

Australian Garnet Lucky Bay Project

Targeted Threatened and Priority Flora Survey

Prepared for Mineral Resources Limited

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EXECUTIVE SUMMARY

In August 2025, Botany Lens was engaged by Mineral Resources Limited to conduct a targeted flora survey at the Australian Garnet Lucky Bay Project, located approximately 35 km south of Kalbarri in the Shire of Northampton. The survey builds on previous assessments undertaken in 2024 and contributes to a growing dataset of flora records compiled since 2008. Its purpose is to support environmental approvals for ongoing operations across mining tenements M70/1280, M70/1387, and L70/0215.

The 2025 survey focused on 39 hectares of remnant, regenerating, and planted native vegetation, with particular attention to areas previously unsurveyed due to safety constraints. Historical aerial imagery indicates that approximately 75% of native vegetation within the proposed disturbance envelope is regrowth following agricultural clearing in the 1980s.

Fieldwork was conducted over two days in September 2025, timed to coincide with peak flowering and undertaken in accordance with relevant Commonwealth and State legislation, including the EPBC Act, BC Act, and EPA Technical Guidance. A total of 36.5 hectares were surveyed using systematic foot traverses and meander techniques, with approximately 18 km walked across Sites 1 and 2.

Desktop assessments identified 21 Threatened and 113 Priority flora taxa within a 40 km radius of the project area. Of these, six Threatened and 19 Priority taxa were assessed as 'likely' to occur within the study areas seasonally wet claypan and coastal dune system. No Threatened flora were recorded during the survey. The Priority species *Frankenia confusa* (P4), previously documented in the claypan of Site 2, was re-identified as the widespread *Frankenia pauciflora*, with confirmation provided by botanists at the Western Australian Herbarium. Several other taxa assessed as 'likely' to occur based on habitat suitability and proximity were outside their flowering period, limiting detectability.

Vegetation condition varied across the survey area. Remnant vegetation at Site 1 supported higher native species diversity despite an understorey dominated by annual weeds. Regenerated areas showed lower diversity and greater weed burden but retained key native shrub species. Planted zones, including olive groves and eucalypt stands, were considered degraded, though some native regeneration was observed. Dense recruitment through fallen trees, annual weeds, and a stoloniferous native grass (*Sporobolus virginicus*) constrained visibility but also created poor habitat conditions for small herbaceous species such as orchids.

This report documents the methods, findings, and implications of the 2025 survey and is intended to inform the environmental impact assessment process.

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1. Introduction

In August 2025, Botany Lens was commissioned by Mineral Resources Limited to undertake a targeted survey for conservation-significant flora at the Australian Garnet Lucky Bay Project (the Project). This survey builds upon work conducted in August and September 2024 and supports environmental approvals required for the Project's ongoing operations.

1.1 Location

The Project is located west of George Grey Drive, approximately 35 km south of Kalbarri in the Shire of Northampton and 460 km north of Perth. It encompasses mining tenements M70/1280 and M70/1387, along with associated infrastructure tenements (Map 1). These tenements span approximately 1,645 hectares, including around 640 hectares of native vegetation; the remainder comprises cleared agricultural land.

The 2025 survey focused on areas within tenements M70/1280 and L70/0215, covering 39 hectares of remnant and regenerating native vegetation (Map 2). Aerial imagery from the 1980s indicates that approximately 75% of native vegetation within the proposed disturbance envelope is regrowth following historical agricultural clearing (Botany Lens 2024).

1.2 Background

This survey contributes to a growing dataset on flora within the Project's proposed disturbance footprint. A Level 1 reconnaissance flora and fauna survey was conducted in part of the area in 2008 (Ecoscape 2009), followed by a Level 2 flora and vegetation survey in October 2013, which included the current survey area and surrounds (Onshore 2013). During the 2013 assessment, the entire study area was ground-truthed at intervals of less than 100 metres, with opportunistic records of conservation-significant flora collected.

In 2021, additional sampling was undertaken to expand coverage and revisit previously recorded locations of conservation-significant flora (Onshore 2022). Desktop assessments that year identified six Threatened flora taxa listed under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), along with 39 state-listed Priority flora taxa considered likely to occur within the broader Lucky Bay Garnet Project area. Notably, a population of the Threatened orchid *Caladenia bryceana* subsp. *cracens*—listed under both Acts—was recorded less than 1.5 km from suitable habitat within the Project area.

A targeted survey for Threatened and Priority flora, with a specific focus on *Caladenia bryceana* subsp. *cracens*, was conducted in August and September 2024 (Botany Lens 2024). While flowering individuals were observed at two nearby populations, intensive searches within suitable habitat in the Project area did not detect any individuals.

To date, no Threatened flora taxa have been recorded within the proposed disturbance footprint. However, three Priority flora species listed by the Western Australian Herbarium (WAH 1998–) have been identified: *Bossiaea calcicola* (P3), *Melaleuca huttensis* (P3), and *Frankenia confusa* (P4) (Map 2; Onshore 2013 & 2022; Botany Lens 2024).

Due to safety constraints near the active mining face, areas within the current clearing permit (CPS 9057 -1) were not surveyed in 2024. With the permit set to expire in 2026 and mining operations temporarily paused, the opportunity was taken to survey remaining vegetation. The survey area was expanded to include an area of remnant vegetation that remained uncleared during the 1980s. Although partially surveyed in 2024, this additional effort improves coverage in areas likely to support higher species diversity than previously cleared agricultural land. The survey also incorporated a revegetated area where native species regeneration is occurring and where *Frankenia confusa* was recorded in 2022, with the aim of delineating the population more precisely.

1.3 Scope of Works

This report documents the methods, results, and key findings of the 2025 targeted survey for Threatened and Priority flora conducted in September 2025. It is intended to support the environmental impact assessment for the Project.

Desktop assessments from 2022 (Onshore) and 2024 (Botany Lens) were reviewed, supplemented by new database searches to compile a list of species likely or potentially occurring in the area. A targeted field survey was conducted to detect conservation-significant flora previously recorded or considered likely to occur. A specific survey was also undertaken to delineate the population extent of *Frankenia confusa*.

Field surveys were conducted in accordance with the following Western Australian guidelines:

- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016a).
- *Draft – Survey Guidelines for Australia’s Threatened Orchids Guidelines for Detecting Orchids Listed as ‘Threatened’ Under the Environment Protection and Biodiversity Conservation Act 1999* Australia (Commonwealth of Australia 2013)
- *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b); and
- *Statement of Environmental Principles, Factors, Objectives and Aims of EIA* (EPA 2023)

Key legislation relevant to this survey includes:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Biodiversity Conservation Act 2016* (BC Act).
- *Biodiversity Conservation Regulations 2018*; and
- *Environmental Protection Act 1986* (EP Act).

Australian Garnet Lucky Bay Project

Location of mining
tenements and survey
area

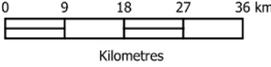
Legend

- Towns
- Highways
- Major Roads
- Survey Area
- Lucky Bay Mining Tenement Area



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CRS GDA2020 / MGA zone 50 EPSG:7850
Projection Universal Transverse Mercator (UTM)

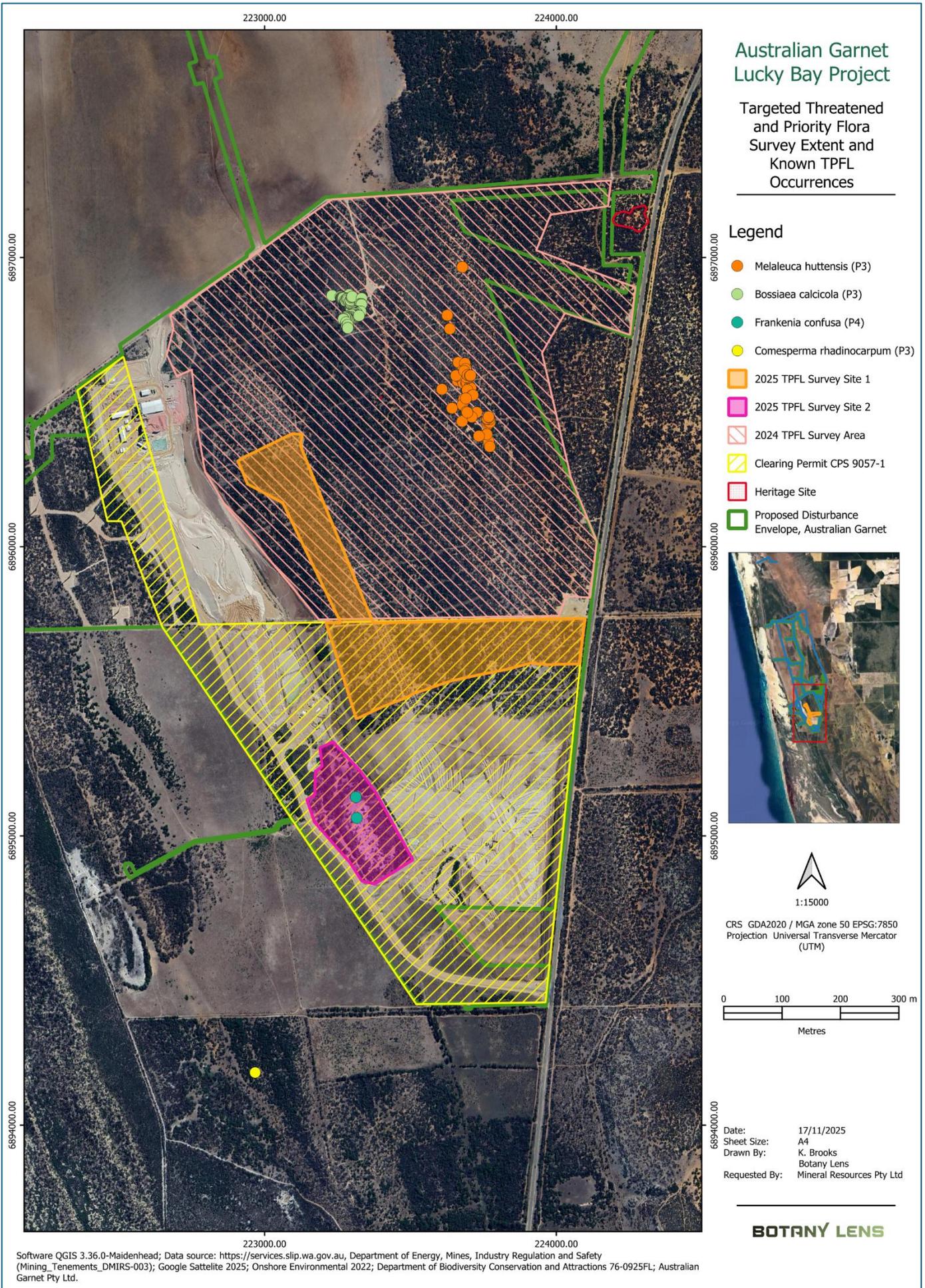


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Drawn By: K. Brooks
Botany Lens
Requested By: Mineral Resources Pty Ltd



Software QGIS 3.36.0-Maidenhead; Data source: <https://services.slp.wa.gov.au>, Landgate (Roads_Simplified_LGATE_195), Department of Energy, Mines, Industry Regulation and Safety (Mining_Tenements_DMIRS-003); Australian Garnet Pty Ltd.

