



Willowdale Targeted Flora Survey – Desktop review of Spring 2023 extension areas

Technical Memorandum

Alcoa of Australia Ltd

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Template 2.8.1

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Abbreviations

| Abbreviation | Description |
|--------------|--|
| Alcoa | Alcoa of Australia Limited |
| ALA | Atlas of Living Australia |
| BC Act | <i>Biodiversity Conservation Act 2016</i> |
| DBCA | Department of Biodiversity, Conservation and Attractions |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water |
| DP | Declared Pest |
| DPIRD | Department of Primary Industries and Regional Development |
| DWER | Department of Water and Environmental Regulation |
| ELA | Eco Logical Australia |
| EPA | Environmental Protection Authority |
| EP Act | <i>Environmental Protection Act 1986</i> |
| EPBC Act | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| ESA | Environmentally Sensitive Area |
| IBRA | Interim Biogeographic Regionalisation for Australia |
| JAF01 | Northern Jarrah Forest IBRA subregion |
| MMP | Mining and Management Program |
| PDWSA | Public Drinking Water Source Area |
| PMST | Protected Matters Search Tool |
| WAH | Western Australian Herbarium |
| WoNS | Weed of National Significance |

1. Introduction

1.1. Project background

Alcoa of Australia Limited's (Alcoa) Western Australian mining operations includes the Willowdale bauxite mine, located in Alcoa's Mining Lease 1SA, east of Waroona, Western Australia. Alcoa has approval to mine within Mining Lease 1SA subject to submitting draft five-year mine plans and associated environmental management programmes known as the Mining and Management Program (MMP) to the State's Mining and Management Program Liaison Group on an annual basis. Alcoa has committed to undertaking pre-clearance ecological surveys for the Willowdale Mine (Larego region) as part of its MMP assessment.

Eco Logical Australia (ELA) was engaged by Alcoa to undertake pre-clearance flora surveys in the Larego region of Willowdale mine. The pre-clearance flora surveys comprise Threatened and Priority Flora and Key Weed species (Weeds of National Significance [WoNS] and Declared Pest plants [DP]) surveys conducted over three survey periods (Spring 2023, Autumn 2024, and Spring 2024). The results of these surveys will be used to: amend conceptual clearing alignments to avoid significant flora and vegetation; create management plans to ensure any identified WoNS or DP and invasive weeds are not spread; inform translocation and environmental management plans as required; and assist Alcoa in preparing its MMP submission.

Following completion of the Spring 2023 survey component it was identified that 96 small areas were omitted from the base assessment layer. These omitted areas have a total of 52.4 ha and occur adjacent to the areas surveyed in Spring 2023, which totalled 65 areas covering 801.0 ha (ELA 2024).

1.2. Scope of works

Eco Logical Australia (ELA) was engaged by Alcoa to undertake a desktop assessment of omitted areas (hence referred to as 'extension areas') in view of results from the Spring 2023 survey (ELA 2024; Figure 1). The scope of works included:

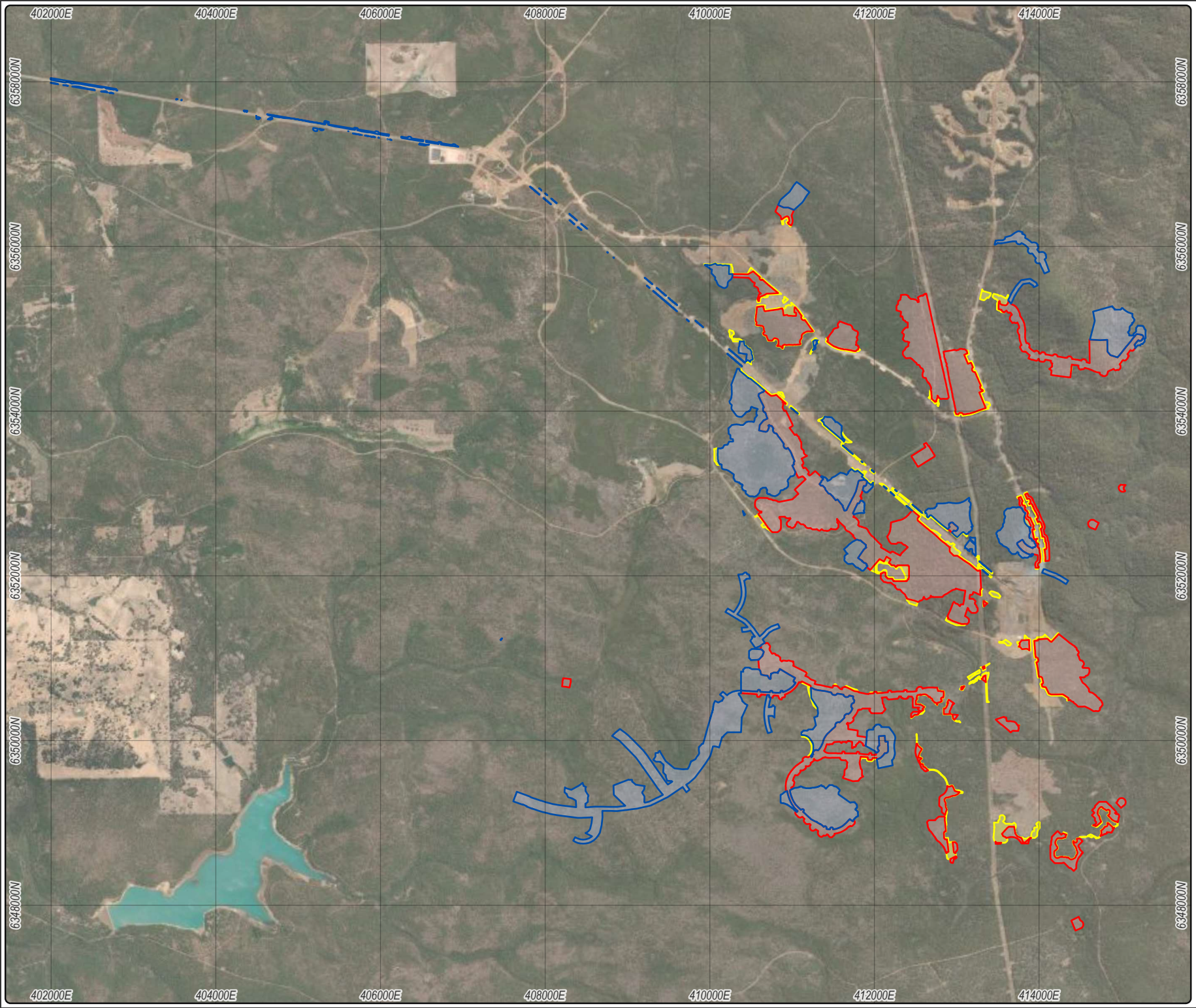
- Undertake a desktop assessment to identify potential conservation significant flora species occurring with the extension areas; and
- Preparation of a brief technical memorandum, detailing findings of the desktop assessment.

2. Environmental setting

Broad environmental values for the region relevant to the extension areas are presented in Table 1 below. For more detailed information refer to ELA (2024).

Table 1: Environmental values of the region

| Existing environmental attributes | Survey area |
|---|---|
| Interim Biogeographical Regionalisation for Australia (IBRA) Bioregion (DCEEW 2023a) | Jarrah Forest |
| IBRA Subregion (DCEEW 2023a) | Northern Jarrah Forest (JAF01) |
| Geology, landform, and soils (Department of Primary Industries and Regional Development [DPIRD] 2022) | <p>Darling Plateau System: lateritic plateau with gravelly soils and Jarrah-marri-wandoo forest and woodland.</p> <p>Murray Valleys System: deeply incised valleys with red loamy earths, shallow duplexes and rock outcrop and Jarrah-marri-wandoo forest and woodland with mixed shrubland.</p> |
| Soil Units (Australian Soil Resource Information System 2023; DPRID 2022) | <p>Unit JZ1: underlain by a dissected plateau with strongly undulating relief and some moderately incised valleys. Soils are characterised by lateritic gravels and block laterite, with the chief soils being ironstone gravels with sandy and earthy matrices.</p> <p>Unit Mw31: comprises deeply incised, steep scarp and valley side slopes of the Darling scarp and its more deeply incised tributary valleys; chief soils are red earths on the colluvial slope deposits, with massive rock outcrops a feature.</p> |
| Beard's (1979) vegetation mapping (DPIRD 2019) | West Darling 3: medium forest of jarrah and marri. |
| Regional Forest Agreement mapping (Mattiske and Havel 1998) | <p>Cooke: Mosaic of open forest of <i>Eucalyptus marginata</i> subsp. <i>marginata</i>-<i>Corymbia calophylla</i> (subhumid zone) and open forest of <i>Eucalyptus marginata</i> subsp. <i>thalassica</i>-<i>Corymbia calophylla</i> (semiarid and arid zones) and on deeper soils adjacent to outcrops, closed heath of Myrtaceae-Proteaceae species and lithic complex on granite rocks and associated soils in all climate zones, with some <i>Eucalyptus laeliae</i> (semiarid), and <i>Allocasuarina huegeliana</i> and <i>Eucalyptus wandoo</i> (mainly semiarid to perarid zones).</p> <p>Dwellingup 1: Open forest of <i>Eucalyptus marginata</i> subsp. <i>marginata</i>-<i>Corymbia calophylla</i> on lateritic uplands in mainly humid and subhumid zones.</p> <p>Murray 1: Open forest of <i>Eucalyptus marginata</i> subsp. <i>marginata</i>-<i>Corymbia calophylla</i>-<i>Eucalyptus patens</i> on valley slopes to woodland of <i>Eucalyptus rudis</i>-<i>Melaleuca raphiophylla</i> on the valley floors in humid and subhumid zones.</p> <p>Swamp: Mosaic of low open woodland of <i>Melaleuca preissiana</i>-<i>Banksia littoralis</i>, closed scrub of Myrtaceae spp., closed heath of Myrtaceae spp. and sedgelands of <i>Baumea</i> and <i>Leptocarpus</i> spp. on seasonally wet or moist sand, peat and clay soils on valley floors in all climatic zones.</p> <p>Yarragil 1: Open forest of <i>Eucalyptus marginata</i> subsp. <i>marginata</i>-<i>Corymbia calophylla</i> on slopes with mixtures of <i>Eucalyptus patens</i> and <i>Eucalyptus megacarpa</i> on the valley floors in humid and subhumid zones.</p> <p>Yarragil 2: Open forest of <i>Eucalyptus marginata</i> subsp. <i>thalassica</i>-<i>Corymbia calophylla</i> on slopes, woodland of <i>Eucalyptus patens</i>-<i>Eucalyptus rudis</i> with <i>Hakea prostrata</i> and <i>Melaleuca viminea</i> on valley floors in subhumid and semiarid zones</p> |
| Hydrology (DWER 2018a, b; DWER 2023) | <p>Catchments: Harvey Diversion_Harvey and Harvey Estuary_Harvey River.</p> <p>Public drinking water source areas (PDWSA): Samson Brook Catchment (P1) and Stirling Dam Catchment (P1).</p> |
| Environmentally Sensitive Areas (ESAs) (DBCA 2023a; DCCEEW 2023b; DWER 2021) | Dwellingup State Forest, a Section 5(1)(a) reserve. |



