

AOI_ECEF764B

Generated 31 May 2026 · Focused — ree

Ree Prospectivity Assessment: Durack REE

*Focused-mode summary. Commodity: **Rare Earth Elements**.*

- **Type:** Area of Interest
- **Reports processed:** 50 A-numbers
- **Verdict:** Prospectivity: Moderate | Exploration maturity: Moderate | Priority: Follow-up

0. Geological Setting

The area lies within the Proterozoic Kimberley Basin, underlain by the Carpentarian Kimberley Group [A100247 (2013), A92141 (2011)]. The basal King Leopold Sandstone is overlain by the Carson Volcanics and the Warton Sandstone [A92141 (2011)]; associated units include the Pentecost Sandstone and the Elgee Siltstone, the latter containing the Teronis Member [A100247 (2013), A86979 (2010)]. Conglomeratic intervals occur within the King Leopold and Warton sandstones [A86979 (2010)], and a pyritic banded chert marker is present in shale above the upper basalt of the Carson Volcanics [A1723 (1971)]. Broader regionally mapped units include the Speewah Sandstone, Whitewater Volcanics and the Bastion Group [A89212 (2011)].

Intrusive rocks comprise the Hart Dolerite and Fish Hole Dolerite, accompanied by granophyre and diorite phases [A89212 (2011), A9674 (1981), A60461 (1971), A720 (1971)]. The Lamboo Complex represents older basement lithologies [A9674 (1981)], and kimberlitic dykes have been identified in the district, including within the Chamberlain project [A70408 (2005)].

Faulting dominates the structural framework; faults are widely documented and are commonly associated with brecciation [A73095 (2006), A1723 (1971), A60461 (1971)]. Lateritic weathering has affected the Carson Volcanics basalt [A1723 (1971)].

1. Commodity Evidence

Direct evidence for rare earth element (REE) minerals exists across several historical reports. Florencite - a cerium-aluminium phosphate with the formula $CeAl_3(PO_4)_2(OH)_6$ - was identified by X ray diffraction as the dominant radioactive mineral in conglomerate samples from the area [A6033 (1968)]. Electron probe microanalysis confirmed the presence of cerium and lanthanum in these grains. Monazite, another REE phosphate, is recorded as the principal uranium and thorium bearing mineral in the matrix of the uraniferous conglomerates of the King Leopold Sandstone [A28 (1970)]. Petrological work on the "purple sandstone" sequence describes titanhematite monazite zircon sandstones, with monazite concentrates assaying up to 5.8% Th and 0.27% U, though the total rare earth oxide content of this monazite is noted to be lower than average

due to huttonite substitution [A60787 (1969)]. Yttrium (6 2640 ppm) is also reported in the purple sandstone, indicating the presence of heavy REE as well.

The area therefore contains at least two REE bearing mineral species (monazite and florencite) in heavy mineral concentrations hosted by conglomeratic and sandy units. No modern multi element REE assays are available in the harvested data; the geochemistry provided focuses on thorium and uranium, which are pathfinders but not direct measures of rare earth content.

2. Structural & Mineralisation Controls

REE mineralisation in this region is stratabound and controlled by sedimentary processes. The primary host is the King Leopold Sandstone, a fluvial to shallow marine quartz rich unit within the Palaeoproterozoic Kimberley Basin. Two uraniferous conglomerate members - a basal conglomerate and an upper conglomerate - have been traced over considerable strike lengths. The basal conglomerate reaches 15 feet thickness with boulders up to 15 inches, while the upper member is more persistent, varying from 2 3 feet to 80 feet thick, and contains pebbles predominantly of quartz [A28 (1970)]. Radioactivity and thorium uranium enrichment are most pronounced in well sorted, pebble rich horizons, suggesting a placer concentration mechanism where heavy minerals such as monazite and florencite were deposited together with zircons and other resistates.

