obtain an approximately 6 kg sample. • Rifle split the 6 kg sample to two sub-samples of about 2 kg using a large splitter. • The 2 kg samples are sent to the laboratory for analysis. • At the laboratory, rifle split the 2 kg sample to obtain 250–350 g for pulverizing. • The 250–350 g split was pulverized to 75 µm, with more than 85% of the material passing the 75 µm mesh. • Approximately 18 g of pulverized material was then weighed analysis. • Creo believes the sample size is appropriate to the grain size of the material sampled.
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	• The samples were analysed at Scientific Services, Cape Town, South Africa. • The samples were analysed via ICP-OES analysis. • The QAQC samples consisted of African Minerals Standards (Pty) Ltd.'s (AMIS) certified reference materials AMIS0774, AMIS0833, AMIS0845 and AMIS0794. Every seventh sample included one standard and one field duplicate, with blanks inserted at regular intervals. • Light Deep Earth laboratory in Pretoria, South Africa served as the umpire laboratory and performed QEMSCAN assay work on the samples. • The point count analysis was conducted by Creo.

Criteria	JORC Code explanation	Commentary
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• All samples and data were verified by the project geologist. • Creo reviewed all available sample and assay reports and is of the opinion that the electronic database supports the field data in almost all aspects and suggests that the database can be used for resource estimation. • All sample material was bagged and tagged on site as per the specific pit it was located in. The sample were weighed at the sampling site. • All hard copy data-capturing was completed at the sampling locality. • All sample material was stored at a secure storage site. • The original assay data has not been adjusted. • Recording of field observations and that of samples collected was done in field notes and transferred to an electronic database following the Standard Operational Procedures. • No twin pits were excavated.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• The locations of all the samples were recorded. • The sample locations are GPS captured using WGS84 UTM zone 33S. • The GPS used is a Garmin GPS map 67i. it has an accuracy of 2m using its multi-band GNSS (GPS, Galileo, QZSS) receiver.
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• In the southern section the sample spacing is on a 30m x 450m grid and in the northern section on a 30m x 500m grid. • The data spacing and distribution of the pits and samples is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied. • At each sample location one composite sample were collected that is representative of the entire pit.
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• All the pits were excavated vertical and perpendicular to the sediment horizons and a composite sample representing all the horizons were collected. • The orientation of the sampling is unbiased. • The relationship between the sampling orientation and the orientation of key mineralized structures is not considered to have introduced a sampling bias.

Criteria	JORC Code explanation	Commentary
Sample security	• *The measures taken to ensure sample security.*	• Whale Head Minerals (Pty) Ltd maintained strict chain-of-custody procedures during all segments of sample handling, transport and samples prepared for transport to the laboratory are bagged and labelled in a manner which prevents tampering. Samples also remain in Whale Head Minerals (Pty) Ltd control until they are delivered and released to the laboratory.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• Audits and reviews were limited to the Standard Operational Procedures in as far as data capturing was concerned during the sampling. • Creo considers that given the general sampling programme, geological investigations and check assaying, the procedures reflect an appropriate level of confidence.

Section 2 Reporting of Exploration Results

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	• The Sea Concession 2A project is situated in the extreme north-western corner of the Northen Cape Province, Republic of South Africa, some 23 km north of Port Nolloth. • The Sea Concession 2A Mining Right area forms part of the Alexkor diamond mining Sea Concessions and is by flanked by the Alexkor land mine areas to the east. • The total legal tenure over the Alexkor mine covers an area of 84 583 ha in the form of a mining right issued by the Department of Mineral Resources and Energy in December 2000. • Ownership in terms of surface rights of the largest part of the property, Farm 1 and Farm 155, is held by the Richtersveld Sida Hub Communal Property Association. • WHM applied for a heavy mineral Mining Right with the South African Department of Mineral Resources and Energy within Sea Concession 2A the Alexkor Sea Concessions. • The total area of the application area is 3 012.95 ha.

Criteria	JORC Code explanation	Commentary
		• WHM negotiated a general access and land use agreement with Alexkor RMC JV in 2020, before mine activities commenced at its Walviskop Mine Permit area. This agreement also covers the 2A Sea Concession and adjacent onshore areas.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• No exploration was conducted at Sea Concession 2A by other parties.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• It is a heavy mineral sand (near shore) marine placer deposit. • The area substrate geology comprises crystalline Precambrian rock of the Gariep Supergroup overlain by unconsolidated and semi-consolidated Cenozoic sediments. • The near shore sediment profile at Sea Concession 2A comprises a marine gravel layer resting on a gently seaward sloping bedrock platform. Here the gravel layer in turn is overlain by a medium to coarse grained beach/shallow marine sand layer. Heavy mineral mineralization occurs predominantly in this near shore sand unit. • The bed rock floor on the platform is a very uneven surface with gullies, potholes and large boulders (> 400 mm in diameter) in places. • The sand comprises a ~50 – 50 mix of course to medium grained quartz sand, broken shell material and heavy minerals as a compact well packed sand layer. • Valuable heavy minerals mineralization developed predominantly in the sandy beach deposits where very high-grade zircon-ilmenite-garnet-rutile-monazite resources formed at the well-developed south facing log spiral bays and is supplied by longshore drift. • Heavy mineral deposits are being enriched by selective entrainment through the removal of light minerals.
Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* ○ *easting and northing of the drill hole collar* ○ *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* ○ *dip and azimuth of the hole* ○ *down hole length and interception depth* ○ *hole length.*	• The sample pit details results have been described in section 8.2 of this report. • All relevant data is included in the report.