Map 1. Location of Lucky Bay Garnet Project.



Map 2. Location of survey area and previous records of conservation significant flora.

2. Site description

2.1 Landscape characteristics

The Lucky Bay Project lies within the Geraldton Sandplains Bioregion and Geraldton Hills Subregion (DCCEEW 2012). Vegetation is broadly mapped as *Acacia rostellifera* Thicket (Greenough 17) on dunes (Beard 1976), a low closed forest type now considered rare due to extensive clearing (Desmond & Chant 2001).

The site features undulating coastal terrain approximately 1.8 km inland, with a primary vegetated dune running north–south parallel to the coast. Dune elevations range from 15 m to 75 m AHD. A central limestone ridge consists of exposed bedrock and 50–90% limestone cobbles, pebbles, and sand (Ecoscape 2009).

Soil-landscape mapping places the area within the Tamala North 1 subsystem (DAFWA 2003) and the Port Gregory Zone of the Carnarvon Province (Tille 2007), characterized by calcareous sand dunes, limestone outcrops, and coastal plains formed by Pleistocene aeolian processes.

2.2 Land Use and Significant Flora Distribution

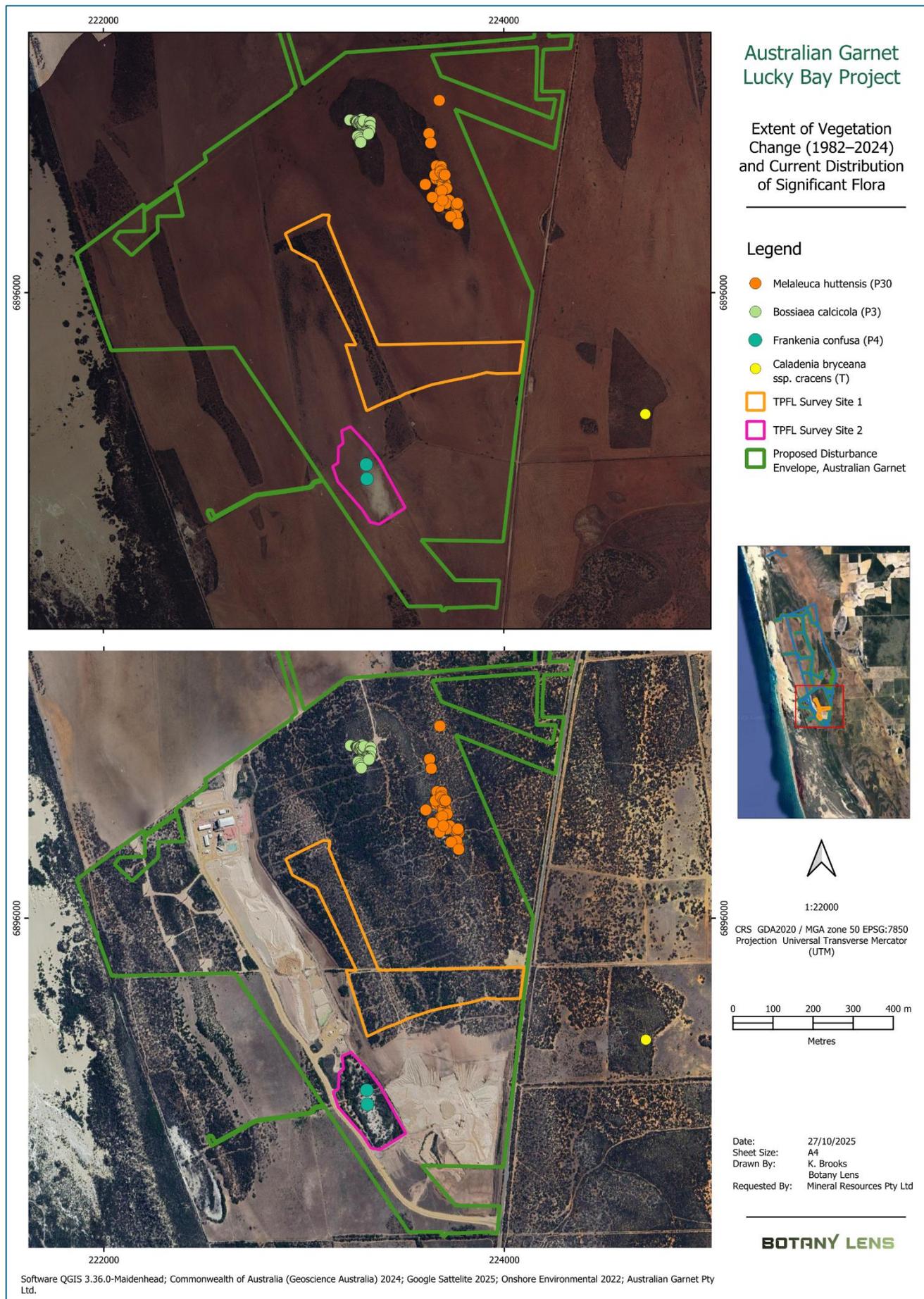
Aerial imagery from 1982 (Geoscience Australia 2024) indicates that much of the site had been cleared for agriculture (Map 3). By 1985, revegetation had started to occur (Landsat / Copernicus imagery - Google 2024), and by 2003, the area was largely vegetated. Imagery from 2024 has the appearance of uncleared vegetation (Map 3).

In the 1982 imagery, the remaining uncleared zones may represent pre-European vegetation remnants, although this cannot be confirmed without additional historical imagery. Two Priority flora taxa—*Melaleuca huttensis* and *Bossiaea calcicola*—were recorded exclusively within this remnant zone, with one exception. *Melaleuca huttensis*, being highly conspicuous, was specifically searched for at the location of the outlying record in 2024, but no individuals were found, suggesting a possible recording error. The nearby population of *Caladenia bryceana* subsp. *cracens* also occurs within an uncleared remnant. In contrast, *Frankenia confusa* was recorded by Onshore (2022) in a claypan area that had been fully cleared during the 1980s.

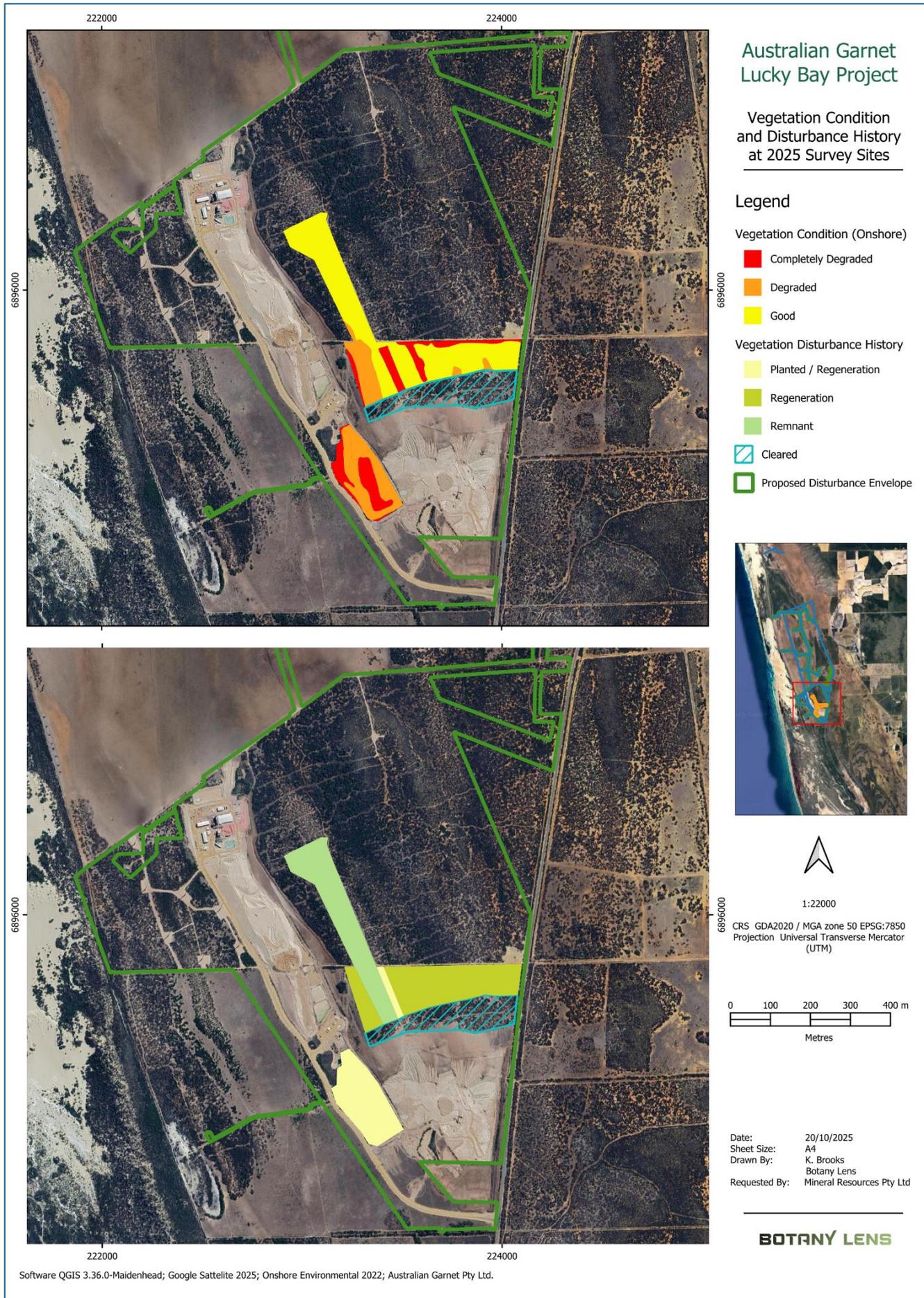
2.3 Vegetation Associations and Site Description

Vegetation mapping within the Lucky Bay Project area has evolved over successive surveys. In 2013, the site was classified into three structural vegetation types—*Acacia* High Shrubland, *Acacia* Shrubland to Open Scrub, and *Eucalyptus* Low Woodland—based on Aplin’s (1979, Appendix 1a) modification of Specht’s classification (Onshore 2013). In 2022, following additional mapping over an expanded survey area, vegetation mapping was consolidated across both surveys to follow Muir (1977, Appendix 1b). Within the study area vegetation was described as: *Acacia* Scrub, *Bromus* Open Low Grass, and *Eucalyptus* Low Forest A (Onshore 2022). Vegetation condition, assessed using Keighery (1994, Appendix 2), ranged from Completely Degraded to Good, with several cleared areas also identified (Map 4).