- Legend**
- Extension Areas
 - Survey areas (ELA 2024)**
 - Priority 1
 - Priority 2

Figure 1: Location of extension areas and 2023 spring survey areas



Datum/Projection:
AGD 1984 AMG Zone 50
23PER5309-JP Date: 23/04/2024



3. Methodology

3.1. Desktop review

Database searches were undertaken as part of the desktop review in ELA (2024), with these searches (and results of the field survey) being used to determine the likelihood of conservation significant flora occurring within the extension areas.

3.1.1. Database searches

The following Commonwealth and State databases were searched for information relating to conservation significant flora within the extension areas. Applied search buffers used are considered suitable based on flora expected to occur (**Table 2**).

Table 2: Database searches undertaken for the extension areas

| Database | Reference | Search area |
|--|--------------------------------|---|
| Atlas of Living Australia Spatial search for records. | Atlas of Living Australia 2023 | 10 km buffer around project area envelope |
| Commonwealth EPBC Act Protected Matters Search Tool (PMST) for Matters of National Environmental Significance, including any Threatened species listed under the EPBC Act. | DCCEEW 2023c | 10 km buffer around project area envelope |
| DBCA Threatened and Priority flora database searches for Declared Rare Flora listed under the latest WA Biodiversity Conservation (listing of native species) (flora) order and Priority Flora [ref# 64-0223FL]^ | DBCA 2023b | Area ~150 km x 80 km covering Alcoa operations areas and buffer |

^Supplied by Alcoa

3.1.2. Literature review

The following publicly available literature and previous survey reports relevant to the extension areas were reviewed:

- *Flora and vegetation management plan (Draft) – Huntly and Willowdale mines* (Mattiske Consulting 2022).
- *Assessment of matters pertaining to the renewal of the Regional Forest Agreement for the South-West Forest Region of Western Australia* (Government of Western Australia 2019).
- Eco Logical Australia 2024. *Willowdale Targeted Flora Survey – Spring 2023* Prepared for Alcoa of Australia.

Aerial photography for the survey areas was reviewed to identify land use patterns, the extent of vegetation, relevant landscape/catchment matters and any other relevant issues where possible.

3.1.3. Likelihood of occurrence assessment

An assessment of the likelihood of Threatened and Priority flora species being present within the extension areas was carried out. The assessment is based on specific likelihood of occurrence criteria. The criteria include factors such as: location and recency of previous records in relation to the extension areas; suitable landforms, soils and habitat that appear to be present based on the desktop review and aerial imagery; and known flowering periods. In addition, Alcoa’s location specific risk rating for Larego (Alcoa 2023) was considered during development of ELA’s likelihood ratings.

Conservation codes, categories and criteria for flora protected under the EPBC Act and the State *Biodiversity Conservation Act 2016* (BC Act) are provided in Appendix A (DBCA 2023c, DBCA 2023d). Criteria used for this assessment are presented in Appendix B.

4. Results and Discussion

4.1. Desktop assessment

The PMST search (DCCEEW 2023c) and review of the DBCA Threatened and Priority flora database search (DBCA 2023b) was undertaken to identify conservation significant flora species recorded within, or nearby to, the extension areas (current and historic). A review of conservation significant flora species recorded by ELA (2024) was also undertaken. Conservation significant flora species previously recorded within, and in proximity to the extension areas are presented in **Figure 2**.

4.1.1. Conservation significant flora species

A total of 76 conservation significant flora species were identified during the desktop assessment. Of these three were considered likely to occur within the extension areas, 10 were considered as having the potential to occur, and 63 were considered unlikely to occur. The full flora likelihood of occurrence assessment is provided in Appendix C.

The three conservation significant flora species considered likely to occur within the extension areas were all recorded by ELA (2024), and were therefore known to occur in the local area, these being:

- *Netrostylis* sp. Nannup (P.A. Jurjevich 1133; listed as P1 by DBCA),
- *Grevillea prominens* (P3), and
- *Senecio leucoglossus* (P4).

Netrostylis sp. Nannup (P.A. Jurjevich 1133) is a perennial, caespitose sedge that grows in valley floor and creeklines on damp soils within woodland and tall shrubland (WAH 1998-). One historical record of this species was located in a creekline between survey areas LR23_28 and LR23_P2_31 (DBCA 2023b; now a cleared area immediately adjacent to a conveyor). ELA (2024) recorded one individual *Netrostylis* sp. Nannup (P.A. Jurjevich 1133) plant in a creekline within survey area LR23_23 (ELA 2024). The occurrence(s) of *Netrostylis* sp. Nannup (P.A. Jurjevich 1133) in the extension areas would likely be restricted to creeklines and associated creek margins (e.g. riparian and flood out zones with clay loam soils).

Grevillea prominens is a spreading shrub that grows in gravelly loam along creeklines in jarrah forest (WAH 1998-). Multiple historical records occur within 25 km, including two records that are less than 100 m southeast of survey area LR23_6 (ELA 2024). ELA (2024) recorded a total of 11 individual plants from 11-point locations. Plants recorded by ELA (2024) were mostly growing adjacent to creeklines on gentle slopes in loamy soils on laterite in jarrah-marri forest. The occurrence(s) of *Grevillea prominens* in the extension areas would likely be restricted to deep gravelly loams adjacent to creeklines and other low-lying areas (e.g. damplands and wetlands).

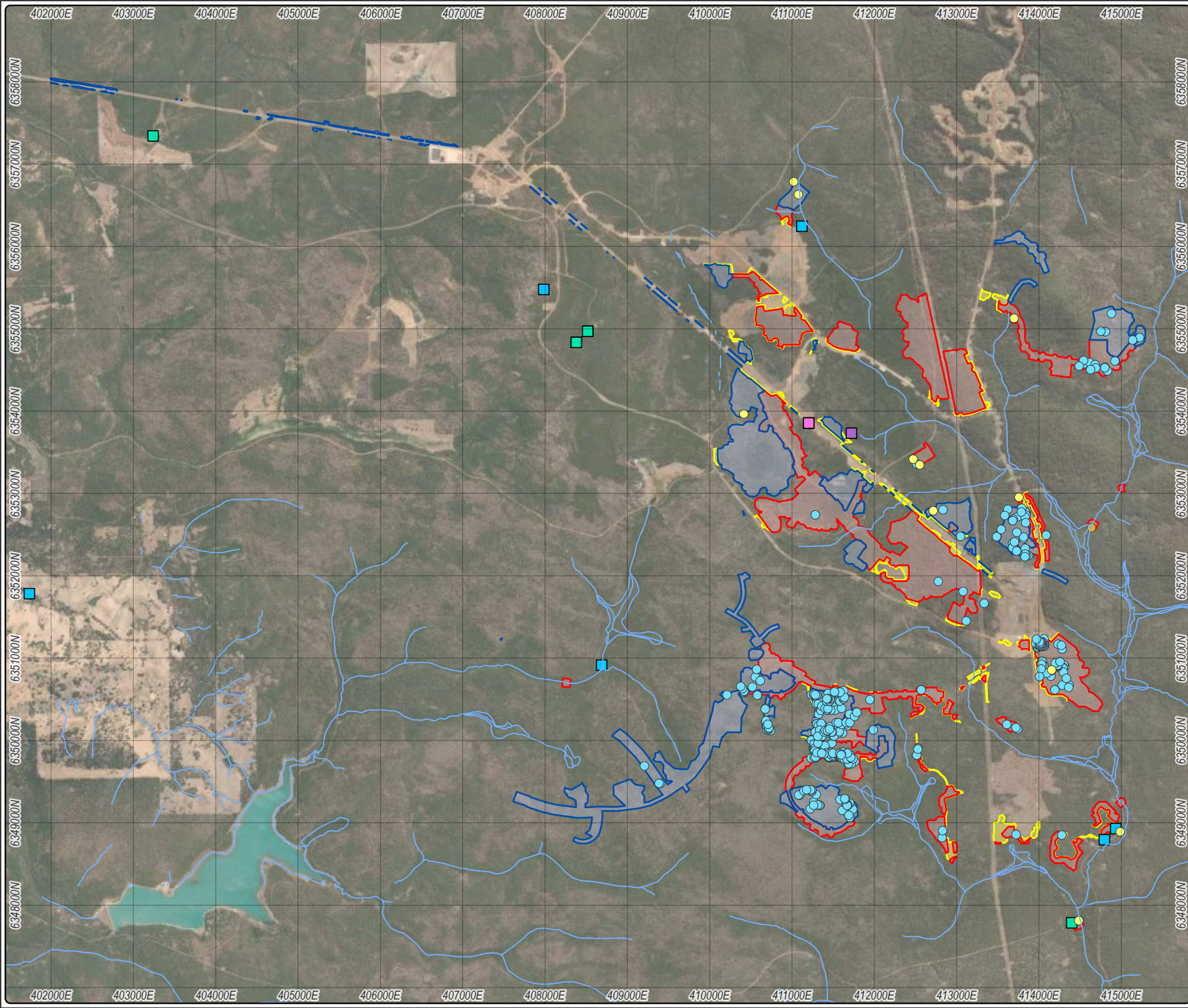
Senecio leucoglossus is an annual herb that grows on gravelly lateritic or granitic soils on slopes or granite outcrops in jarrah-marri forest (WAH 1998-). Multiple historical records occur within 25 km, including one directly adjacent to Turbidity area b (DBCA 2023b; ELA 2024). ELA (2024). ELA (2024) recorded a