Supergene processes are also implicated. Florencite is known to form in weathering environments, and its occurrence as oolites and grain coatings indicates remobilisation of REE bearing phosphates during lateritisation or groundwater flow [A6033 (1968)]. The purple sandstones show alteration of titanhematite to anatase, and the presence of florencite as a cement or replacement further supports post depositional REE redistribution. This dual control - primary sedimentary concentration of heavy minerals, followed by supergene phosphate precipitation - could enhance REE grades in specific redox or chemical boundaries, though no dedicated leach cap testing is recorded.

There is no direct mention of carbonatite or alkaline intrusion related REE mineralisation in the reports, despite the proximity of the Hart Dolerite and Carson Volcanics. If the source rocks for the detrital monazite were such intrusions, the placer deposits in the King Leopold Sandstone represent the downstream detrital expression of a potentially larger primary system. The area's structural architecture, with fault bounded blocks and steep dips (up to 30°) in places, may have localised heavy mineral traps, but no structural controls beyond bedding and palaeochannel orientations are described.

3. Historical Work Performed

- **A6033 (1968):** Airborne scintillometer magnetometer survey over the Kimberley region, followed by ground checking. Radioactive conglomerate samples were analysed mineralogically, identifying florencite as the REE bearing phase.
- **A28 (1970):** Detailed mapping of the Durack Ranges, tracing the uraniferous conglomerate members for over 50 miles. Diamond drilling (DDH DR1 to DR3) tested down dip extensions of the conglomerates, with assays showing an average 31 ppm U in drill core versus <10 ppm at surface, and a lower Th/U ratio at depth, hinting at possible supergene leaching. Monazite was confirmed in the conglomerate matrix.

- **A60787 (1969):** Petrological study of the purple sandstone sequence, classifying three rock types. Heavy mineral concentrates were prepared; monazite and zircon were identified as the main U Th carriers. Whole rock assays for the purple sandstone (58 samples) gave U 1 1360ppm, Th 9 20370ppm, Y 6 2640ppm, and TiO₂ 0.8 24.0%. Mineral separate assays yielded ThO₂ contents higher than average for monazite due to huttonite substitution.
- **Later exploration (post 2007):** Reports from A83048, A86979, A86980, A89212, and A92141 focused on copper, gold, uranium, and mineral sands. Drilling in A92141 (9 holes, max depth 178m) targeted copper, not REE. Rock chip and soil sampling in those programmes recorded Th values up to 50ppm and U up to 10ppm, which are low relative to the earlier concentrate grades. No REE specific analytical work is evident in the harvested data.

4. Extracted Signals

Structured geochemical data from the tenure pack and GSWA harvested files reinforce the copper and uranium focus but offer limited direct REE information. Soil samples from A86980 return maximum Th of 50ppm and U of 10ppm, while rock chip samples from the same programme show Th up to 50ppm (sample DUR10017). These values are consistent with a low level radiometric signature but do not indicate economic REE without accompanying Ce, La, Nd, etc. assays. The high Th values in earlier concentrate work (5.8% Th in monazite) imply that where heavy mineral sands are concentrated, REE grades could be significant; however, the bulk sample grades (e.g., 9 20370ppm Th in whole rock purple sandstone) suggest dilution by quartzose sand.

In the A92141 drilling, downhole base metal assays (Cu up to 8400ppm, Zn up to 340ppm) and elevated Ag (up to 8ppm) are clearly associated with copper bearing veins and not the sedimentary heavy mineral horizons. No Th or U assays are reported from that drilling. The known mineral occurrence [MINEDEX S0030002] (Durack Ranges 10) is classified as a heavy mineral and uranium occurrence, confirming that detrital heavy mineral concentrations are recognised in the area.

Soil geochemistry from A92141 shows anomalous Au (up to 79ppb) and Cu (up to 3133ppm) in the southern part of the area, which may reflect a different mineralisation style unrelated to REE.