Criteria	JORC Code explanation	Commentary
	• *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of high-grade results and longer lengths of low-grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• A zero cut-off was used for all the relevant heavy minerals. The estimated volumes and grades are based on this cut-off grade.
Relationship between mineralisation widths and intercept lengths	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* • *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	• The pits were all excavated vertical, with the sand units being horizontal. • The sand thickness intercepted range from 4.5 m to 8.9 m. Individual HM layers were not measured.
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• The appropriate diagrams and tabulations are supplied in the main report.
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable representative reporting of both low and high grades and/or widths should be practiced avoiding misleading reporting of Exploration Results.*	• This report has been prepared to present the prospectivity of the project and results of historical and recent exploration activities. • All the available reconnaissance work results have been reported.
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	• There is no other exploration data available for Sea Concession 2A.
Further work	• *The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).*	• It is recommended that future exploration and sampling campaigns transition to a purpose-designed marine dredging framework to

Criteria	JORC Code explanation	Commentary
	• *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	expand the current resource footprint. • See section 15 for detailed recommended and planned further exploration activities.

Section 3 Estimation and Reporting of Mineral Resources

Criteria	JORC Code explanation	Commentary
Database integrity	• *Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* • *Data validation procedures used.*	• Creo has independently verified the underlying sampling and assay data. • Creo is of the opinion that the electronic database supports the field data in almost all aspects and suggests that the database can be used for resource estimation.
Site visits	• *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* • *If no site visits have been undertaken indicate why this is the case.*	• Johan Hattingh the competent person conducted several site inspections visits between 2016 and 2026 to Sea Concession 2A. During these visits, first hand field surveys were performed, and discussions were held with key on-site and head office personnel.
Geological interpretation	• *Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* • *Nature of the data used and of any assumptions made.* • *The effect, if any, of alternative interpretations on Mineral Resource estimation.* • *The use of geology in guiding and controlling Mineral Resource estimation.* • *The factors affecting continuity both of grade and geology.*	• Creo considers that the quantity and quality of the sampling, sample preparation and handling is sufficient to declare the Mineral Resource to the level of confidence implied by the classification used in the report. • The inclusive approach adopted in the declaration of mineral resources and mineral reserves is a consequence of the ability to predict even over long distances the extent and grade of the deposit due to the simple lithological composition and mineralisation style and the correct interpretations thereof.
Dimensions	• *The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	• The resource has a total area of 428 634 m^2. • The sediment resource extends from the surface to depths of 4.5 m to 8.9 m depending on the bedrock morphology.

Criteria	JORC Code explanation	Commentary
Estimation and modelling techniques	• *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.* • *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* • *The assumptions made regarding recovery of by-products.* • *Estimation of deleterious elements or other non-grade variable of economic significance (eg sulphur for acid mine drainage characterisation).* • *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.* • *Any assumptions behind modelling of selective mining units.* • *Any assumptions about correlation between variables.* • *Description of how the geological interpretation was used to control the resource estimates.* • *Discussion of basis for using or not using grade cutting or capping.* • *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	• The sampling data were loaded into the Surpac™ software package, which were used for the modeling and estimation. • Preliminary modelling provides a visual check that the sample pit plot correctly on the survey plan and values are displayed correctly. • Geostatistical analysis of grade variation was performed by using variography during estimations of grades and tonnages. Due to the stratiform nature, good continuity of geology and mineralization, only inverse distance weighting to the second order (IDW2 in 2D) with a 25 m cell size and an initial 100 m search radius was applied as the primary interpolation method. • The IDW2 was used to interpolate (1) the surf zone sediment thickness, (2) the average grade of the surf zone sediment. • The survey area was divided into 50 m x 50 m polygon blocks, which were individually numbered and assigned the respective average interpolated values of (1) and (2) over the areas which they cover. The volume of any 50 x 50 m block is estimated based on (1). The tonnage of an estimated block is estimated on (5) *50m*50m*(average beach sediment density of 2.532 ton/m3). The estimated contained THM content (in tonnes) for each block was calculated by tonnage. • A zero cut-off was used for all the relevant heavy minerals.
Moisture	• *Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	• Moisture was not considered during tonnage estimation.
Cut-off parameters	• *The basis of the adopted cut-off grade(s) or quality parameters applied.*	• A zero cut-off was used for all the relevant heavy minerals.
Mining factors or assumptions	• *Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	• No assumptions have been made.

Criteria	JORC Code explanation	Commentary
Metallurgical factors or assumptions	• *The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	• No assumptions have been made.
Environmental factors or assumptions	• *Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	• No assumptions have been made.
Bulk density	• *Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* • *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* • *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	• No bulk density measurements were conducted. • Average beach sediment density of 2.532 ton/m^3 were used for resource estimation.
Classification	• *The basis for the classification of the Mineral Resources into varying confidence categories.* • *Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* • *Whether the result appropriately reflects the Competent Person's view of the deposit.*	• The Whale Head Minerals (Pty) Ltd exploration area in Sea Concession 2A is classified as an Inferred Mineral Resource. • The results reflect the Competent Person's view of the deposit.

Criteria	JORC Code explanation	Commentary
Audits or reviews	• *The results of any audits or reviews of Mineral Resource estimates.*	• Creo has independently verified the underlying sampling and assay data as well as the resource modelling and where possible also the resource calculations. Creo considers that given the general sampling programme, geological investigations, independent check assaying and, in certain instances, independent audits, the estimates reflect an appropriate level of confidence.
Discussion of relative accuracy/ confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* • *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* • *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	• Creo considers that the quantity and quality of the sampling, sample preparation and handling is sufficient to declare the Mineral Resource to the level of confidence implied by the classification used in the audited Mineral Resource estimate given in this report.