total of 2,063 individual plants from 348-point locations, with the majority of records occurring in the east and south of the mine area. *Senecio leucoglossus* was relatively common across the broader survey area, and the same would be expected within the extension areas; particularly those comprising mid and upper slopes with gravelly lateritic soils.

Ten conservation significant flora species were considered as having the Potential to occur within the extension areas, namely:

- *Hibbertia acrotoma*, listed as P1 by DBCA
- *Melaleuca viminalis*, listed as P2
- *Schizaea rupestris*, listed as P2
- *Actinotus repens*, listed as P3
- *Cyathochaeta teretifolia*, listed as P3
- *Netrostylis* sp. Blackwood River (A.R. Annel's 3043), listed as P3
- *Tetratheca parvifolia*, listed as P3
- *Cyanothamnus tenuis*, listed as P4
- *Pimelea rara*, listed as P4
- *Stylidium ireneae*, listed as P4

A precautionary approach was taken when assigning a Potential likelihood of occurrence rating for the fore mentioned species. These Potential likelihood ratings were primarily based on the presence and proximity of previous database records, and presence of suitable habitat (both vegetation and landform) noted during systematic searches conducted by ELA (2024) in locations adjacent to the extension areas.



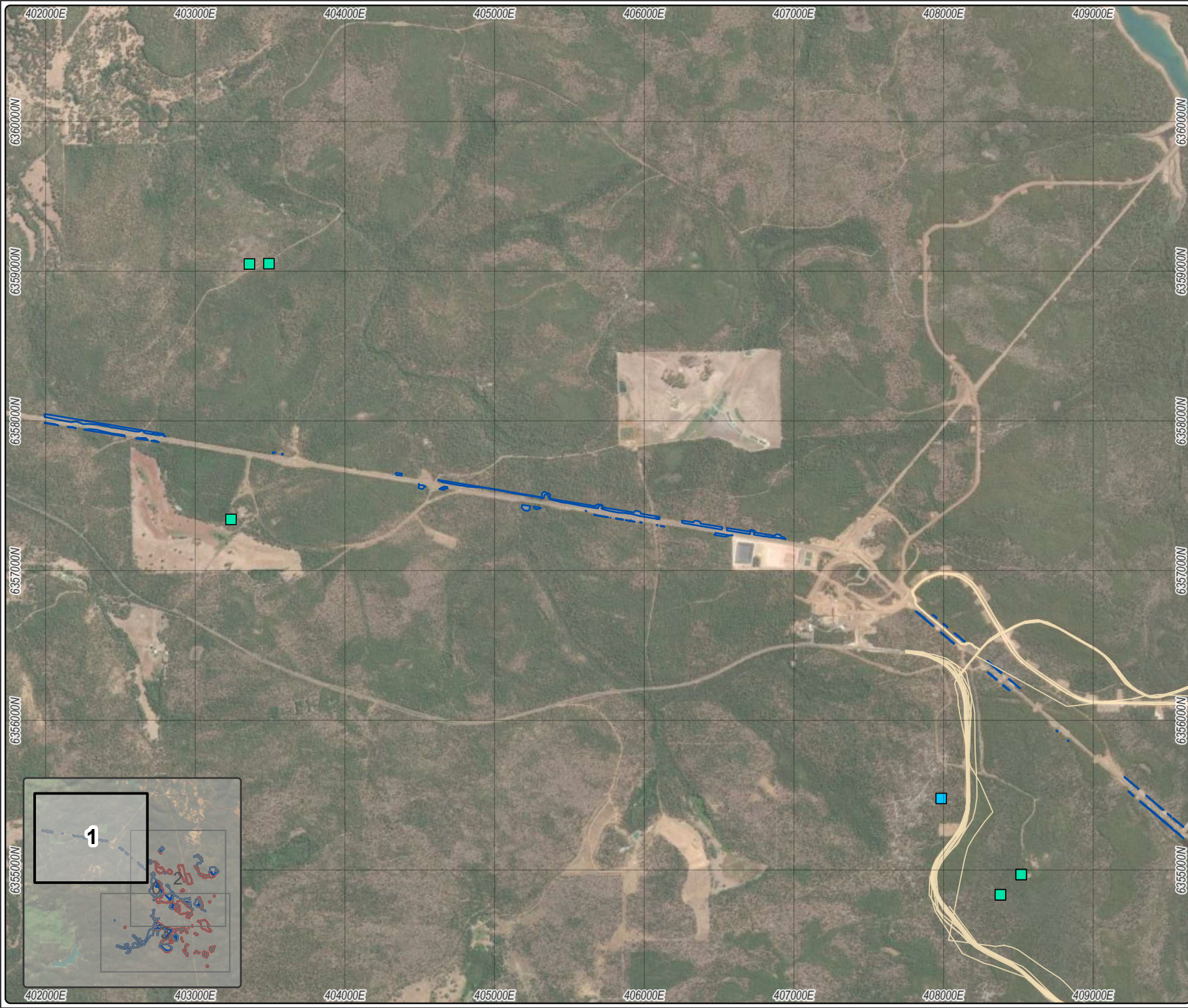
- Legend**
- Extension Areas
 - Streams
 - Survey areas (ELA 2024)**
 - Priority 1
 - Priority 2
 - Conservation significant flora (DBCAs 2023)**
 - Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Conservation significant flora (ELA 2024)**
 - Netrostylis* sp.
 - Nannup (P.A. Jurjevich 1133) (P1)
 - Grevillea prominens* (P3)
 - Senecio leucoglossus* (P4)

Figure 2A:
Conservation significant flora previously recorded within and in the vicinity of the extension areas (Overview)

0 0.250.5 1
 Kilometres

Datum/Projection:
 AGD 1984 AMG Zone 50

23PER5309-JP Date: 23/04/2024



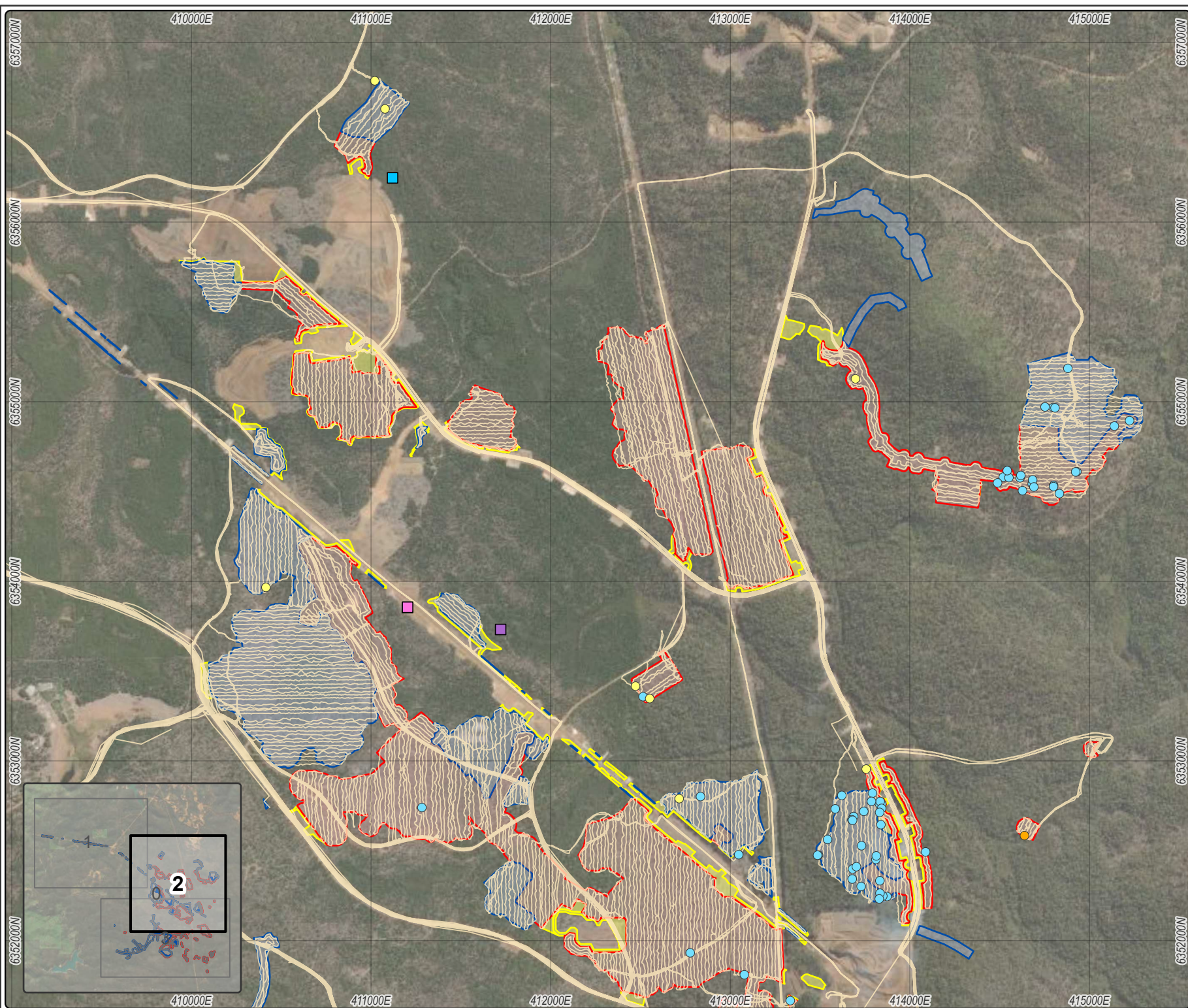
- Legend**
- Extension Areas
 - GPS Tracks
 - Survey areas (ELA 2024)**
 - Priority 2
 - Conservation significant flora (DBCA 2023)**
 - Priority 3
 - Priority 4