5. Prospectivity Assessment

The area holds tangible REE prospectivity based on the confirmed presence of monazite and florencite in sedimentary placer deposits. The King Leopold Sandstone and the purple sandstone unit contain extensive, stratiform heavy mineral enrichments that have already been shown to carry REE bearing phosphates. The historical data indicate that monazite is the main host in the conglomerates, while florencite dominates in some supergene altered zones, providing two complementary REE traps. The potential for ionic clay REE deposits in deeply weathered profiles above the sandstone or in adjacent lateritic terrains is not tested, though supergene remobilisation is evident.

However, the exploration maturity for REE is low. None of the past programmes included a systematic multi element REE analytical suite; the focus was uranium and thorium. The most relevant data are now over 50 years old and were generated primarily for uranium assessment. The area has seen extensive drilling for copper (e.g., DDH DR4, DR5, DR23) but no drilling specifically targeting the heavy mineral horizons with modern REE analysis. The lack of any REE assay data in the harvested

records means that the true grade and distribution of LREE and HREE remain unknown. The area's proximity to alkaline igneous rocks (Carson Volcanics) and possible carbonatite sources is speculative but could represent an unexplored primary source.

Given the large footprint of the favourable sandstone and conglomerate units, a targeted programme of heavy mineral concentrating and REE analysis, combined with mapping of the palaeoplacer horizons, is warranted. The presence of florencite as a supergene phosphate suggests that in situ leaching or weathering profiles might also merit investigation.

Recommended Next Steps: - Re sample the known radioactive conglomerate and purple sandstone outcrops, prepare heavy mineral concentrates, and analyse for full REE suite (LREE and HREE) plus Y, Th, U to establish baseline grades. - Compile and digitise the historical scintillometer and mapping data to define the most continuous heavy mineral trends, especially the upper conglomerate marker unit traced for over 50 miles [A28 (1970)]. - Conduct a reconnaissance stream sediment heavy mineral survey over the broader drainage, with microprobe analysis to identify any monazite or xenotime that may indicate an upstream alkaline intrusion source. - If concentrate grades are encouraging, undertake shallow drilling (auger or RC) across the best defined palaeoplacer horizons, with systematic downhole gamma logging and multi element geochemistry to test thickness and continuity.

Tenement Context: AOI Report (~36 blocks, 1 tenements)

Generated: 31/05/2026

This context is generated by the NextMaps pipeline from SLIP public data and the NextMaps register. It supplements the WAMEX report corpus. For full due diligence data including tenure history, expenditure compliance, and spatial datasets, see the Tenure Pack at nextmaps.com.au.

Tenement Timeline

Historical tenure on this ground — shows who explored here, for how long, and what happened.

Timeline Summary — 33 historical

- Unique holders: 23 · Avg duration: 2.0 yrs · Oldest record: 12 Feb 1976
- Status: Withdrawn (13) | Surrendered (11) | Forfeited (6) | Cancelled (2) | Refused (1)

Most active holder: WHIRLIGIG PTY LTD (4 tenements) **Longest tenure:** 4.1 yrs — P 80/1303 (WHIRLIGIG PTY LTD)

Tenement	Status	Holder	Start	End	Overlap
E 80/6165	Withdrawn	EXMAPS PTY LTD	4 Aug 2025	6 Oct 2025	98%
E 80/5951	Withdrawn	OAKOVER RESOURCES PTY LTD	3 Aug 2023	26 Jun 2025	59%
E 80/5886	Withdrawn	GREENROCK METALS PTY LTD	9 Dec 2022	9 Jun 2023	6%
E 80/5625	Withdrawn	PEAK MINERALS LIMITED	12 May 2021	19 Jan 2023	16%
E 80/5626	Withdrawn	PEAK MINERALS LIMITED	12 May 2021	19 Jan 2023	81%

...and 28 earlier tenements not shown — see Tenure Pack for full history.

Context sourced from DMPE SLIP WA public datasets and NextMaps register. Verify against primary sources before reliance.