Durack HMS

Generated 29 May 2026 · Focused — heavy_mineral_sands

Heavy Mineral Sands Prospectivity Assessment: Durack HMS

> *Focused-mode summary. Commodity:* ***Heavy Mineral Sands****.*

- **Type:** Area of Interest
- **Reports processed:** 53 A-numbers
- **Verdict:** Prospectivity: Low | Exploration maturity: Moderate | Priority: Not recommended

0. Geological Setting

The area is situated within the Proterozoic Kimberley Basin, underlain by the Carpentarian Kimberley Group [A95199 (2012), A100247 (2013)]. The stratigraphy consists of a thick succession of sedimentary and volcanic rocks, with the basal King Leopold Sandstone overlain successively by the Carson Volcanics, Warton Sandstone, Elgee Siltstone, and Pentecost Sandstone [A100247 (2013), A89212 (2011), A92141 (2011)]. Additional regionally mapped units include the Speewah Sandstone, Whitewater Volcanics, and Bastion Group [A89212 (2011)]. At a more local scale, formations such as the Lansdown arkose, Valentine siltstone, and a diabase member have been recorded [A60461 (1970)]. Intrusive rocks are dominated by the Hart Dolerite, a widespread mafic suite that locally develops a granophyre member [A9674 (1981), A60461 (1970)]. Other intrusive lithologies intersected include granophyre, dolerite, and diorite [A720 (1971)]. The structural framework is characterized by faulting and lineations [A60461 (1970), A1723 (1971)], with localised brecciation developed along fault zones [A73095 (2006)]. Sedimentary units include heavy mineral bands and pyritic chert layers within shale and sandstone [A1723 (1971)]. No regional metamorphism has been documented in the provided reports.

1. Commodity Evidence

Descriptions of heavy mineral concentrations in this region come almost entirely from bedrock hosted accumulations, not from coastal or aeolian placer sands. The most detailed account is a petrological study of the "purple sandstone" at the top of the Carson Volcanics, which describes titanhematite monazite zircon sandstone seams with uranium and thorium [A60787 (1969)]. Monazite and zircon occur as rounded sand sized grains, and anatase ("leucoxane") forms a cement derived from altered titanhematite. This is a lithified sedimentary unit with elevated Ti, U and Th, but it is not a modern unconsolidated heavy mineral sand deposit.

In the surrounding river systems, reconnaissance stream sediment sampling at The Gut (Wyndham) showed 0.5 - 2% heavy minerals, predominantly ilmenite/leucoxene with minor zircon and monazite in old strand lines [A60460 (1970)]. Closer to the area, auger sampling of alluvial sands in the NW Speewah Valley (Pentecost River) returned total heavy mineral contents up to 92.2%, but the bulk of

the heavy fraction is titanomagnetite with only minor ilmenite exsolution lamellae; discrete ilmenite is typically <1 % and rutile was not identified [A60462 (1970), A60584 (2000)]. Zircon is present only in trace amounts. Despite a relatively high titanium content (up to 4.62 % TiO_2), the mineralogy is dominated by magnetic iron titanium oxides rather than the valuable suite of rutile, zircon, and high grade ilmenite required for economic HMS operations.

The recorded mineral occurrence Durack Ranges 10 [MINEDEX S0030002] is classified as a heavy mineral (HM) and uranium occurrence, almost certainly representing the purple sandstone horizon. However, later explorers noted that "heavy mineral deposits" were pursued without delineating any deposits of note [A100618 (?), A89212 (2011)]. No significant volume of unconsolidated, heavy mineral enriched placer sand has been reported.

2. Structural & Mineralisation Controls

The prospectivity for typical coastal or aeolian heavy mineral sands is negligible, because the area lies well inland, in an erosional terrain of rugged sandstone and volcanic hills. The modern drainages are entrenched, and there is no evidence of preserved beach or dune systems capable of concentrating economic HMS placers.

The only potential heavy mineral target is stratabound and sedimentary, controlled by the position of the purple sandstone at the top of the Carson Volcanics (the basal unit of the Warton Sandstone). This horizon hosts titanhematite monazite zircon laminae, the result of primary heavy mineral accumulation during deposition of the sandstone. The heavy minerals are fine grained (average 0.13 - 0.15 mm), and the horizon is limited in thickness. Structural dips (12° to the west) and faulting have not been implicated in any secondary enrichment of these strata, and no evidence of surficial upgrading or placer re concentration has been reported.