Figure 2B:
Conservation significant flora previously recorded within and in the vicinity of the extension areas (Detailed Map 1 of 3)



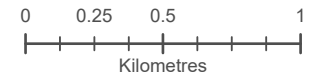
Datum/Projection:
 AGD 1984 AMG Zone 50
 23PER5309-JP Date: 22/04/2024



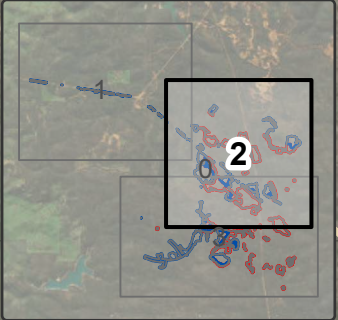


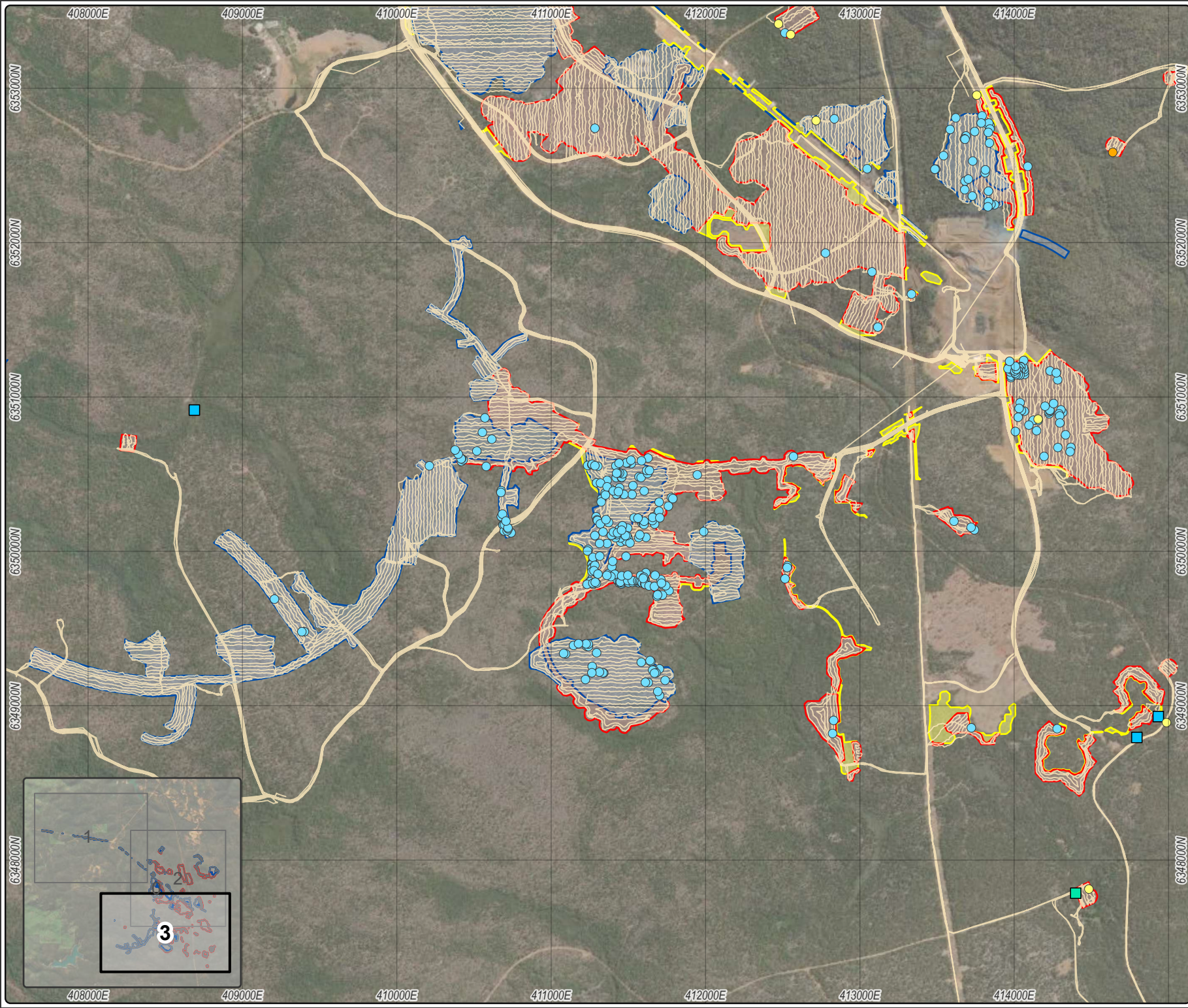
- Legend**
- Extension Areas
 - GPS Tracks
- Survey areas (ELA 2024)**
- Priority 1
 - Priority 2
- Conservation significant flora (DBCAs 2023)**
- Priority 1
 - Priority 2
 - Priority 3
- Conservation significant flora (ELA 2024)**
- Netrostylis* sp.
 - Nannup (P.A. Jurjevich 1133) (P1)
 - Grevillea prominens* (P3)
 - Senecio leucoglossus* (P4)

Figure 2C:
Conservation significant flora previously recorded within and in the vicinity of the extension areas (Detailed Map 2 of 3)



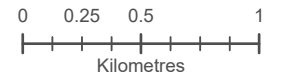
Datum/Projection:
 AGD 1984 AMG Zone 50
 23PER5309-JP Date: 22/04/2024





- Legend**
- Extension Areas
 - GPS Tracks
- Survey areas (ELA 2024)**
- Priority 1
 - Priority 2
- Conservation significant flora (DBCA 2023)**
- Priority 3
 - Priority 4
- Conservation significant flora (ELA 2024)**
- Netrostylis* sp.
 - Nannup (P.A. Jurjevich 1133) (P1)
 - Grevillea prominens* (P3)
 - Senecio leucoglossus* (P4)

Figure 2D:
Conservation significant flora previously recorded within and in the vicinity of the extension areas (Detailed Map 3 of 3)



Datum/Projection:
 AGD 1984 AMG Zone 50
 23PER5309-JP Date: 22/04/2024

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Appendix A Framework for conservation significant flora and fauna ranking

CATEGORIES OF THREATENED SPECIES UNDER THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Species listed as 'conservation dependent' and 'extinct' are not Matters of National Environmental Significance and therefore do not trigger the EPBC Act.

| Category | Definition |
|----------------------------|--|
| Extinct (EX) | There is no reasonable doubt that the last member of the species has died. |
| Extinct in the Wild (EW) | Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form. |
| Critically Endangered (CE) | Taxa considered to be facing an extremely high risk of extinction in the wild. |
| Endangered (EN) | Taxa considered to be facing a very high risk of extinction in the wild. |
| Vulnerable (VU) | Taxa considered to be facing a high risk of extinction in the wild. |
| Near Threatened (NT) | Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future. |
| Least Concern (LC) | Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category. |
| Data Deficient (DD) | There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status. |
| Not Evaluated (NE) | Taxa has not yet been evaluated against the criteria. |
| Migratory (MI) | Not an IUCN category. Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: <ul style="list-style-type: none"> • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the People's Republic of China for the Protection of Migratory Birds and their environment (CAMBA); • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); or • the agreement between Australia and the Republic of Korea to develop a bilateral migratory bird agreement similar to the JAMBA and CAMBA in respect to migratory bird conservation and provides a basis for collaboration on the protection of migratory shorebirds and their habitat (ROKAMBA). |

CONSERVATION CODES FOR WESTERN AUSTRALIA FLORA AND FAUNA

The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Threatened species (T)

Threatened fauna is that subset of ‘Specially Protected Fauna’ listed under Schedule 2 of the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022 made by the Minister under sections 13(1), 19(1) and 23(1) of the Act and regulation 174(1) of the *Biodiversity Conservation Regulations 2018*.