A comparison of 1982 clearing extent with current vegetation condition maps, suggests that historical clearing has had limited influence on present-day condition in remnant and spontaneously regenerated areas. In contrast, planted areas are consistently classified as Degraded to Completely Degraded (Map 4).



Map 3. Historical Land Use (1982–2024): Vegetation Clearing, Regeneration Extent, and Distribution of Recorded Threatened and Priority Flora within the proposed disturbance envelope and survey area.



Map 4. Vegetation condition delineated by Onshore 2022 and disturbance history showing vegetation origin and integrity across the targeted flora survey area.

2.3.1 Site 1

Site 1 features gently undulating terrain with low-gradient hillslopes and crest. Soils comprise sand with scattered limestone pebbles. The area has remained unburnt for over 20 years, with no fire scars visible in satellite imagery dating back to 2003 (Google, 2024). Widespread structural damage from Cyclone Seroja (April 2021) is evident across the site.

Remnant Vegetation (12 ha)

The remnant vegetation was classified as *Acacia* High Open Shrubland / *Acacia* Scrub and is dominated by *Acacia rostellifera* over a mixed open shrubland (Onshore 2013, 2022). Condition was assessed as Good, with some Degraded patches (Onshore 2013). At the time of the current survey, the understorey was dominated by introduced annual tussock grasses and forbs; however, native species diversity remained relatively high in comparison to surrounding areas (Plate 1).

Dominant native species include:

- *Stylobasium spathulatum*, *Pimelea microcephala*, *Alyogyne hakeifolia*, *Rhagodia preissii*, and *Rhagodia latifolia*

Species restricted to the remnant area include:

- *Pimelea sessilis*, *Scholtzia oligandra*, *Diplopeltis petiolaris*, *Dichopogon tyleri*, *Waitzia coymbosa*, *Goodenia berardiana*, *Opercularia spermacoea*, *Lysiandra calycina*, and *L. scabra*

Although annual weeds dominate the understorey, the remnant supports more open herbland patches and greater native species richness than adjacent regenerated areas.



Plate 1. *Acacia* scrub within the remnant vegetation at Survey Site 1, a shady area dominated by native herb *Goodenia berardiana* and *Dichopogon tyleri*, common, but only observed in the uncleared remnant.

Regenerated Vegetation (13.7 ha)

This area is classified as *Acacia* Shrubland to Open Scrub and *Acacia* High Shrubland, transitioning to *Acacia* Scrub and *Bromus* Open Low Grass. It was assessed as being in Good condition in 2013, with some Degraded to Completely Degraded patches. However, native species diversity is low, and the understorey is heavily impacted by annual weeds (Plate 2). Site condition is more aligned with Poor as classified by Trudgen (1988, Appendix 2).

Dominant species include:

- *A. rostellifera*, *S. spathulatum*, *P. microcephala*, *R. preissii*, and *R. latifolia*

Scattered occurrences of:

- *Scaevola crassifolia*, *Olearia cf. sp.* Kennedy Range (G. Byrne 66), and *Roepera fruticulosa*

Weed-dominated understorey includes:

- Grasses: *Bromus diandrus*, *Ehrharta longiflora*, *Avena barbata*
- Broadleaf weeds: *Brassica tournefortii*, *Urospermum picroides*, *Reichardia tingitana*, *Sonchus oleraceus*

Occasional native herbs and low shrubs such as *Calandrinia polyandra*, *Erodium cygnorum*, *Euphorbia sharkoensis*, and *Acanthocarpus preissii* persist in open patches.



Plate 2. Acacia Scrub and Bromus Open Low Grass typical of the low diversity regenerated areas of Survey Site 1.

Planted Area (~ 1 ha)

The planted area at Site 1 was classified as Completely Degraded by Onshore (2013). It consists of four rows of *Olea europaea* (olive trees). The understorey is a dense cover of introduced annual grasses. A patch of planted *Eucalyptus camaldulensis*, old machinery, concrete slabs and a fenceline are also present in the immediately adjacent regenerated area (Plate 3).



Plate 3. Introduced annual grasses beneath rows of olive trees, planted *Eucalyptus camaldulensis* and signs of the site's agricultural past.

2.3.2 Site 2

Planted Vegetation and Claypan (9 ha)

Site 2 occupies a low-lying position within the surrounding landscape. Soils comprise grey to brown sand over clay, with the southeastern portion characterised by a grey claypan (Plate 4). The site was classified as Degraded to Completely Degraded by Onshore (2013).

The site is bounded by planted *Eucalyptus* and *Melaleuca* species and supports extensive regeneration of *A. rostellifera*, with scattered *Rhagodia* spp., *S. spathulatum*, and *P. microcephalus*. The understorey in planted areas is dominated by introduced annual grasses and forbs. Evidence of historical agricultural use—such as dilapidated sheds, old machinery, and concrete pads—is visible, particularly in and around the planted zones, now overgrown by regenerating *A. rostellifera*.

Claypan occupies 3.5 ha of the site. Within the claypan, regeneration of *Lawrenzia viridigrisea* and *F. confusa* is extensive. *Casuarina obesa* recruitment is also present; however, the uniform age and alignment of mature individuals suggest they were planted.

The population extent of the taxon previously identified as *Frankenia confusa* (P4) was delineated at this site as part of the current survey.



Plate 4. Regeneration of a handful of native species amongst planted eucalypts, old machinery and fallen trees surround the regenerating claypan at Survey Site 2.

3. Methods

3.1 Desktop assessment

The desktop assessment builds on previous analyses by Onshore (2022), with minor updates by Botany Lens (2024). Additional database searches were conducted to capture any new records of conservation-significant flora within or near the study area. The following databases were queried using a 40 km radial search:

- EPBC Act Protected Matters Database (DCCEEW 2025)
- BC Act Threatened and Priority Flora List (TPFL) (DBCA 2025)
- Western Australian Herbarium Database (DBCA 2025)

Definitions of conservation significant taxa are provided in Appendix 3.

3.1.1 Likelihood of Occurrence

A list of conservation-significant taxa within a 40 km radius was compiled. Likelihood of occurrence was assessed using criteria established by Onshore (2022) and modified by Botany Lens (2024), including:

- Presence of suitable landforms (inferred from aerial imagery and contour overlays)
- Known habitat records and local botanical knowledge
- Beard's (1977) vegetation mapping, which informed inclusion of taxa associated with coastal dune systems between Kalbarri and Geraldton

Each taxon was evaluated based on these criteria to determine its likelihood of occurring within the current survey area (Table 1).

Table 1. Ranking system used to assign the likelihood that a species would occur in the survey area (modified from Onshore 2022).

Rank	Criteria
Recorded	The species has been recorded in the study area.
Likely to occur	The species has previously been recorded from a landform which is present within the study area, and there are previous records within a 20 km radius of the study area, or it occurs in the coastal dune vegetation between Kalbarri and Geraldton.
Possible to occur	The species has previously been recorded from a landform which is present within the study area, and there are previous records within a 50 km radius of the study area.
Unlikely to occur	The landform from which the species has previously been recorded is absent within the study area, and/or there are no previous records within a 50 km radius of the study area.

Conservation significance includes flora beyond those formally listed as Threatened or Priority at the State or national level (EPA, 2016b). Species may be locally significant due to restricted distribution or declining abundance. Although not legislatively protected, such species are recognised as vulnerable to threats, particularly habitat loss through land clearing. Reports and species lists from previous surveys of the study area and surrounds were reviewed, noting instances of local endemism and range extensions.

3.2 Field survey

3.2.1 Personnel and survey dates

The survey was conducted by Dr Kristine Brooks, a local botanist with extensive experience in conservation flora surveys, including prior work with DBCA. Fieldwork occurred from September 12–13, 2025, and was timed to coincide with peak flowering periods for target species in accordance with EPA (2016a) technical guidance.

3.2.2 Seasonal conditions

Climate statistics were collected from Kalbarri (BOM Site Number 008251), using data from 2000 to 2024 to calculate long-term averages. For 2025, rainfall data is available up to September 30, while temperature data extends to August 31 (BOM 2025a).

The Kalbarri data showed a wetter-than-average winter, with above-average rainfall in July and August. Temperatures were generally warmer than average, though slightly cooler from June to August. These conditions were considered optimal for detecting annual and cryptic perennial flora.

Although the Balline weather station (4 km from the Project site) is closer, rainfall records were incomplete after May 2025. Kalbarri data was therefore used as the primary reference.

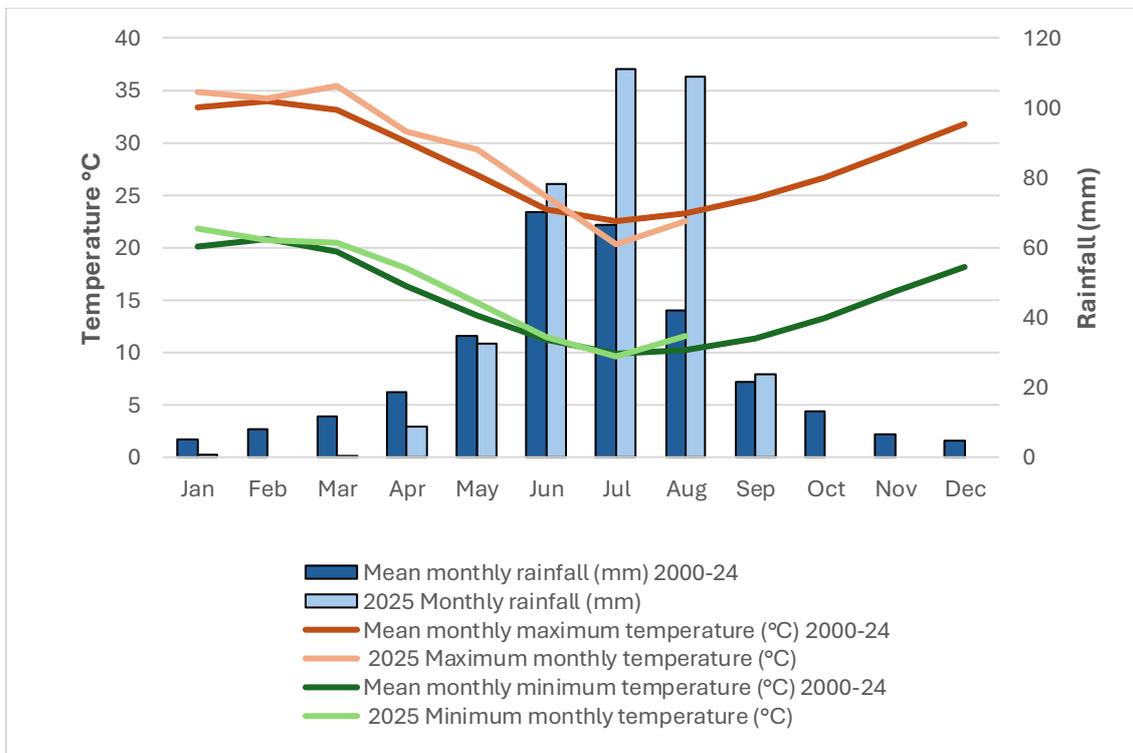


Figure 1. Comparison of 2025 rainfall and temperature data to mean climate data for the years 2000 to 2024.