3. Historical Work Performed

Early exploration between 1968 and 1971 by Planet Mining Company and Planet Management & Research included wide ranging reconnaissance for copper, uranium and heavy minerals. Specific HMS focused work comprised: - Petrological and mineralogical analysis of purple sandstone samples, with chemical assays for U, Th, and Ti [A60787 (1969)]. - Stream sediment sampling and auger drilling of alluvial sandbars along the Pentecost River and in the Speewah Valley [A60460 (1970), A60462 (1970), A60584 (2000)]. - Heavy mineral separations and optical examinations, which consistently identified titanomagnetite/ilmenite as the dominant heavy species, with accessory zircon and monazite, and a general absence of rutile [A60459 (1970), A60584 (2000)]. - Field reconnaissance by subsequent explorers that noted the "heavy mineral (monazite, zircon, anatase) seams in purple sandstones at the top of the Carson Volcanics" as one of five prospect types, but with no follow up work specifically targeting HMS [A100618 (?), A109121 (2016)].

Ground disturbing work for other commodities (e.g., diamond drilling for copper by Pegasus Metals [A92141 (2011)]) has not included HMS specific drill testing. No systematic grid based heavy mineral sampling or resource estimation for HMS has been conducted.

4. Extracted Signals

Structured geochemical data from tenure pack downloads and GSWA submissions provide limited and indirect vectors for HMS. Rock chip samples in the area show elevated Th (up to 50 ppm) and U (up to 10 ppm), suggesting the presence of monazite or uranothorite in the stratigraphic sequence [A86979 (2010), A89212 (2011)]. However, these samples were collected primarily for base metal assessment, not for HMS, and no accompanying Ti, Zr, or Hf assays exist. The few soil traverses show comparable Th and U values without defining coherent heavy mineral dispersion trails.

Drillhole data from copper focused programs [A92141 (2011)] logged sandstone, basalt, and mixed volcanic sedimentary lithologies but did not assay for Ti, Zr or heavy mineral indicators. Stream sediment surveys from 1969 - 1970 reported Cu, Zn, Ni, Co, and Pb, but not HMS relevant elements [A28 (1970)]. Consequently, the structured data cannot be used to delineate HMS targets or evaluate placer potential.

The only direct mineralogical evidence comes from the 1970s auger studies, which confirm the prevalence of titaniferous magnetite rather than economic ilmenite, zircon, or rutile in alluvial deposits [A60462 (1970), A60584 (2000)]. This signal does not support a conceptual HMS placer model.

5. Prospectivity Assessment

The area lacks the essential ingredients for a conventional heavy mineral sand deposit. There is no palaeo coastal or aeolian sand system of significant thickness or lateral extent. The only recorded heavy mineral enrichment is in indurated sandstone, which would require crushing and complex mineral separation techniques to recover monazite, zircon, and possibly anatase - a concept far removed from typical mineral sand mining. Alluvial deposits examined to date are dominated by titanomagnetite with very low discrete ilmenite and insignificant rutile and zircon contents. The grades observed (e.g., <1 % ilmenite, <0.05 % zircon) fall below economic thresholds for modern HMS operations.

Later stage explorers concluded that no economic heavy mineral deposits had been delineated [A89212 (2011), A109121 (2016)], and no further work on HMS has been proposed. The presence of thorium and uranium in the purple sandstone adds a complicating factor that may be of interest for uranium/thorium exploration, but that lies outside the scope of heavy mineral sands.

Recommended Next Steps: - No further work for heavy mineral sands is recommended. The geological setting and the mineralogical character of the known heavy mineral occurrences are entirely unsuited to economic placer HMS. - If there is interest in the monazite zircon anatase purple sandstone as a possible uranium thorium resource, a separate assessment of that commodity should be commissioned, but it would not be a mineral sand target. - For completeness, a modern hyperspectral or portable XRF traverse over the Carson Volcanics - Warton Sandstone contact could verify the lateral continuity of the monazite zircon horizon, but only within a hard rock mining concept.

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

Generated: 29/05/2026

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	58%
E 80/5886	Withdrawn	GREENROCK METALS PTY LTD	9 Dec 2022	9 Jun 2023	5%
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	80%

...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.