Threatened flora is that subset of ‘Rare Flora’ listed under Schedule 1 of the Biodiversity Conservation (Listing of Native Species) (Flora) Order 2022 made by the Minister under sections 19(1) and 23(1) of the BC Act and regulation 174(1) of the *Biodiversity Conservation Regulations 2018*.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

| Category | Code | Description |
|-------------------------------|------|---|
| Critically Endangered species | CR | Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under Schedule 2-Division 1 of the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022 for critically endangered fauna or Schedule 1-Division 1 of the Biodiversity Conservation (Rare Flora) Notice 2022 for critically endangered flora. |
| Endangered species | EN | Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under Schedule 2-Division 2 of the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022 for endangered fauna or Schedule 1-Division 2 of the Biodiversity Conservation (Rare Flora) Notice 2022 for critically endangered flora. |
| Vulnerable species | VU | Threatened species considered to be “facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under Schedule 2-Division 3 of the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022 for endangered fauna or Schedule 1- |

| Category | Code | Description |
|----------|------|---|
| | | Division 3 of the Biodiversity Conservation (Rare Flora) Notice 2022 for critically endangered flora. |

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild, as follows:

| Category | Code | Description |
|-----------------------------|------|---|
| Extinct species | EX | Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Extinct Species under Schedule 3 of the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022 for endangered fauna or Schedule 2 of the Biodiversity Conservation (Rare Flora) Notice 2022 for critically endangered flora. |
| Extinct in the wild species | EW | Species that “is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice. |

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. These species meet one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

Categories are detailed below.

| Category | Code | Description |
|---|------|--|
| Migratory species | MI | <p>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).</p> <p>Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.</p> <p>Published as migratory birds protected under an international agreement under Schedule 1-Division 2 of the 5 of the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022.</p> |
| Species of special conservation interest (conservation dependent fauna) | CD | <p>Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).</p> <p>Published as conservation dependent fauna under Schedule 1-Division 1 of the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022.</p> |
| Other specially protected species | OS | <p>Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).</p> <p>Published as other specially protected fauna under Schedule 1-Division 3 of the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022.</p> |

Priority species (P)

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

| Category | Code | Definition |
|------------|------|---|
| Priority 1 | P1 | <p>Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p> |
| Priority 2 | P2 | <p>Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p> |
| Priority 3 | P3 | <p>Poorly-known species</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p> |
| Priority 4 | P4 | <p>Rare, Near Threatened and other species in need of monitoring</p> <p>(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p> |

Appendix B Likelihood of occurrence assessment criteria

| Likelihood rating | Criteria |
|---|--|
| Recorded | The species has previously been recorded within the survey area from DBCA database search results and/or from previous surveys of the survey area, and/or the species has been confirmed through a current vouchered specimen at WA Herbarium. |
| Likely | <p>The species has not previously been recorded from within the survey area. However, (to qualify requires one or more criteria to be met):</p> <ul style="list-style-type: none"> the species has been recorded in close proximity to the survey area, and occurs in similar habitat to that which occurs within the survey area; core habitat and suitable landforms for the species occurs within the survey area either year-round or seasonally. In relation to fauna species, this could be that a host plant is seasonally present on site, or habitat features such as caves are present that may be used during particular times during its life cycle e.g. for breeding. In relation to both flora and fauna species, it may be there are seasonal wetlands present; and there is a medium to high probability that a species uses the survey area. |
| Potential | <p>The species has not previously been recorded from within the survey area. However, (one or more criteria requires to be met):</p> <ul style="list-style-type: none"> targeted surveys may locate the species based on records occurring in proximity to the survey area and suitable habitat occurring in the survey area; the survey area has been assessed as having potentially suitable habitat through habitat modelling; the species is known to be cryptic and may not have been detected despite extensive surveys; the species is highly mobile and has an extensive foraging range so may not have been detected during previous surveys; <p>Species has been recorded in the survey area by a previous consultant survey or there is historic evidence of species occurrence within the survey area. However, (one or more criteria requires to be met):</p> <ul style="list-style-type: none"> doubt remains over taxonomic identification, or the majority of habitat does not appear suitable (although presence cannot be ruled out due to factors such as species ecology or distribution); and coordinates are doubtful. |
| Unlikely | <p>The species has been recorded locally through DBCA database searches. However, it has not been recorded within the survey area and:</p> <ul style="list-style-type: none"> it is unlikely to occur due to the site lacking critical habitat, having at best marginally suitable habitat, and/or being severely degraded it is unlikely to occur due to few historic record/s and no other current collections in the local area. <p>The species has been recorded within the bioregion based on literature review but has not been recorded locally or within the survey area through DBCA database searches. The species has not been recorded in the survey area despite adequate survey efforts, such as a standardised methodology or targeted searching within potentially suitable habitat.</p> |
| Does not occur (one or more criteria requires to be met). | <p>The species is not known to occur within the IBRA bioregion based on current literature and distribution. The conspicuous species has not been recorded in the survey area despite adequate survey efforts at an appropriate time of year to detect the species within potentially suitable habitat. The survey area lacks important habitat for a species that has highly selective habitat requirements.</p> <p>The species has been historically recorded within survey area or locally; however, it is considered locally extinct due to significant habitat changes such as land clearing and/or introduced predators.</p> |

Appendix C Flora likelihood of occurrence assessment

| Species | Conservation status | | Source* | Description | Habitat | Likelihood |
|--|---------------------|---------------|-------------|---|---|--|
| | EPBC Act | BC Act / DBCA | | | | |
| <i>Synaphea</i> sp. Fairbridge Farm (D.Papenfus 696) | CR | CR | DCCEEW 2023 | Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. yellow, Oct. | Selena's <i>Synaphea</i> occurs on grey, clayey sand with lateritic pebbles in low woodland areas near winter-wet flats. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Caladenia bryceana</i> subsp. <i>bryceana</i> | EN | EN | Alcoa 2023 | Tuberous, perennial, herb, 0.05-0.1 m high. Fl. green-yellow, Aug to Oct. | Sand, loam. Adjacent to watercourses, winter-wet sites. | Unlikely ELA (2024) observed marginal habitat to be present, however no nearby records; nearest record ~100km SE (1985), all other records NE of Albany. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Caladenia leucochila</i> | EN | EN | Alcoa 2023 | Perennial orchid which produces a single hirsute leaf from an underground tuber in late autumn and grows through winter and spring. The leaf dehisces at the end of spring and the plant spends summer and early autumn as a dormant tuber. Flower stem to 0.4m high, 1-2 flowers that are 5-10cm across. Fl. Cream-pale yellow-greenish yellow-maroon, mid Sep-late Oct. | Jarrah, Marri and Sheoak forest over <i>Xanthorrhoea preissii</i> and dwarf scrub of <i>Bossiaea ornata</i> , <i>Banksia nivea</i> and <i>Lechenaultia biloba</i> in well-drained sandy slopes. Frequently occur under <i>Allocasuarina fraseriana</i> in leaf litter. Found in open woodland, tends to be in the lower parts of the valley between 230-245m ASL and slightly upslope of seasonally damp areas. | Unlikely ELA (2024) observed marginal habitat to be present, however no nearby records; all records ~55km SE (2008-2012) near Collie. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Diuris purdiei</i> | EN | EN | DCCEEW 2023 | Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow, Sep to Oct. | Sand to sandy clay soils, in areas subject to winter inundation, and amongst native sedges and dense heath with scattered emergent <i>Melaleuca preissiana</i> , <i>Eucalyptus calophylla</i> , <i>E. marginata</i> and <i>Nuytsia floribunda</i> . | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Grevillea rara</i> | EN | EN | Alcoa 2023 | Dense, prickly shrub, to 2 m high. Fl. white-pink/white, Oct. | Lateritic loam. Creeklines. | Unlikely ELA (2024) observed marginal habitat to be present. No nearby (<25km) records. A cluster of recent records near Worsley refinery ~40km S. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Jacksonia velveta</i> | EN | EN | Alcoa 2023 | Open, upright, sometimes sprawling shrub, to 1.9 m high. Fl. yellow-orange, Dec. | Brown gravelly loam, dry grey sand, ironstone. Slight hillslopes, ridges. | Unlikely ELA (2024) observed marginal habitat to be present. No nearby (<25km) records. Nearest record ~30km E (2017). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Banksia mimica</i> | EN | VU | DCCEEW 2023 | Prostrate, lignotuberous shrub, 0.15-0.4 m high. Fl. yellow-brown, Dec or Jan to Feb. | Flat to gentle slopes, on grey and white sand in open woodlands. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Anthocercis gracilis</i> | VU | VU | DCCEEW 2023 | Erect, spindly shrub, to 0.6(-1) m high. Fl. yellow-green, Sep to Oct. | Sandy or loamy soils. Granite outcrops. | Unlikely ELA (2024) observed marginal habitat to be present. No nearby records. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Diuris drummondii</i> | VU | VU | DBCA 2023 | Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow, Nov to Dec or Jan. | Low-lying depressions and swamps. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |

| Species | Conservation status | | Source* | Description | Habitat | Likelihood |
|---|---------------------|---------------|-------------------------|--|---|---|
| | EPBC Act | BC Act / DBCA | | | | |
| <i>Diuris micrantha</i> | VU | VU | Alcoa 2023, DCCEEW 2023 | A tuberous, perennial herb that grows 0.3-0.6 m high. Fl. yellow and brown, Sep-Oct. | Brown loamy clay areas, Winter-wet swamps and in shallow water. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Eleocharis keigheryi</i> | VU | VU | Alcoa 2023, DCCEEW 2023 | Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green, Aug to Nov. | Small clumps in a substrate of clay or sandy loam. This species is emergent in freshwater creeks, and transient waterbodies such as drainage lines and claypans in water to approximately 15 cm deep. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Morelotia australiensis</i> | VU | VU | DBCA 2023, DCCEEW 2023 | Perennial sedge 0.3-1.3m high, 0.1-0.6m across. Rhizome short, thick, woody, 8-15mm diam. Culms terete, 2.0-5.5mm diam, multi-striate, glabrous. Leaves mostly basal and 3-4 cauline; lamina of basal leaves 12-18cm long, 2-6mm wide, linear, finely- multi-striate, pubescent when young, green to blue-green, margins sparsely scabrous. Inflor narrow panicle-like, 15-27cm long, 10-20mm wide. Fl. Oct-Feb, usually one year post-fire. | East side of SCP; historical populations near Armadale and Canning apparently now extinct. Usually in winter-wet swampy depressions, drainage lines or sandy rises adjacent swamps. Grey sand over clay or yellow and sandy or clayey lateritic soils. Open <i>Corymbia calophylla</i> or <i>Eucalyptus marginata</i> woodland over low shrubs, herbs and sedges. | Unlikely ELA (2024) observed suitable habitat to be present. Several recent (2008-2010) nearby records <25km away, however these all occur in foothills. Species tends to occur along the foothills of the scarp rather than in pure jarrah forest. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Tribonanthes purpurea</i> | VU | VU | Alcoa 2023 | Tuberous, perennial, herb, 0.03-0.04 m high. Fl. pink-purple, Aug. | Seasonally wet soils in moss swards & herbfields among granite rocks. | Unlikely ELA (2024) did not observe suitable habitat to be present, however no nearby (<25km) records. Nearest record ~85km SE (1999). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Caladenia uliginosa</i> subsp. <i>patulens</i> | - | P1 | DBCA 2023 | Tuberous, perennial, herb, 0.2-0.35 m high. Fl. green-cream, Sep to Oct. | Clay loam and gravel. Well drained soils amongst dense shrubs. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Caladenia validinervia</i> | - | P1 | Alcoa 2023 | Plants solitary. Leaf 5–16 cm long, 3–6 mm wide, linear, erect, incurved in cross section, pale green, the basal 1/5 irregularly blotched with red-purple. Scape 12–21 cm tall. Flowers 1 or 2, 5–8 cm across, pale yellow to pale creamy yellow with prominent, dull red stripes, Sep-early Oct. | Between Collie and Manjimup and eastward to near Rocky Gully, growing in sandy gravelly soil in <i>Corymbia calophylla</i> - <i>E. marginata</i> forest with <i>Anigozanthos manglesii</i> , <i>Persoonia</i> and <i>Lechenaultia</i> species. | Unlikely ELA (2024) observed marginal habitat to be present, however no nearby records; nearest record ~45km SE (1965) near Collie. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Calytrix simplex</i> subsp. <i>simplex</i> | - | P1 | Alcoa 2023 | Shrub, ca 0.2 m high. Fl. purple, Oct to Nov. | Jarrah woodland over heath. Slopes, flats. Granitic and lateritic soils. | Unlikely ELA (2024) observed marginal habitat to be present, with nearest record ~30km E (2020). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Deyeuxia inaequalis</i> | - | P1 | DBCA 2023 | Erect, tufted annual, grass-like or herb, 0.75 m high. Leaves mostly basal. Leaf-sheaths scaberulous, glabrous on surface. Ligule an eciliate membrane, 3–5 mm long, membranous, lacerate, truncate. Leaf-blades linear, 5–12 cm long, 1–5 mm wide. Inflorescence solid, a panicle. Panicle linear or oblong, dense, 1–6 cm long. | Slopes, flats. Gravelly sandy loam. Forest of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> . | Unlikely ELA (2024) observed marginal habitat to be present. One recent record (2021) nearby (<25km) record to N, however all other records S of Margaret River. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Hemigenia rigida</i> | - | P1 | ALA 2023 | Upright or spreading shrub, 0.1-0.6(-1) m high. Fl. blue-purple/violet, Aug to Dec or Jan. | Sandy soils, lateritic gravelly soils. Hillslopes, granite outcrops, flats, ironstone ridges. | Unlikely ELA (2024) observed marginal habitat to be present. All records >100km to SE. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |

| Species | Conservation status | | Source* | Description | Habitat | Likelihood |
|---|---------------------|---------------|-----------------------|--|---|---|
| | EPBC Act | BC Act / DBCA | | | | |
| <i>Hibbertia acrotoma</i> | - | P1 | DBCA 2023 | Lax, openly-branched, spreading shrubs with stems to 0.5 m. Fl. Yellow, Aug-Sep. | Steep slopes, gravelly loam, granite boulders/outcrops. Jarrah-marri forest. | Potential ELA (2024) observed potentially suitable habitat to be present. One relatively recent (2005) nearby record 16km to N on scarp. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Hibbertia ambita</i> | - | P1 | Alcoa 2023 | Shrub to 80cm. Fl. Yellow, Aug-Oct. | Slopes. Lateritic soils. Jarrah-marri forest. | Unlikely ELA (2024) observed marginal habitat to be present. All records ~40km NE. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Netrostylis</i> sp. Nannup (P.A. Jurjevich 1133) | - | P1 | DBCA 2023 | Perennial, caespitose sedge to 0.9m. | Valley floors, creeklines. Damp sand, loam, clay. Woodland and tall shrubland. | Likely This species was recorded by ELA (2024) within a minor creekline; therefore it is known to occur in the local area. |
| <i>Cardamine paucijuga</i> | - | P2 | DBCA 2023 | Slender erect annual, herb, to 0.4 m high. Usually glabrous; leaves petiolate, pinnate, with 1-4 pairs of pinnae, ovate to linear. Sepals 1.5-2 mm long, sometimes purple, margins white; petals 2.5-3.5 mm long, white, rarely pink; stamens 6. Siliqua linear, 10-30 mm long, 0.7-1 mm wide, erect; style slender or obtuse, to 1 mm long; pedicels in fruit spreading, 3-15 mm long. Fl. white, Sep to Oct. | Winter-wet depressions and flats, drainage lines. Rich soils in moist to dry habitats. Marri, karri forest. <i>Eucalyptus rudis</i> , <i>Melaleuca raphiophylla</i> . Melaleuca tall shrubland. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. One recent (2016) nearby (<25km) record, at base of foothills. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Gonocarpus keigheryi</i> | - | P2 | Alcoa 2023, DBCA 2023 | Erect or decumbent shrub to 20cm high. Fl. Green, Dec-Feb. | Watercourses, seasonally wet areas. Lateritic gravelly or clayey sand. Jarrah, Marri, Karri forest. | Unlikely ELA (2024) observed marginal habitat to be present. One nearby record ~21km SE but not recent (1997). All other records further S. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Grevillea ornithopoda</i> | - | P2 | Alcoa 2023, DBCA 2023 | Slender erect shrub to 3 m high by 2 m wide. Fl. cream-white, Jun-Oct. | Riverbanks. <i>Eucalyptus rudis</i> , <i>E. patens</i> . | Unlikely ELA (2024) did not observe suitable habitat to be present. Several recent (2017-2019) nearby (<25km) records to N. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Leucopogon extremus</i> | - | P2 | Alcoa 2023 | Low, spreading shrub to 40cm high. Fl. Greenish-white, Sep-Oct. | Valley bottoms, creeks. Sandy clay, sandy loam. <i>Callitris pyramidalis</i> tall shrubland over Myrtaceous mid shrubland and sedges. | Unlikely ELA (2024) did not observe suitable habitat to be present. Nearest record ~35km SE (2006). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Logania sylvicola</i> | - | P2 | Alcoa 2023 | Erect to spreading compact multi-branched shrub 50 cm high, up to 50 cm wide. Leaves opposite, subsessile; linear, 3–5 mm long, 0.5–0.6 mm wide. Fl. White-cream, Aug-Sep. | Woodland to open forest vegetation on the mid-slope of laterite rises associated with brown clay to clayey sand. | Unlikely ELA (2024) observed suitable habitat to be present, however nearest recent record ~60km SE (2005). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Melaleuca viminalis</i> | - | P2 | Alcoa 2023 | Small tree to 10 m with pendulous foliage. Fl. Red, Nov-May. | Watercourses. Sandy clay. | Potential ELA (2024) observed suitable habitat to be present. One recent (2005) nearby record 10km NW on scarp. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |

| Species | Conservation status | | Source* | Description | Habitat | Likelihood |
|---|---------------------|---------------|---------------------------------|---|---|--|
| | EPBC Act | BC Act / DBCA | | | | |
| <i>Millotia tenuifolia</i> var. <i>laevis</i> | - | P2 | Alcoa 2023, DBCA 2023 | Ascending to erect annual, herb, 0.02-0.1 m high. Fl. yellow, Sep to Oct. | Granite or laterite soils. Jarrah and Allocasuarina woodland. | Unlikely ELA (2024) observed suitable habitat to be present, however no nearby (<25km) recent records. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Schizaea rupestris</i> | - | P2 | ALA 2023, Alcoa 2023, DBCA 2023 | Rhizomatous, perennial, herb or grass-like or (fern), 0.1-0.2 m high, fronds simple, glossy; sporangia-bearing segments in pinnately arranged 'cock's comb'. | Sand. Gullies, creek banks, shaded moist rock faces. | Potential ELA (2024) observed suitable habitat to be present. 1 recent (2000) nearby record 4km N. 1 older (1997) record immediately adjacent areas L23_127 and L23_123. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Stylidium acuminatum</i> subsp. <i>acuminatum</i> | - | P2 | Alcoa 2023 | Perennial herb to 20cm high, scape to 40cm. Basal rosette. Fl. Pale yellow, Nov-Dec. | Disturbed areas, hillslopes. Lateritic gravelly loam. Jarrah-marri forest. | Unlikely ELA (2024) observed suitable habitat to be present, however no nearby (<25km) records. Nearest record ~30km S (1967). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Stylidium korijekup</i> | - | P2 | DBCA 2023 | Perennial, herb, 0.18-0.34 m high. Leaves in a spreading rosette, spatulate (lamina ovate-elliptic), apex obtuse-subacute, margin entire, 4-6 cm long (petioles 3-4 mm long, lamina 1.4-2 cm long), 9-16 mm wide, glabrous. Scape c. 18-34 cm high. Fl. Cream, Oct. | Well-drained grey-brown sandy loam with laterite. Upland ridges. <i>Eucalyptus marginata</i> and <i>E. haematoxylon</i> woodland with <i>Xanthorrhoea acanthostachya</i> and <i>X. gracilis</i> . | Unlikely ELA (2024) observed marginal habitat to be present. Two recent (2005-2006) nearby (<25km) records. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Thysanotus</i> sp. Badgingarra (E.A. Griffin 2511) | - | P2 | Alcoa 2023 | Perennial, herb (with tuberous roots), ca 0.35 m high. Fl. blue, Dec. | Gentle slopes and flats. Grey sand with lateritic gravel. Eucalypt woodland. | Unlikely ELA (2024) observed suitable habitat to be present, however No nearby (<25km) records. Nearest record ~60km E (1960). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i> | - | P3 | Alcoa 2023 | Shrub, 0.9-2.5 m high, 'minni-ritchi' bark, phyllodes mostly 8-13 cm long, 1-2 mm wide. Fl. yellow, Aug to Oct. | Granitic soils, with boulders and outcrops. In heath and open woodland. | Unlikely ELA (2024) observed marginal habitat to be present. No nearby (<25km) records. Nearest recent record 75km N (2013). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Actinotus repens</i> | - | P3 | ALA 2023, DBCA 2023 | Prostrate perennial herb to 5cm high, 20cm wide. Fl. White, Jan-Mar. | Sandy clay and mud in valleys along creeklines and edges of watercourses. Eucalyptus or Melaleuca dominated woodland. | Potential ELA (2024) observed suitable habitat to be present. 3 nearby records: one in area L23_039 (2020); one ~100m SE of L23_131 (2003); one ~7km N (2000). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i> | - | P3 | Alcoa 2023 | Prostrate, mat-forming, non-lignotuberous shrub, to 0.3 m high. Fl. white-cream-pink-green/green, Jul or Sep to Dec or Jan. | Grey sand, lateritic gravel. | Unlikely ELA (2024) observed suitable habitat to be present, however No nearby (<25km) records. Given this conspicuous shrub was not recorded during the Spring 2023 targeted flora survey (ELA 2024), it is unlikely to occur within the extension areas. |
| <i>Angianthus drummondii</i> | - | P3 | ALA 2023, Alcoa 2023, DBCA 2023 | Erect annual, herb, to 0.1 m high. Fl. yellow, Oct to Dec. | Grey or brown clay soils, ironstone. Seasonally wet flats. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP and foothills species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Asteridea gracilis</i> | - | P3 | Alcoa 2023 | Annual, herb, 0.15-0.35 m high. Fl. white-pink, Sep to Dec. | Slopes, flats. Sand, clay, gravelly soils. Eucalypt woodland over heath. | Unlikely ELA (2024) observed marginal habitat to be present. Nearest record ~30km E (1980), all recent records >100km N. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |

| Species | Conservation status | | Source* | Description | Habitat | Likelihood |
|---|---------------------|---------------|---------------------------------|--|---|---|
| | EPBC Act | BC Act / DBCA | | | | |
| <i>Calytrix pulchella</i> | - | P3 | Alcoa 2023 | Shrub, 0.3-0.7(-1) m high. Fl. pink, Aug to Nov. | Grey or white sand over laterite. Ridges, flats. | Unlikely ELA (2024) observed marginal habitat to be present. No nearby records. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Carex tereticaulis</i> | - | P3 | DBCA 2023 | Monoecious, rhizomatous, tufted perennial, grass-like or herb (sedge), 0.7 m high. Fl. brown, Sep to Oct. | Damp flats, edges of watercourses. Black peaty sand. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Chamaescilla gibsonii</i> | - | P3 | DBCA 2023 | Clumped tuberous, herb. Fl. blue, Sep. | Clay to sandy clay. Winter-wet flats, shallow water-filled claypans. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Cyathochaeta teretifolia</i> | - | P3 | ALA 2023, Alcoa 2023, DBCA 2023 | Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown. | Grey sand, sandy clay. Swamps, creek edges. | Potential ELA (2024) observed suitable habitat to be present. One older (1997) nearby (<25km) record just outside L23_127. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Dillwynia dillwynioides</i> | - | P3 | DBCA 2023 | Decumbent or erect, slender shrub, 0.3-1.2 m high. Fl. red & yellow/orange, Aug to Dec. | Sandy soils. Winter-wet depressions. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Eryngium</i> sp. Ferox (G.J. Keighery 16034) | - | P3 | Alcoa 2023 | Perennial herb to 30cm high. Fl. Purple, blue, Dec-Jan | Winter-wet flats, clay. Eucalypt woodland, Melaleuca shrubland over herbs and sedges. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Grevillea prominens</i> | - | P3 | ALA 2023, Alcoa 2023, DBCA 2023 | Spreading shrub, 0.5-1.7 m high, 0.3-1 m wide. Fl. cream-white, Sep to Oct. | Gravelly loam. Along creeklines. | Likely This species was recorded by ELA (2024) within a minor creekline; therefore it is known to occur in the local area. |
| <i>Hakea oldfieldii</i> | - | P3 | Alcoa 2023 | Open, straggling shrub, up to 2.5 m high. Fl. white-cream/yellow, Aug to Oct. | Red clay or sand over laterite. Seasonally wet flats. | Unlikely ELA (2024) did not observe suitable habitat to be present. No nearby (<25km) records. Three recent records ~35km NE. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Hemigenia microphylla</i> | - | P3 | Alcoa 2023, DBCA 2023 | Slender shrub, 0.4-1.8 m high. Fl. blue-purple, Sep to Dec. | Sandy clay, peaty clay, granite. Winter-wet depressions. | Unlikely ELA (2024) did not observe suitable habitat to be present. No nearby (<25km) records. Three recent records ~35km NE. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Juncus meianthus</i> | - | P3 | Alcoa 2023 | Tufted perennial, herb, 0.05-0.2 m high, to 0.4 m wide. Fl. brown, Nov to Dec or Jan. | Black sand, sandy clay. Creeks, seepage areas. | Unlikely ELA (2024) observed marginal habitat to be present. No nearby (<25km) records. Nearest record ~35km S (2005). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Lepyrodia heleocharoides</i> | - | P3 | Alcoa 2023 | Rhizomatous, slender, tufted perennial, herb (sedge-like), 0.15-0.25 m high. Fl. Dec. | Moist peaty sand. Dry or seasonally inundated heath or woodland, swamps. | Unlikely ELA (2024) observed marginal habitat to be present. No nearby (<25km) records. Nearest record ~70km N (2003). |

| Species | Conservation status | | Source* | Description | Habitat | Likelihood |
|---|---------------------|---------------|---------------------------------|---|---|--|
| | EPBC Act | BC Act / DBCA | | | | |
| | | | | | | This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Meionectes tenuifolia</i> | - | P3 | Alcoa 2023 | Annual semi-aquatic herb. Flowering in October to December. | Seasonally wet poorly drained flat and granite flats, ironstone gravel, hilltop on grey sand, loam, clay. | Unlikely ELA (2024) did not observe suitable habitat to be present. No nearby (<25km) records. Nearest record ~27km NE (2007). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Netrostylis</i> sp. Blackwood River (A.R. Annels 3043) | - | P3 | Alcoa 2023 | Sprawling sedge to 1.5m high. | Creeklines, swamps. Sandy or peaty clay loam. <i>Eucalyptus patens</i> , <i>E. megacarpa</i> woodland, Melaleuca tall shrubland. | Potential ELA (2024) observed suitable habitat to be present. 1 nearby record in area L23_039 (2020). Next nearest record ~27km NE (2018). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Stylidium aceratum</i> | - | P3 | Alcoa 2023, DBCA 2023 | Fibrous rooted annual, herb, 0.05-0.09 m high, leaves spatulate. Fl. pink/white, Oct to Nov. | Sandy soils. Swamp heathland. | Unlikely ELA (2024) did not observe suitable habitat to be present. Two recent (2003-2013) nearby records 14km NW in foothills. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Stylidium paludicola</i> | - | P3 | ALA 2023 | Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous. Scape mostly glabrous, inflorescence axis glandular. Inflorescence racemose. Fl. pink, Oct to Dec. | Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Tetradlea parvifolia</i> | - | P3 | Alcoa 2023, DBCA 2023 | Small shrub, 0.2-0.3 m high. Fl. pink, Oct. | Slopes. Gravelly, sandy loam over granite. Jarrah-Marri forest over heath. | Potential ELA (2024) observed suitable habitat to be present. 1 recent (2005) nearby record 10km S. All other records further S. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Tetradlea pilifera</i> | - | P3 | Alcoa 2023 | Spreading shrub, 0.1-0.3 m high. Fl. purple, Aug to Oct. | Rocky slopes, rocky drainage lines. Gravelly and sandy loam. <i>Eucalyptus wandoo</i> woodland. | Unlikely ELA (2024) did not observe suitable habitat to be present. Nearest record ~25km N (1997). All other records >100km N. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Acacia oncinophylla</i> subsp. <i>patulifolia</i> | - | P4 | Alcoa 2023 | Shrub, 0.5-2.5(-3) m high, 'minni-ritchi' bark, phyllodes 4-9 cm long, 3-6 mm wide. Fl. yellow, Aug to Nov or Nov to Dec. | Granitic soils, occasionally on laterite. | Unlikely ELA (2024) observed marginal habitat to be present. Only nearby (<25km) record from 1992 and on SCP. All recent records >100km N (2005-2015). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Acacia semitrullata</i> | - | P4 | ALA 2023, Alcoa 2023, DBCA 2023 | Slender, erect, pungent shrub, (0.1-)0.2-0.7(-1.5) m high. Fl. cream-white, May to Oct. | White/grey sand in open heath, frequently fringing seasonally dry swamps, and in sand over laterite in shallow depressions in open Jarrah (<i>Eucalyptus marginata</i>) forest. | Unlikely ELA (2024) observed marginal habitat to be present, however this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i> | - | P4 | DBCA 2023 | Erect, multi-stemmed shrub that grows 1-2 m high. Fl. red, Jun-Aug. | Clay over granite, lateritic soils. Hillsides. | Unlikely ELA (2024) observed suitable habitat to be present, one old (1979) nearby (<25km) record. Given this conspicuous shrub was not recorded during the Spring 2023 targeted flora survey (ELA 2024), it is unlikely it occur within the extension areas. |