3.2.3 Field preparation and identification

Prior to fieldwork, documentation was compiled for all conservation-significant taxa identified as likely or possibly occurring. This included photographs, drawings, scanned specimens, and species descriptions, stored digitally for field access. A comprehensive species list from previous flora surveys was also used to assist with identification of unknown taxa.

3.2.4 Survey method

Site 1 was surveyed using linear foot traverses spaced 10–40 m apart, adjusted based on vegetation condition and diversity. Survey intensity was increased in areas of good condition vegetation and decreased in areas of low species diversity and dense annual weed cover. Visibility was generally good, allowing observation up to 20 m on either side of the traverse.

However, large areas of felled *Acacia* (likely due to Cyclone Seroja) and regrowth of dominant shrub species, created tangled thickets up to 2 m high. These zones were difficult to traverse and often required detours. Where access was possible, visibility of the ground layer was limited.

Site 2: The area, comprising predominantly planted vegetation over dense annual weeds, was surveyed at lower intensity using a meander technique to identify suitable habitat and assess regeneration diversity. A targeted search was undertaken to delineate the extent of the previously identified *Frankenia confusa* population. Where visibility was impeded by weed cover or dense regrowth, an additional traverse was conducted parallel to the population boundary. Within the population area, the meander technique was again employed to minimise trampling while allowing investigation of areas of interest.

In total, 21 km were walked over 14 hours across two days, covering 36.5 ha. Survey timing (8:30 AM to 4:00 PM) and weather conditions were favourable. The track log is shown in Map 5.

3.2.5 Specimen Identification, Nomenclature and Data

For suspected or confirmed conservation-significant flora, the following data were recorded:

- Colour photograph
- GPS location
- Associated habitat and landscape features
- Time and date of observation

Species familiar to the botanist were identified in the field. Unidentified specimens were collected, dried, and processed according to Western Australian Herbarium guidelines (WAH 2008). Identification was based on taxonomic literature and comparison with pressed specimens. A small number of specimens were submitted to the WA Herbarium for confirmation by specialist taxonomist Mike Hislop.

Nomenclature used in this report aligns with current listings on FloraBase (WAH 2025) at the time of report preparation. A full species list is provided in Appendix 4.

3.2.6 Survey Limitations

The survey was conducted by an experienced botanist during optimal seasonal conditions and within the recommended timing window (EPA 2016a). Contextual information from previous surveys and desktop assessments informed the methodology and target taxa.

However, several limitations should be noted:

- **Detection of small or cryptic taxa:** Ten significant-flora taxa identified as likely to occur and eleven as possibly occurring are herbs or small shrubs. Traverse widths of 40 m are insufficient for reliably detecting these taxa, especially given the dense annual weed cover (30–80 cm high). However, this same weed cover is also likely to suppress their presence. In areas with a more open understorey, traverse widths were reduced, and suitable habitat was carefully scanned for orchids and other small herbs (Plate 5).
- **Phenological limitation:** The survey was conducted outside the recorded flowering period for 30% of significant taxa occurring within 40 km of the study area, including seven herbaceous taxa that are more readily detected when flowering. Apart from *Diuris drummondii*, which flowers from November to December, the remaining herb species typically flower in August and were likely fruiting at the time of

survey which would aid visibility. Most are associated with wet depressions and would be visible within the open claypan area.

- **Tangled thickets:** Areas with fallen trees and dense shrub recruitment created impenetrable thickets. These zones were generally unsurveyed except for surface-level observations. Which indicated thickets were species poor and dominated by *A. rostellifera* and *Rhagodia* species (Plate 5).



Plate 5. Heavy annual weed burden and shrub recruitment through a tangle of felled Acacia trees: Limitations to survey for conservation significant small herbaceous species.

Australian Garnet Lucky Bay Project

Track log: Threatened and Priority Flora survey

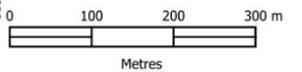
Legend

- Frankenia confusa
- Tracklog
- TPFL Survey Site 1
- TPFL Survey Site 2
- Cleared
- Disturbance Envelope



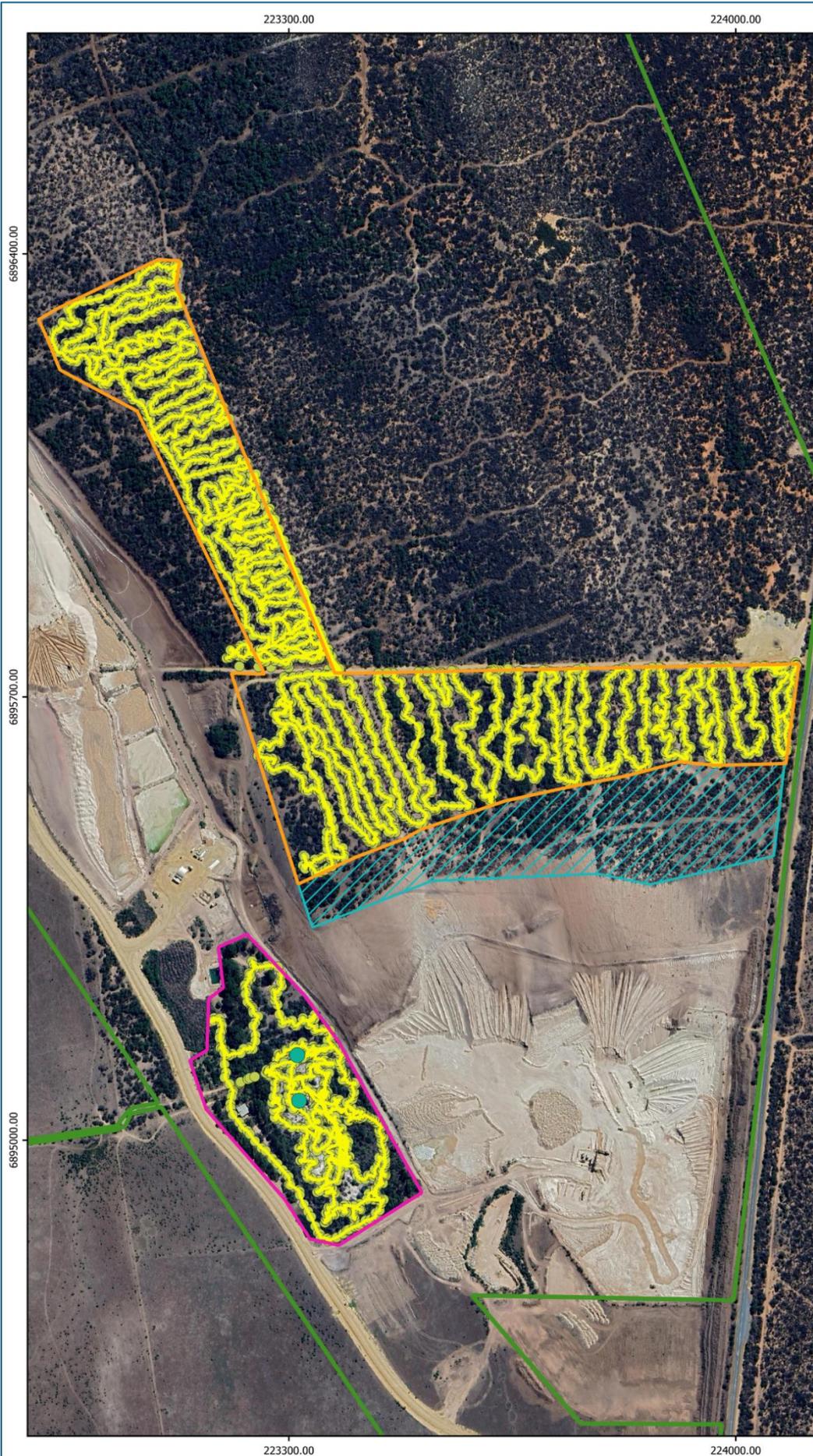
1:8000

CRS: GDA2020 / MGA zone 50 EPSG:7850
Projection: Universal Transverse Mercator (UTM)



Date: 27/10/2025
Sheet Size: A4
Drawn By: K. Brooks
Botany Lens
Requested By: Mineral Resources Pty Ltd

BOTANY LENS



Software: QGIS 3.36.0-Maidenhead; Data source: <https://services.slp.wa.gov.au>, Department of Energy, Mines, Industry Regulation and Safety (Mining_Tenements_DMIRS-003); Google Sattelite; Australian Garnet Pty Ltd.

Map 5: Tracklog from survey for Threatened and Priority Flora.

4. Results and Discussion

4.1 Desktop assessment

Information on conservation-significant flora species potentially occurring in the area was compiled through searches of the DBCA Threatened and Priority Flora List and the Western Australian Herbarium databases, requested in 2025 (search reference #76-0925FL; DBCA 2025). The EPBC Act Protected Matters Search Tool (DCCEEW 2025) was also utilised. Each search was conducted within a 40 km radius of the coordinates - 28.028849 S; 114.187953 E. An additional search was undertaken for species associated with the coastal vegetation strip between Kalbarri and Geraldton.

4.1.1 Threatened Flora listed under state and federal legislation

No Threatened Flora taxa listed under the EPBC Act or the BC Act were recorded within the survey area; category definitions are provided in Appendix 3a. However, the EPBC Act Protected Matters database identified 21 Threatened flora taxa as either occurring or having suitable habitat within a 40 km radius of the study area (DCCEEW 2025):

- *Androcalva bivillosa*
- *Beyeria lepidopetala*
- *Caladenia barbarella*
- *Caladenia bryceana* subsp. *cracens*
- *Caladenia elegans*
- *Caladenia hoffmanii*
- *Caladenia wanosa*
- *Caleana dixonii* (*Paracaleana dixonii* WA)
- *Diuris drummondii*
- *Drakaea concolor*
- *Drummondita ericoides*
- *Eucalyptus beardiana*
- *Eucalyptus cuprea*
- *Gastrolobium hamulosum*
- *Grevillea christineae*
- *Hypocalymma angustifolium* subsp. *Hutt River* (S.Patrick 2982)
- *Hypocalymma longifolium*
- *Lechenaultia chlorantha*
- *Pterostylis sinuata*
- *Stachystemon nematophorus*
- *Wurmbea tubulosa*

Of these, 14 taxa have been previously recorded within this radius and are also listed under the BC Act (DBCA 2025; State of Western Australia 2025).

As noted in *Botany Lens* (2024), *H. angustifolium* subsp. *Hutt River* (S. Patrick 2982) is no longer listed under the BC Act (State of Western Australia 2023). The only recorded specimen has since been reidentified as *Hypocalymma balbakiae* Tauss & Rye, which is not considered a Threatened species (WAH 1998–).

The Protected Matters database identified four flora taxa listed under the EPBC Act as either occurring or having suitable habitat within the Lucky Bay Project survey area. Of these, the orchid *C. hoffmanii* was assessed as ‘likely’ to occur, while three taxa—*A. bivillosa*, *C. bryceana* subsp. *cracens* and *C. elegans*—were classified as possibly occurring. None of these species have been previously recorded within the study area. A targeted search of suitable habitat near the current study area in 2024 for *C. bryceana* subsp. *cracens* did not detect any individuals.

Based on proximity of known records and the presence of suitable habitat—including coastal dune systems, seasonally wet areas, and claypans—the desktop assessment identified six Threatened flora taxa as ‘likely’ to occur within the study area. An additional two species were considered ‘possible’, while six taxa were assessed as ‘unlikely’ to occur (Table 2). Most ‘likely’ taxa occurred in winter-wet depressions and clay flats.

Table 2. Likelihood of occurrence and flowering time of Threatened flora taxa listed under the EPBC Act and BC Act and recorded within a 40 km radius of the Lucky Bay Garnet Project study area, or in coastal vegetation between Kalbarri and Geraldton.

Taxon	BC ACT	EPBC ACT	Habitat	Likelihood	Flowering
<i>Androcalva bivillosa</i>	T (CR)	CR	Dry white / yellow sand on sandplain slope.	Possible	Aug-Sep
<i>Beyeria lepidopetala</i>	T (VU)	VU	Yellow sand over limestone. Gully.	Likely	Jul-Aug
<i>Caladenia barbarella</i>	T (EN)	EN	Rocky ledges, alongside seasonal creeklines, in winter-wet depressions.	Likely	Aug-Sep
<i>Caladenia bryceana</i> subsp. <i>cracens</i>	T (EN)	VU	South of Kalbarri in low heath on limestone hills; north in winter-moist flats.	Unlikely	Aug-Sep
<i>Caladenia elegans</i>	T (CR)	CR	Clayey loam. Winter-wet clay flats.	Likely	Jul-Aug
<i>Caladenia hoffmanii</i>	T (EN)	EN	Clay, loam, laterite, granite. Rocky outcrops and hillsides, ridges, swamps and gullies. (open heath)	Likely	Aug-oct
<i>Caladenia wanosa</i>	T (EN)	EN	Sand. Sandstone outcrops, top edges of gorges.	Unlikely	Aug-Sep
<i>Diuris drummondii</i>	T (EN)	EN	Low-lying depressions, swamps.	Likely	Nov-Dec
<i>Drakaea concolor</i>	T (EN)	EN	Grey sand. (Dense heath / sedgeland)	Unlikely	Aug-Sep
<i>Eucalyptus cuprea</i>	T (EN)	EN	Shallow soils over granite.	Unlikely	Aug-Nov
<i>Lechenaultia chlorantha</i>	T (CR)	CR	Rocky sandstone gullies & on ledges.	Unlikely	Aug-Sep
<i>Paracaleana dixonii</i>	T(EN)	VU	Low Heath	Unlikely	Oct-Jan
<i>Pterostylis sinuata</i>	T (CR)	CR	Winter wet flat below breakaway system. Clay loam and laterite.	Possible	Sep
<i>Wurmbea tubulosa</i>	T (VU)	VU	Clay, loam. Riverbanks, seasonally wet places.	Likely	Jun-Aug

4.1.2 Priority Flora

Priority flora are possible Threatened taxa that are data-deficient or don't meet specific survey criteria (P1, P2 and P3). Species that are adequately known, and are rare but not Threatened, or meet criteria for near Threatened, or that have been recently removed from the Threatened list for other than taxonomic reasons are listed as Priority 4 (DBCA n.d., Appendix 3b).

A total of 113 Priority Flora taxa listed on DBCA's TPFL and WAH databases have been recorded within a 40 km radius of the Lucky Bay Project, as well as within coastal vegetation associations between Kalbarri and Geraldton (DBCA 2025). Two taxa, *Melaleuca huttensis* and *Bossiaea calcicola* have been collected within the Project area (Onshore 2013, 2022, Botany Lens 2024) and *Frankenia confusa* has been collected within the survey area (Onshore 2022). Based on recorded habitats and proximity of previous collections, 19 taxa were classified as

‘likely’ to occur within the current study area (Table 3), while 63 taxa were deemed ‘possible’ and 30 taxa ‘unlikely’ to occur within the study area. The complete list is available in Appendix 5.

Onshore (2013) reported the occurrence of *Beyeria cinerea* subsp. *cinerea* (P3) within the study area. However, after revisiting the site in 2021 and re-examining multiple specimens collected in both 2013 and 2021, these collections were determined as *Beyeria cinerea* subsp. *borealis* (Onshore 2022). This subspecies is not listed as a Priority flora taxon by the DBCA (WAH 1998–). Additionally, *Comesperma rhadinocarpum* (P3) was previously recorded within the Lucky Bay project area, though not specifically within the study area. Onshore Environmental visited the location in September 2021 but found no plants at or near the site (Onshore 2022).

Table 3. Priority flora assessed as ‘likely’ to occur within the Lucky Bay Garnet Project survey area.

Taxon	Priority	Habitat	Likelihood	Flowering
<i>Acacia latipes</i> subsp. <i>licina</i>	3	White sand, granitic soils. Limestone hills, sandplains.	Likely	Jun-Sep
<i>Acanthocarpus parviflorus</i>	3	Sand over limestone or sandstone.	Likely	May-Jun
<i>Anthocercis intricata</i>	3	Sand or loam over limestone. Consolidated sand dunes.	Likely	Jun-Sep
<i>Caladenia bigeminata</i>	1	Broken sandstone on clay or in damper areas around low areas and along drainages.	Likely	Aug
<i>Calectasia browneana</i>	2	White-grey sand, laterite. Adjacent to wet areas of creekline.	Likely	Jun-Aug
<i>Carpobrotus</i> sp. <i>Thevenard Island (M. White 050)</i>	3	Coarse white sand. Dune tops, disturbed areas.	Likely	Aug
<i>Chthonocephalus tomentellus</i>	2	Red sand. Undulating plains, sand dunes, near saline depressions.	Likely	Aug-Nov
<i>Comesperma rhadinocarpum</i>	3	Low limestone ridge, sand over limestone. Sandy soils.	Likely	Oct-Nov
<i>Diuris recurva</i>	4	Loam. Clay, rocky, Winter-wet areas.	Likely	Jul-Aug
<i>Drosera radicans</i>	3	Sand or sandy clay. Winter-wet areas.	Likely	Aug-Sep
<i>Eremophila microtheca</i>	4	Sandy clay. Winter wet flats, saline flats, sandplains.	Likely	Aug-Sep
<i>Frankenia confusa</i>	4	Wet pale brown sand, brown clay, grey soil. Banks of rivers & waterholes, river floodplains.	Recorded	Sep
<i>Grevillea stenomera</i>	2	Red or yellow sand on limestone. Coastal areas.	Likely	May-Jun
<i>Lasiopetalum oldfieldii</i>	3	White, grey or yellow sand, gravel, laterite. Sandplains, rises.	Likely	Aug-Nov
<i>Macarthuria intricata</i>	3	Red or black soil over limestone, grey sand over sandstone, sandy clay. Sandplains & sand dunes.	Likely	Sep-Dec
<i>Melaleuca huttensis</i>	3	Light yellow or beige sand. Lower slopes of undulating plains, sandplains.	Likely	Jun-Sep
<i>Scaevola kallophylla</i>	4	Sandy soils over limestone. Coastal plain	Likely	Aug-Dec
<i>Scaevola oldfieldii</i>	3	Sand, loam, clay. Near rivers. Sand over limestone.	Likely	Aug-Dec
<i>Scholtzia tenuissima</i>	2	Brown clay over laterite or dull yellow sand. Sandplains and dune swales.	Likely	Sep-Nov
<i>Thryptomene conica</i>	2	Shallow sandy soils. Coastal limestone cliffs, stream beds.	Likely	Aug

4.2 Field survey: Conservation Significant Taxa

4.2.1 Threatened Flora – National and State Significance

No taxa listed as Threatened flora under the EPBC Act (DCCEEW 2024) or the BC Act (State of Western Australia 2024) were recorded within the study area during the current survey.

4.2.2 Priority Flora – State Significance

No Priority Flora taxa were recorded during the targeted survey. *Frankenia confusa* Summerh. (Priority 4) had previously been documented in the claypan area of Site 2 (Onshore 2022). However, despite extensive searches, only two *Frankenia* species were observed: *Frankenia pauciflora* and the introduced *Frankenia pulverulenta* (Plate 6).

The *Frankenia* population within the study area was originally identified as *F. pauciflora* (Onshore 2013). Both *F. confusa* and *F. pauciflora* are small shrubs that differ in leaf morphology and floral traits, yet they share considerable character overlap, allowing for misidentification. Taxonomic boundaries between these species remain unresolved, with potential intergrades occurring between *F. confusa* and the widespread *F. pauciflora* (pers. comm. Mike Hislop).

During the current survey, several infertile specimens were collected. A follow-up visit on 14 October 2025 yielded a flowering specimen, which was submitted to the Western Australian Herbarium for confirmation and lodgement (collection ID Brooks, K.J. AG-71). Identification botanist Mike Hislop confirmed the specimen as *Frankenia pauciflora*. A voucher specimen of the weed *F. pulverulenta* was also submitted.



Plate 6. *Frankenia pauciflora* A. flower, B. form and C. *Frankenia pulverulenta* at the study area.

Four Threatened taxa and seven Priority taxa classified as likely to occur were outside their flowering period. Among these were three orchid species—*Caladenia elegans* (CR), *Diuris drummondii* (EN), *Caladenia bigeminata* (P1), and *Diuris recurva* (P4)—as well as the small herb *Wurmbea tubulosa* (V). All are typically found in seasonally wet habitats, including claypans and swamps.

These species have distinctive leaves, and while small would likely have been visible in the open areas of the claypan. They would have been more difficult to observe but are unlikely to occur within the dense swathe of stoloniferous grass (*Sporobolus virginicus*) present at the site. Orchids with specific ecological traits—such as low stature and seasonal emergence—are particularly vulnerable to competition from dense weed regrowth (Brundrett

2025), which *S. virginicus*, although native, effectively emulates. It remains possible that some individuals may have occurred beneath the dense tangle of branches and regrowth and were therefore missed.

For shrubs outside their flowering period, the low species diversity through the planted eucalypts and the Acacia scrub meant that different leaf shapes stood out, attracting further investigation.

4.2.3 Local Significance

One species of interest was also recorded from the study area. *Lawrencia glomerata* was common within the claypan area. Although a widespread species, this occurrence represents a range extension of approximately 100 km. Plants at the site also has glabrous leaves, unusual for this species. Identification was made from a voucher specimen was submitted to Western Australian Herbarium (Brooks, K.J. AG-72).