| Species | Conservation status | | Source* | Description | Habitat | Likelihood |
|---|---------------------|---------------|---------------------------------|--|--|---|
| | EPBC Act | BC Act / DBCA | | | | |
| <i>Chorizema ulotropis</i> | - | P4 | Alcoa 2023 | Sprawling, open, semi-prostrate shrub, to 0.45 m high. Fl. orange-yellow, Jul to Sep. | Moist to dry soils, white sand with gravel, laterite, granite. Outcrops, winter damp to dry areas, flats. | Unlikely ELA (2024) observed marginal habitat to be present. No nearby (<25km) records. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Conostylis pauciflora</i> subsp. <i>pauciflora</i> | - | P4 | ALA 2023 | Rhizomatous, stoloniferous perennial, grass-like or herb, 0.1-0.35 m high. Fl. yellow, Aug to Oct. | Grey sand, limestone. Hillslopes, consolidated dunes. SCP only. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Cyanothamnus tenuis</i> | - | P4 | ALA 2023, Alcoa 2023, DBCA 2023 | Erect, slender shrub to 40cm high. Fl. Blue, pink, white, Aug-Nov. | Slopes, flats. Granitic or lateritic stony soils. Eucalypt woodland, Myrtaceous shrubland. | Potential ELA (2024) observed suitable habitat to be present. One recent (2005) nearby (<25km) record. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Drosera occidentalis</i> | - | P4 | Alcoa 2023 | Fibrous-rooted, rosetted perennial, herb, to 0.025 m high. Fl. pink/white, Oct to Dec or Jan. | In swampy flats. White/black sand over yellow clay. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Eucalyptus x graniticola</i> | - | P4 | ALA 2023, Alcoa 2023, DBCA 2023 | Erect-stemmed lignotuberous mallee to 4 m tall; bark smooth, cream, powdery, sometimes rough–grey and flaky at base. Adult leaves petiolate, lanceolate with lamina averaging 11 cm long × 2.5 cm wide, alternate, concolorous, dull, grey-green. Inflorescence axillary, unbranched, 7-flowered. Buds pedicellate, ovoid to globular, to 9 mm long × 6 mm wide; operculum obtusely conical. Stamens erect of inflexed, all fertile, cream. Fruit pedicellate, subcampanulate, 6 mm long × 7 mm wide. Fl. May-Nov. Hybrid between <i>E. rudis</i> and <i>E. drummondii</i> . | Granite outcrops on Darling Scarp. Soil pocket surrounded by westward sloping sheet granite rock as an isolated emergent mallee over closed shrubland/sedgeland. | Unlikely ELA (2024) did not observe suitable habitat to be present. One recent (2006) nearby record <2km to N. All other nearby (<25km) records historical. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Hydrocotyle lemnoides</i> | - | P4 | Alcoa 2023 | Aquatic, floating annual, herb. Fl. purple, Aug to Oct. | Swamps. | Unlikely ELA (2024) did not observe suitable habitat to be present. No nearby (<25km) records. Nearest record ~45km SE (2011). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Lasiopetalum bracteatum</i> | - | P4 | ALA 2023 | Erect, open shrub, 0.4-1.5 m high. Fl. pink-purple, Aug to Nov. | Sandy clay, clay, lateritic gravel. Along drainage lines, creeks, gullies, granite outcrops. | Unlikely ELA (2024) observed suitable habitat to be present, however no recent nearby (<25km) records. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Lasiopetalum cardiophyllum</i> | - | P4 | Alcoa 2023 | Erect, multi-stemmed shrub, 0.2-0.5 m high. Fl. pink, Aug to Dec or Jan. | Lateritic gravelly soils, sandy clay. Flats, hillslopes. | Unlikely ELA (2024) observed suitable habitat to be present, however no nearby (<25km) records. Nearest recent record ~35km E (2007). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Microtis quadrata</i> | - | P4 | Alcoa 2023 | Orchid to 40cm high. Fl. Cream-white, Oct-Dec. | Winter-wet flats, drainage lines. Sand, loam, clay over laterite. Jarrah-Marri forest, Melaleuca shrubland. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. No nearby (<25km) records. Nearest record ~40km NW (1984) on Swan Coastal Plain. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |

| Species | Conservation status | | Source* | Description | Habitat | Likelihood |
|---------------------------------|---------------------|---------------|---------------------------------|---|--|---|
| | EPBC Act | BC Act / DBCA | | | | |
| <i>Ornduffia submersa</i> | - | P4 | Alcoa 2023 | An aquatic herb growing in water 60 cm deep with leaves and flowers floating on the surface. Fl. White-cream-yellow, Oct-Nov. | Wetlands, open depressions, winter wet flats. Sandy clay. <i>Melaleuca raphiophylla</i> , <i>M. preissiana</i> , <i>M. incana</i> over sedges. | Unlikely ELA (2024) did not observe suitable habitat to be present. One nearby (~17km NW) recent (2000) record but on Swan Coastal Plain. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Parsonsia diaphanophleba</i> | - | P4 | ALA 2023, Alcoa 2023, DBCA 2023 | Woody climber, to 10 m high. Fl. white/cream & pink, Jan to Feb or Apr to Jun or Sep. | Alluvial soils. Along rivers. | Unlikely ELA (2024) did not observe suitable habitat to be present. 1 recent (2015) nearby records 20km N. Several older records in same area. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Pimelea rara</i> | - | P4 | Alcoa 2023, DBCA 2023 | Shrub, 0.2-0.35 m high. Glabrous except for inflorescence. Leaf lamina bluish-green (when dry). Fl. white, Dec or Jan. | Slopes. Lateritic soils. Jarrah-marri forest. | Potential ELA (2024) observed suitable habitat to be present. Nearest record ~14km N (1998). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Pultenaea skinneri</i> | - | P4 | Alcoa 2023 | Slender shrub, 1-2 m high. Fl. yellow/orange & red, Jul to Sep. | Sandy or clayey soils. Winter-wet depressions. | Unlikely ELA (2024) did not observe suitable habitat to be present. Nearest record ~35km S (2006). This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Schoenus natans</i> | - | P4 | Alcoa 2023 | Aquatic annual, grass-like or herb (sedge), 0.3 m high. Fl. brown, Oct. | Winter-wet depressions. | Unlikely ELA (2024) did not observe suitable habitat to be present. Nearest record ~14km NW (2012) but on Swan Coastal Plain. Nearest JAF records ~35km SE. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Senecio leucoglossus</i> | - | P4 | ALA 2023, Alcoa 2023, DBCA 2023 | Erect annual, herb, to 1.3 m high. Fl. white, Aug to Dec. | Gravelly lateritic or granitic soils. Granite outcrops, slopes. | Likely This species was recorded by ELA (2024) within a minor creekline; therefore, it is known to occur in the local area. |
| <i>Stylidium ireneae</i> | - | P4 | Alcoa 2023, DBCA 2023 | Lax perennial, herb, (0.06-) 0.1-0.28 m high. Basal rosette of leaves, leaves oblanceolate, 0.4-2 cm long, 1-3 (-5) mm wide, apex subacute to acuminate, margin entire, glandular. Scape glandular. Inflorescence racemose. Fl. pink, Oct to Dec. | Sandy loam. Valleys near creek lines, woodland, often with Agonis. | Potential ELA (2024) observed suitable habitat to be present. Multiple recent (2000) nearby records 8-18km N. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Stylidium longitubum</i> | - | P4 | ALA 2023 | Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink, Oct to Dec. | Sandy clay, clay. Seasonal wetlands. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |
| <i>Trithuria australis</i> | - | P4 | Alcoa 2023 | Aquatic annual herb to 2cm high. | Edges of wetlands, seasonally wet flats. Silty clay. <i>Melaleuca</i> shrubland, sedgeland, herbland. | Unlikely ELA (2024) did not observe suitable habitat to be present, in addition this is a SCP species. This species was not recorded during the Spring 2023 targeted flora survey (ELA 2024). |