5. Summary

A targeted survey for conservation-significant flora was conducted under favourable seasonal conditions in September 2025. The survey was designed to support environmental approvals for the ongoing operation of the Lucky Bay Garnet Project.

The desktop assessment identified a substantial number of conservation-significant flora within a 40 km radius of the project area, including 21 Threatened taxa and 113 Priority taxa. Based on habitat suitability and proximity to known records, six Threatened and 19 Priority taxa were assessed as 'likely' to occur within the study area.

No Threatened or Priority flora were recorded during the survey. The field survey confirmed the *Frankenia* species previously identified as *Frankenia confusa* (P4), within the claypan of Site 2 to be the widespread and highly variable taxon *Frankenia pauciflora*.

Several taxa assessed as 'likely' to occur were outside their flowering period, limiting detectability. Visibility was further constrained by dense vegetation, tangled fallen trees, annual weeds, and stoloniferous native grass. These conditions represent poor habitat for small herbaceous species such as orchids, reducing the likelihood of their occurrence.

6. References

- Beard, J. S. (1976) Murchison. Explanatory Notes and Map Sheet 6, 1:1 000 000 series Vegetation Survey of Western Australia. University of Western Australia Press: Nedlands.
- Brundrett, M. C. (2025) Orchid losers and winners after fire in West Australian urban bushland: A response continuum deeply integrated with other traits. *Pacific Conservation Biology*, 31, Article PC25045. <https://doi.org/10.1071/PC25045>
- Bureau of Meteorology (BOM) (2025) Climate Statistics for Australian Locations: Kalbarri <http://www.bom.gov.au/climate/data>
- Commonwealth of Australia (2013) *Draft – Survey Guidelines for Australia’s Threatened Orchids Guidelines for Detecting Orchids Listed as ‘Threatened’ Under the Environment Protection and Biodiversity Conservation Act 1999* Australia
- Council of Heads of Australasian Herbaria (n.d.). *Australasian Virtual Herbarium*. Retrieved from <https://avh.ala.org.au>
- Department of Biodiversity, Conservation and Attractions (DBCA) (2025) Threatened and Priority Flora Database Search. Search reference 76-0925FL.
- Department of Biodiversity, Conservation and Attractions (DBCA) (n.d.) *Conservation codes for Western Australian flora and fauna*. Retrieved from <https://florabase.dpaw.wa.gov.au/help/conservation-codes>
- Department of Agriculture and Food, WA (DAFWA) (2003), *Soils and Landforms of the Perth Area - Western Australia*. Department of Primary Industries and Regional Development, Western Australia, Perth. Map. Retrieved from https://library.dpird.wa.gov.au/gis_maps/12
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2025). *Interim Biogeographic Regionalisation for Australia (IBRA), Version 7.1*. Commonwealth of Australia. <https://www.dcceew.gov.au/environment/land/nrs/science/ibra>. Accessed: Oct 2025
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2025). Available: <https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool>. Accessed: September, 2025.
- Desmond, A., & Chant, A. (2001) *Geraldton Sandplains 2 (GS2 - Geraldton Hills subregion)*. In *A biodiversity Audit of Western Australia’s 53 Biogeographical Subregions in 2002*, Department of Conservation and Land Management.
- Ecoscope (2009) *Haddington Resources Balline Level 1 Flora and Fauna assessment*. Report for Haddington Resources.
- Environmental Protection Authority (2016a) *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment*, EPA, Perth.
- Environmental Protection Authority (2016b) *Environmental Factor Guideline Flora and Vegetation*, EPA, Perth.
- Environmental Protection Authority (EPA) (2023). *Statement of Environmental Principles, Factors, Objectives and Aims of EIA (Version 5.0)*. Government of Western Australia. Retrieved from <https://www.epa.wa.gov.au/statement-environmental-principles-factors-and-objectives>
- Geoscience Australia (2024) *Photo Series ‘Geraldton Groundwater Study. W.A.’ 15 December 1982*. Film No. SOC525, Run 1, Frame 0115.

Google (2024) Google Earth Pro 7.3.6.9796

Green, A. J., Lovas-Kiss, Á., Reynolds, C., Sebastián-González, E., Silva, G. G., van Leeuwen, C. H. A., & Wilkinson, D. M. (2023). Dispersal of aquatic and terrestrial organisms by waterbirds: A review of current knowledge and future priorities. *Freshwater Biology*, 68(2), 173–190.
<https://doi.org/10.1111/fwb.14038>

IUCN (2012) IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. Available online: <https://www.iucnredlist.org/resources/categories-and-criteria>

Keighery, B. J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc.), Nedlands, Western Australia.

Onshore Environmental (2013) *Level 2 Flora and Vegetation Survey Balline Garnet Project*. Prepared for Australian Garnet.

Onshore Environmental (2022) *Lucky Bay Garnet Project Detailed Flora and Vegetation Survey*. Prepared for Australian Garnet.

State of Western Australia (2023) Biodiversity Conservation (Listing of Native Species) (Flora) Order 2023. Western Australian Government Gazette 2023 (135): 3402-3408.

State of Western Australia (2025) Biodiversity Conservation (Listing of Native Species) (Flora) Order 2024. *Western Australian Government Gazette* 2025 (78): 1070–1075.

Tille, P. (2006) *Soil-landscapes of Western Australia's rangelands and arid interior*. Resource management technical report 313. Department of Agriculture and Food WA.

Trudgen, M.E. (1988) *A report on the flora and vegetation of the Port Kennedy area*. Unpublished report prepared for Bowman Bishaw Gorham, Perth.

Western Australian Herbarium (WAH) (2008) *How to collect herbarium specimens: A guide prepared by the Western Australian Herbarium*. Department of Biodiversity, Conservation and Attractions.

Western Australian Herbarium (WAH) (1998–) *Florabase: The Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. Retrieved from <https://florabase.dpaw.wa.gov.au> (16/10/2024)

7. Appendices

Appendix 1. Vegetation Condition Scale as developed by Keighery (1994).

Condition	Code	Description
Pristine	1	Pristine or nearly so, no obvious signs of disturbance.
Excellent	2	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	3	Vegetation structure altered; obvious signs of disturbance.
Good	4	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
Degraded	5	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching Very Good condition without intensive management.
Completely Degraded	6	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

Appendix 2. Vegetation Condition Categories Trudgen (1988).

Condition	Code	Description
Pristine	1	Pristine or nearly so, no obvious signs of disturbance.
Excellent	2	Vegetation structure intact; disturbance affects individual species and weeds are non-aggressive.
Very Good	3	Vegetation structure altered; obvious signs of disturbance.
Good	4	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic structure or ability to regenerate it.
Poor	5	Vegetation structure severely impacted; obvious signs of degradation; limited regeneration potential without intensive management.
Degraded	6	Vegetation structure very degraded; regeneration unlikely without major intervention.
Completely Degraded	7	Vegetation structure no longer intact; area is completely or almost completely without native species.

Appendix 3. Categories used in the assessment of conservation status.

Appendix 3a. Threatened Flora

Some flora species are protected by Australian Government legislation (*Environment Protection and Biodiversity Conservation Act 1999*, EPBC Act) or by WA legislation (*Biodiversity Conservation Act 2016*, BC Act). Species specially protected by these acts are referred to as threatened species and can be listed as critically endangered, endangered, or vulnerable. Both the EPBC Act and The BC Act adopt the use of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species Categories and Criteria (IUCN 2012) and is based on the national distribution of the species.

Code	Category	Definition
EX	Extinct	No reasonable doubt the last individual of the plant species has died.
EW	Extinct in the Wild	Known only to survive in cultivation, in captivity, or as a naturalised population.
CR	Critically Endangered	Facing an extremely high risk of extinction in the wild in the immediate future.
EN	Endangered	Facing a very high risk of extinction in the wild in the near future.
VU	Vulnerable	Facing a high risk of extinction in the wild in the medium-term future.
CD	Conservation Dependent	The species is the focus of a specific conservation program and would become threatened without it.

Appendix 3b. Western Australia Priority Species Categories (Non-statutory under BC Act) adapted from *Conservation codes for Western Australian flora and fauna* (DBCA n.d.)

Code	Category	Description
P1	Priority 1: Poorly-known species – few locations, none on conservation lands	Known from ≤ 5 locations, all outside conservation lands; potentially at risk; urgently require further survey due to inadequate data and potential threats.
P2	Priority 2: Poorly-known species – few locations, some on conservation lands	Known from ≤ 5 locations, some within conservation lands; still under potential threat; further survey needed to assess conservation status.
P3	Priority 3: Poorly-known species – several locations	Known from several or few widespread locations; not under imminent threat but may face known pressures; further survey required.
P4	Priority 4: Rare, Near Threatened, or species in need of monitoring	Includes: (a) Rare but not currently threatened; (b) Near Threatened; (c) Recently delisted from threatened/specially protected lists (non-taxonomic reasons); (d) Other species needing monitoring.

Appendix 4. Complete flora list from the 2025 targeted flora survey, and area in which taxa were observed.

*Introduced, ^Planted, +Occurs naturally in within 20 km of site (pertains to planted flora)

FAMILY	TAXON	Occurrence			
		Site 1 Remnant	Site 1 Regeneration	Site 1 Planted/Regen	Site 2 Planted/Regen
Aizoaceae	* <i>Mesembryanthemum crystallinum</i>				x
Aizoaceae	<i>Tetragonia implexicoma</i>	x			
Amaranthaceae	<i>Ptilotus divaricatus</i>	x			
Amaranthaceae	<i>Ptilotus polystachyus</i>	x	x		
Anacardiaceae	^* <i>Schinus molle</i>				x
Asparagaceae	<i>Acanthocarpus preissii</i>	x	x		
Asparagaceae	<i>Dichopogon tyleri</i>	x			
Asparagaceae	<i>Thysanotus manglesianus</i>	x	x		
Asparagaceae	<i>Thysanotus sp. indet</i>		x		
Asteraceae	* <i>Arctotheca calendula</i>		x		x
Asteraceae	* <i>Hypochaeris glabra</i>	x	x	x	x
Asteraceae	* <i>Leontodon rhagadioloides</i>	x			
Asteraceae	* <i>Reichardia tingitana</i>	x	x	x	
Asteraceae	* <i>Sonchus oleraceus</i>	x	x	x	x
Asteraceae	* <i>Urospermum picroides</i>	x	x	x	x
Asteraceae	<i>Olearia axillaris</i>				x
Asteraceae	<i>Olearia</i> cf. sp. Kennedy Range	x	x		
Asteraceae	<i>Senecio pinnatifolius</i>		x		
Asteraceae	<i>Waitzia corymbosa</i>	x			
Asteraceae	<i>Podotheca gnaphalioides</i>	x			
Brassicaceae	* <i>Brassica tournefortii</i>	x	x		x
Brassicaceae	* <i>Raphanus raphanistrum</i>		x		
Caryophyllaceae	* <i>Polycarpon tetraphyllum</i>	x			x
Casuarinaceae	^+ <i>Casuarina obesa</i>				x
Chenopodiaceae	* <i>Chenopodium murale</i>		x		x
Chenopodiaceae	<i>Rhagodia latifolia</i> subsp. <i>recta</i>	x	x		x
Chenopodiaceae	<i>Rhagodia preissii</i> subsp. <i>obovata</i>	x	x	x	x
Convolvulaceae	* <i>Cuscuta sp.</i>	x			
Convolvulaceae	<i>Convolvulus remotus</i>	x	x		x
Crassulaceae	<i>Crassula colorata</i>	x	x		
Dioscoreaceae	<i>Dioscorea hastifolia</i>	x	x		
Euphorbiaceae	* <i>Euphorbia terracina</i>	x	x		x
Euphorbiaceae	<i>Euphorbia sharkoensis</i>	x	x		x
Euphorbiaceae	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	x			
Fabaceae	* <i>Lupinus cosentinii</i>		x		
Fabaceae	* <i>Medicago truncatula</i>	x	x	x	x
Fabaceae	* <i>Melilotus indicus</i>				x
Fabaceae	<i>Acacia rostellifera</i>	x	x	x	x
Fabaceae	<i>Acacia saligna</i>				x
Fabaceae	<i>Lotus australis</i>	x			
Frankeniaceae	* <i>Frankenia pulverulenta</i>				x
Frankeniaceae	<i>Frankenia pauciflora</i>				x
Geraniaceae	* <i>Erodium cicutarium</i>	x			

FAMILY	TAXON	Occurrence			
		Site 1 Remnant	Site 1 Regeneration	Site 1 Planted/Regen	Site 2 Planted/Regen
Geraniaceae	<i>Erodium cygnorum</i>	x	x		
Goodeniaceae	<i>Goodenia berardiana</i>	x			
Goodeniaceae	<i>Scaevola crassifolia</i>	x	x		
Loranthaceae	<i>Amyema linophylla</i> subsp. <i>linophylla</i>				x
Malvaceae	<i>Alyogyne hakeifolia</i>	x	x		
Malvaceae	<i>Hibiscus drummondii</i>	x	x		
Malvaceae	<i>Lawrenzia glomerata</i>				x
Malvaceae	<i>Lawrenzia viridigrisea</i>				x
Montiaceae	<i>Calandrinia liniflora</i>	x	x		
Myrtaceae	^+ <i>Melaleuca viminea</i> subsp. <i>viminea</i>				x
Myrtaceae	^+ <i>Eucalyptus camaldulensis</i>				x
Myrtaceae	^ <i>Eucalyptus gomphocephala</i>				x
Myrtaceae	^ <i>Eucalyptus sargentii</i> subsp. <i>sargentii</i>				x
Myrtaceae	^ <i>Eucalyptus utilis</i>				x
Myrtaceae	^ <i>Melaleuca lanceolata</i>				x
Myrtaceae	<i>Scholtzia oligandra</i>	x			
Nyctaginaceae	<i>Commicarpus australis</i>	x	x		
Oleaceae	^* <i>Olea europea</i>		x		x
Phyllanthaceae	<i>Lysiandra calycina</i>	x			
Phyllanthaceae	<i>Lysiandra scaber</i>	x			
Phyllanthaceae	<i>Poranthera drummondii</i>	x	x		
Pittosporaceae	<i>Pittosporum angustifolium</i>		x		
Poaceae	* <i>Lamarckia aurea</i>		x		
Poaceae	* <i>Avena barbata</i>	x	x	x	x
Poaceae	* <i>Brachypodium distachyon</i>	x			
Poaceae	* <i>Bromus diandrus</i>	x	x	x	x
Poaceae	* <i>Bromus rubens</i>	x			
Poaceae	* <i>Ehrharta longiflora</i>	x	x		x
Poaceae	* <i>Hordeum leporinum</i>		x		x
Poaceae	* <i>Lolium perenne</i>				x
Poaceae	* <i>Parapholis incurva</i>				x
Poaceae	* <i>Pentameris airoides</i> subsp. <i>airoides</i>	x	x		
Poaceae	* <i>Rostraria pumila</i>		x		
Poaceae	* <i>Vulpia myuros</i> forma <i>myuros</i>	x	x		
Poaceae	<i>Austrostipa crinita</i>	x			
Poaceae	<i>Austrostipa elegantissima</i>	x	x		
Poaceae	<i>Sporobolus virginicus</i>				x
Poaceae	* <i>Polypogon monspeliensis</i>				x
Primulaceae	* <i>Lysimachia arvensis</i>	x	x	x	x
Rubiaceae	<i>Opercularia spermacocea</i>	x			
Sapindaceae	<i>Diplopeltis petiolaris</i>	x			
Solanaceae	* <i>Solanum nigrum</i>		x		
Solanaceae	<i>Anthocercis ilicifolia</i>	x	x		
Solanaceae	<i>Solanum oldfieldii</i>	x			
Surianaceae	<i>Stylobasium spathulatum</i>	x	x	x	x
Thymelaeaceae	<i>Pimelea microcephala</i>	x	x	x	x
Thymelaeaceae	<i>Pimelea sessilis</i>	x			

FAMILY	TAXON	Occurrence			
		Site 1 Remnant	Site 1 Regeneration	Site 1 Planted/Regen	Site 2 Planted/Regen
Urticaceae	<i>Parietaria cardiostegia</i>	x	x		
Vitaceae	<i>Clematicissus angustissima</i>	x			
Zygophyllaceae	<i>Roepera fruticulosa</i>	x	x		x

Appendix 5. Likelihood of occurrence and flowering time of Priority flora taxa listed under the EPBC Act and BC Act and recorded within a 40 km radius of the Lucky Bay Garnet Project study area, or in coastal vegetation between Kalbarri and Geraldton.

Taxon	Priority	Habitat	Likelihood	Flowering
<i>Acacia gelasina</i>	2	Yellow sand. Sandplains, low rises.	Possible	Jun-Sep
<i>Acacia latipes</i> subsp. <i>licina</i>	3	White sand, granitic soils. Limestone hills, sandplains.	Likely	Jun-Sep
<i>Acacia leptospermoides</i> subsp. <i>obovata</i>	2	Yellow/brown sand. Sandplains, sand ridges.	Possible	Jul-Aug
<i>Acacia pelophila</i>	1	Clay. Saline creeklines.	Possible	Jul-Aug
<i>Acacia ridleyana</i>	3	Grey or yellow/brown sand, gravelly clay, granitic loam	Possible	Aug-Dec
<i>Acacia stereophylla</i> var. <i>cylindrata</i>	2	Sand. Sandstone cliffs.	Unlikely	Aug-Sep
<i>Acanthocarpus parviflorus</i>	3	Sand over limestone or sandstone.	Likely	May-Jun
<i>Androcalva microphylla</i>	2	White grey or orange brown sand over sandstone.	Possible	Aug-Nov
<i>Angianthus microcephalus</i>	2	Sandy or clayey soils. Salt swamps & pans.	Unlikely	Sep-Dec
<i>Anthocercis intricata</i>	3	Sand or loam over limestone. Consolidated sand dunes.	Likely	Jun-Sep
<i>Arnocrinum drummondii</i>	3	White or yellow sand.	Possible	Sep-Dec
<i>Baeckea</i> sp. <i>Western Australia</i> (<i>J. Drummond s.n.</i>)	1	Yellow sand. Sandplains, gentle lower slopes, road verges.	Unlikely	Dec-Feb
<i>Baeckea subcuneata</i>	2	Red/yellow sand. Sandstone outcrops, dunes.	Possible	Aug-Nov
<i>Balladonia aevroides</i>	3	Unknown.	Possible	
<i>Beyeria cinerea</i> subsp. <i>cinerea</i>	3	Light yellow sand on dry flats.	Possible	Aug-Nov
<i>Beyeria gardneri</i>	3	Yellow sand.	Unlikely	Aug-Sep
<i>Blackallia nudiflora</i>	3	Clay or sandy clay with granite. On hills or breakaways, plains.	Possible	Aug-Sep
<i>Bossiaea calcicola</i>	3	Compacted sand over limestone. Exposed sites on coastal cliffs and slopes.	Possible	Jul-Sep
<i>Bossiaea inundata</i>	2	Sand, sandstone. River beds and banks, seasonally inundated areas.	Possible	May-Sep
<i>Brachyloma pirara</i>	2	Sand.	Possible	Jun-Aug
<i>Caladenia bigeminata</i>	1	Broken sandstone on clay or in damper areas around low areas and along drainages.	Likely	Aug
<i>Caladenia longicauda</i> subsp. <i>minima</i>	2	Unknown.	Possible	Aug
<i>Calectasia browneana</i>	2	White-grey sand, laterite. Adjacent to wet areas of creekline.	Likely	Jun-Aug

Taxon	Priority	Habitat	Likelihood	Flowering
<i>Calothamnus cupularis</i>	2	Yellow or yellow-white sand. Hillslopes, flats and breakaways.	Possible	Sep-Oct
<i>Calytrix formosa</i>	3	White or yellow sand. Sandplains.	Possible	Sep-Nov
<i>Calytrix harvestiana</i>	2	White or yellow sand. Flats.	Possible	Sep-Dec
<i>Calytrix paucicostata</i>	2	Yellow or grey sand. Sand dunes.	Possible	Sep-Oct
<i>Calytrix pimeleoides</i>	3	Grey or yellow-brown sand, laterite. Sandplains, flats, hills, outcrops.	Possible	Aug-Oct
<i>Calytrix purpurea</i>	2	White, grey or yellow sand, often over laterite. Sandplains, sand dunes.	Possible	Sep-Dec
<i>Carpobrotus sp. Thevenard Island (M. White 050)</i>	3	Coarse white sand. Dune tops, disturbed areas.	Likely	Aug
<i>Centrolepis cephaliformis</i> subsp. <i>murrayi</i>	3	Sand, granite. Moss, salt flats.	Unlikely	Aug-Oct
<i>Chamaescilla maculata</i>	1	Stony brown clay loam in seasonally wet and low lying areas brown loam / clay over sandstone.	Possible	Aug-Sep
<i>Chamelaucium marchantii</i>	3	Sand. Breakaway slopes, near creeks.	Possible	Aug-Nov
<i>Chamelaucium sp. Coolcalalaya (A.H. Burbidge 4233)</i>	1	Sand over Kaolinite.	Possible	Oct-Nov
<i>Chthonocephalus tomentellus</i>	2	Red sand. Undulating plains, sand dunes, near saline depressions.	Likely	Aug-Nov
<i>Comesperma rhadinocarpum</i>	3	Low limestone ridge, sand over limestone. Sandy soils.	Likely	Oct-Nov
<i>Corynotheca acanthoclada</i>	1	Open area, grye/white sand near creek bed	Unlikely	Oct-Dec
<i>Cryptandra glabriflora</i>	2	Yellow or grey sand, gravelly soils. Plains.	Possible	May-Aug
<i>Desmocladius ferruginipes</i>	1	Midslope on dark grey sand and grey sand	Possible	Aug-Oct
<i>Diuris recurva</i>	4	Loam. Clay, rocky, Winter-wet areas.	Likely	Jul-Aug
<i>Drosera radicans</i>	3	Sand or sandy clay. Winter-wet areas.	Likely	Aug-Sep
<i>Drosera rechingeri</i>	3	Pale yellow or grey sand.	Unlikely	Sep-Oct
<i>Enekbatus cristatus</i>	2	Yellow sand, sandy gravel, clay over sandstone. Sloping sand plains.	Unlikely	Aug-Sep
<i>Eremophila brevifolia</i>	2	Red/brown gravelly clay/loam. Breakaway. Steep river bank.	Unlikely	Jul-Sep
<i>Eremophila microtheca</i>	4	Sandy clay. Winter wet flats, saline flats, sandplains.	Likely	Aug-Sep

Taxon	Priority	Habitat	Likelihood	Flowering
<i>Eucalyptus blaxellii</i>	4	Grey sand, clay. Rocky hillsides, creek flats.	Unlikely	Aug-Nov
<i>Frankenia confusa</i>	4	Wet pale brown sand, brown clay, grey soil. Banks of rivers & waterholes, river floodplains.	Likely	Sep
<i>Gastrolobium propinquum</i>	3	Clay, clay-loam or sandy clay soils, granite, shale. Hills, flats, drainage lines, winter-wet areas.	Possible	Jun-Sep
<i>Geleznovia amabilis</i>	2	Brown, yellow or red sand on slopes and sandplains	Possible	Sep-Dec
<i>Geleznovia narcissoides</i>	3	White, grey, red, brown, sand, Gentle slopes and flats	Possible	Aug-Nov
<i>Grevillea costata</i>	3	Alluvial sand, clay. In or near river beds among sandstone or granite rocks.	Unlikely	Jul-Sep
<i>Grevillea leptopoda</i>	3	Loam & lateritic gravel, sand, clay.	Possible	Aug-Sep
<i>Grevillea leucoclada</i>	3	Red or yellow sand over sandstone. River gorges.	Unlikely	Aug-Sep
<i>Grevillea stenomera</i>	2	Red or yellow sand on limestone. Coastal areas.	Likely	May-Jun
<i>Grevillea triloba</i>	3	Sandy loam on sandstone or limestone, lateritic soils.	Possible	Jun-Oct
<i>Guichenotia quasicalva</i>	2	Sandy clay over laterite. Drainage line.	Unlikely	Sep-Oct
<i>Hemiandra</i> sp. <i>Kalbarri</i> (D. Bellairs 1505)	2	White or grey sand on sandplains	Unlikely	Sep-Oct (Feb)
<i>Hemigenia pimeleifolia</i>	2	Sandstone shale, plains	Unlikely	Sep-Oct
<i>Jacksonia velutina</i>	4	Yellow sand. Sandplains & sandhills.	Possible	Aug-Sep
<i>Lasiopetalum oldfieldii</i>	3	White, grey or yellow sand, gravel, laterite. Sandplains, rises.	Likely	Aug-Nov
<i>Lasiopetalum oppositifolium</i>	3	Sandy soils over sandstone or limestone. Sandstone cliffs & crevices.	Unlikely	Aug-Oct
<i>Lepidobolus densus</i>	4	Yellow lateritic sand, lateritic gravel. Dry kwongan.	Unlikely	Aug-Sep
<i>Lepidosperma rupestre</i>	4	River beds, sandstone.	Unlikely	Aug-Sep
<i>Leucopogon psammophilus</i>	1	Breakaways.	Unlikely	Aug-Oct
<i>Leucopogon</i> sp. <i>Moresby Range</i> (S. Patrick 2614)	3	Brown sandy loam, gravel, sandstone. Middle slopes of valleys, steep rocky hillsides, ridges, roadverges.	Possible	Jun-Jul
<i>Leucopogon</i> sp. <i>Port Gregory</i> (C. Page 33)	1	Breakaways or hillslopes. Brown sand or loam	Possible	May-Jul

Taxon	Priority	Habitat	Likelihood	Flowering
<i>Liparophyllum congestiflorum</i>	4	Drainage lines, swamps, flats and gullies. Sandstone with grey sand.	Possible	Oct
<i>Macarthuria intricata</i>	3	Red or black soil over limestone, grey sand over sandstone, sandy clay. Sandplains & sand dunes.	Likely	Sep-Dec
<i>Malleostemon costatus</i>	2	Yellow brown, red brown clayey sand or clay.	Possible	Jul-Oct
<i>Malleostemon pustulatus</i>	2	Yellow silty sand, clayey sand or red loam with ironstone. Sandplains and broad depressions	Possible	Sep-Oct
<i>Melaleuca huttensis</i>	3	Light yellow or beige sand. Lower slopes of undulating plains, sandplains.	Likely	Jun-Sep
<i>Melaleuca oldfieldii</i>	2	Red or brown sand over sandstone or limestone, sandy clay.	Possible	Aug-Dec
<i>Micromyrtus collina</i>	1	Midslope above creek. Dry sandstone gravel.	Possible	May-Aug
<i>Millotia jacksonii</i>	2	Shallow sandy soils. In depressions on sandstone.	Unlikely	Sep
<i>Mirbelia corallina</i>	3	Yellow, white or brown sand. Sandplains or flats	Possible	Aug-Sep
<i>Ozothamnus vespertinus</i>	1	Brown /red loam or white clay loam. Breakaways	Unlikely	Nov
<i>Persoonia brachystylis</i>	2	Yellow or grey sand, often over laterite. Sandplains.	Possible	Nov-Dec
<i>Physopsis chrysophylla</i>	3	Red or yellow sandy soils. Sandplains.	Possible	Sep-Dec
<i>Pileanthus bellus</i>	3	Yellow sand or shallow grey sand over sandstone. Sand dunes.	Possible	Oct-Dec
<i>Platysace</i> sp. <i>Kalbarri</i> (D. & B. Bellairs 1383)	2	Red gravelly soils & sandstone. Coastal areas.	Unlikely	Oct-Nov
<i>Prostanthera scutata</i>	2	Gravelly sand.	Unlikely	Oct-Dec
<i>Pterostylis argillacea</i>	2	Yellow sandplain. Brown clay. Winter wet.	Possible	Sep
<i>Ptilotus chortophytus</i>	1	Yellow or brown loam or sandy loam. Breakaways and hillslopes	Possible	Sep-Nov
<i>Rhodanthe</i> sp. <i>Yuna</i> (G.J. Keighery, B.J. Keighery & B. Moyle 2820)	3	On rocky outcrop.	Unlikely	Sep-Nov
<i>Scaevola kallophylla</i>	4	Sandy soils over limestone. Coastal plain	Likely	Aug-Dec
<i>Scaevola oldfieldii</i>	3	Sand, loam, clay. Near rivers. Sand over limestone.	Likely	Aug-Dec

Taxon	Priority	Habitat	Likelihood	Flowering
<i>Scaevola</i> sp. Golden hairs (D. & B. Bellairs 1450 A)	1	Grey or white sand. Sandplain sand plains.	Possible	Aug-Nov
<i>Scholtzia bellairsiorum</i>	3	Yellow, brown or grey sand. Flat sandplain.	Possible	Sep-Nov
<i>Scholtzia kalbarri</i>	2	Unknown.	Possible	Aug-sep
<i>Scholtzia oleosa</i>	3	Light brown or grey sand or clay. Sandplains, undulating rises and depressions.	Possible	Sep-Nov
<i>Scholtzia tenuissima</i>	2	Brown clay over laterite or dull yellow sand. Sandplains and dune swales.	Likely	Sep-Nov
<i>Stachystemon nematophorus</i>	4	Dry sand, sandy gravel over laterite, sandstone. Exposed rocky sites, disturbed ground.	Unlikely	? Nov
<i>Stenanthemum divaricatum</i>	3	White or yellow sand over sandstone.	Unlikely	? Jun
<i>Stylidium torticarpum</i>	3	Sandy clay and clay loam over laterite. Adjacent to creeklines, depressions, and beneath breakaways. Heath or mallee shrubland.	Unlikely	Sep-Nov
<i>Styphelia allittii</i>	3	Plain. Dry gravelly yellow clayey sand.	Possible	?Jun
<i>Styphelia cernua</i>	2	Grey, yellow or white sand on sandplains	Possible	May-Aug
<i>Styphelia inopinata</i>	1	Pale brown clay loam. Rocky shale breakaway.	Possible	?Jun
<i>Teucrium</i> sp. Hutt River (W.H. Butler 54)	1	Unknown.	Possible	?Oct
<i>Thryptomene calcicola</i>	2	Red brown clay or loam and red or grey sand. Hillslopes and sandplains.	Possible	Jul-Sep
<i>Thryptomene conica</i>	2	Shallow sandy soils. Coastal limestone cliffs, stream beds.	Likely	Aug
<i>Thryptomene johnsonii</i>	2	Grey sand, sandstone. Sandplain slopes.	Possible	Sep-Oct
<i>Thryptomene striata</i>	2	Sandy & loamy soils with ironstone pebbles.	Possible	Sep
<i>Thysanotus kalbarriensis</i>	2	Yellow or grey sand. Sandplains	Possible	Sep-Nov
<i>Triodia bromoides</i>	4	Red, grey & calcareous sand. Dunes, sandplains, stony rises.	Possible	Jul-Oct
<i>Triodia dielsii</i>	3	White/grey sand over sandstone or with lateritic gravel. Sandplains, near gorges.	Unlikely	Jul-sep
<i>Trithuria australis</i>	4	Waterhole on a granite platform.	Unlikely	Nov
<i>Verticordia capillaris</i>	4	Yellow sand, sandy loam, sandy clay. Sandplains.	Possible	Oct-Nov
<i>Verticordia dasystylis</i> subsp. <i>kalbarriensis</i>	2	Clay-silt. Winter-wet areas.	Possible	Oct-Nov

Taxon	Priority	Habitat	Likelihood	Flowering
<i>Verticordia densiflora</i> var. <i>roseostella</i>	3	Sandy gravelly soils.	Possible	Sep-Dec
<i>Verticordia dichroma</i> var. <i>dichroma</i>	3	Yellow sand. Sandplains.	Possible	Oct-Dec
<i>Verticordia dichroma</i> var. <i>syntoma</i>	3	Yellow or red sand. Sandplains.	Possible	Oct-Nov
<i>Verticordia polytricha</i>	4	Sand, gravelly clay. Sandstone outcrops.	Unlikely	Sep-Oct
<i>Wurmbea murchisoniana</i>	4	Clay, sandy clay, loam. Seasonally inundated clay hollows, rock pools.	Possible	Jul-Sep

