



BEEBYN-W11 PROJECT

WORKS APPROVAL APPLICATION

ATTACHMENT 7

SITING AND LOCATION

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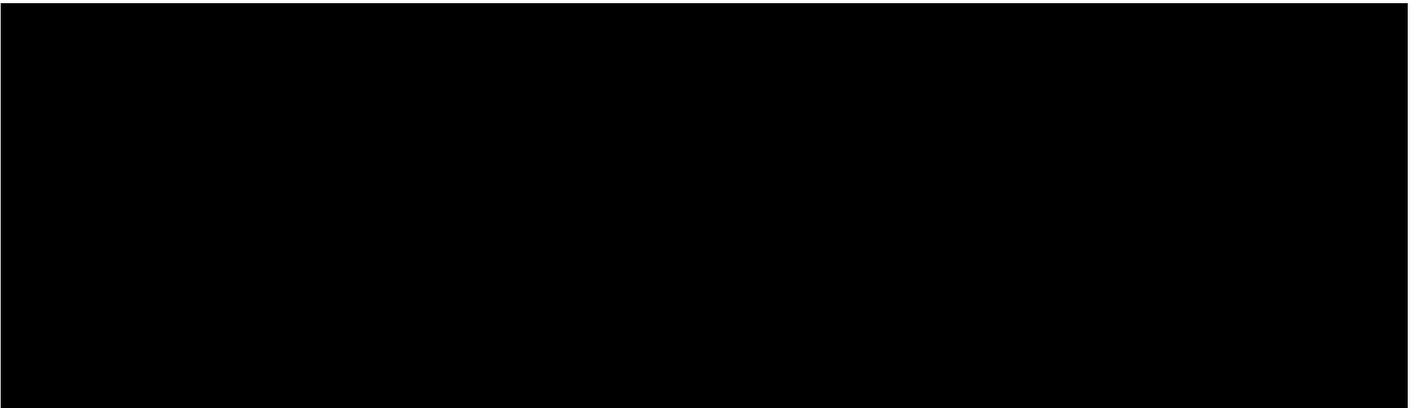


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APPENDICES (Provided as Attachment 8B)**Appendix 1:** Flora and Fauna Reports

1a: Weld Range Flora and Vegetation Assessment - ecologia Environment 2010

1b: Beebyn Flora, Vegetation and Fauna Assessment – APM 2024

1c: Iron Ridge Biological Survey 2019 – ecologia Environment 2020

1d: Status review of *Idiosoma clypeatum* – Biologic Environmental Survey 2019

1e: Weld Range *Idiosoma nigrum* Survey – Biologic Environmental Survey 2012

Appendix 2: Iron Ridge Stygofauna Assessment - *ecologia* Environment 2020**Appendix 3:** Hydrogeology and Hydrology Assessment - Pentium Water 2024

1.0 EXISTING ENVIRONMENT

1.1 Aboriginal Heritage

Mining Lease M51/869 and the associated infrastructure tenure is located within the Wajarri Yamaji Native Title Claim.

The Weld Range Complex contains several places of Aboriginal Heritage significance, several of which are located close to the Beebyn-W11 project area (Figure 1.1 and Figure 1.2). Aboriginal Heritage site "Weld - QAS-0722" (#28784) was lodged with the WA Department of Planning, Lands and Heritage (DPLH) in May 2010 and is located adjacent to the proposed Beebyn-W11 pit.

Wilgie-Mia Reserve (16670) is located approximately 10km south west of the project and will not be impacted.

Full archaeological and ethnographical surveys have been undertaken of the project area and a number of culturally significant locations have been identified during these surveys. The site layout has been designed to avoid these locations and there will be no disturbance to these locations as a result of the project.

A Native Title Mining Agreement with the Wajarri Yamaji Native Title group has been negotiated and endorsed by members of the Wajarri Yamaji Working Group, for authorisation by the Native Title Applicants. The Mining Agreement will be fully executed before commencement of operations at Beebyn-W11. A Mining Agreement between SMC and the Wajarri Yamaji Native Title group was fully executed in 2015. SMC and Fenix will comply with the requirements of clause 8.2(f) of the Native Title Agreement and enter into a deed with the Wajarri Yamaji by which Fenix will be bound by the Aboriginal Heritage Protocol and clauses 8.1 and 9 of the Native Title Mining Agreement.

The Project activities will not cause any impacts to Aboriginal sites within the meaning of Section 5 of the *Aboriginal Heritage Act 1972* (AH Act), as Fenix has carried out Aboriginal heritage surveys over the entire mining proposal footprint and has designed the mining proposal activities to avoid all the Aboriginal sites. The Aboriginal Heritage survey conducted by Eureka (University of WA) in 2010 confirms that there are no Aboriginal sites present in the Proposal footprint.

The Aboriginal Cultural Heritage Inquiry System (ACHIS) that is administered by the Department of Planning, Lands and Heritage (DPLH), shows that there are two Aboriginal sites on listed on the mining proposal land. These sites are DPLH ID 32728 (Weld-QASA-0842) and DPLH ID 11181 (Wilgie Creek). Both these sites are displayed in dithered or expanded boundaries on the ACHIS and mask the actual location of each site.

DPLH ID 32728 was recorded by Eureka Consulting and WYAC members in 2010. The site features three stone structures that indicate the locations of 3 potential burial sites, a stone quarry and an artefact scatter. Fenix has the exact GPS coordinates for this site from the heritage survey report it commissioned. DPLH has masked the location of the site using a dithered boundary because of the potential burial sites that may be present. Fenix confirms that the actual location of DPLH ID 32728 is not within the Proposal footprint.

DPLH ID 11181 is a small artefact scatter that was recorded in 1969. The DPLH has mapped the site using a large box on the ACHIS because accurate GPS coordinates were not available at the time of the original recording in 1969. Fenix has reviewed the original recording and the sketch drawings and confirms that the actual location of the site is not within the Proposal footprint. Fenix has also commissioned a new Aboriginal Heritage survey through the WYAC that is scheduled to commence in June 2024 to reconfirm the location of DPLH ID 11181 is not within the Proposal footprint.

1.2 National Heritage

In 2011 the Wilgie Mia Aboriginal Ochre Mine (NHL 106044), located approximately 10 km south-west of the project, was included on the National Heritage List (Department of Agriculture, Water and Environment [DAWE] 2019a). The project will have no impact on this historic site and will not interfere with existing access or amenity to that site.

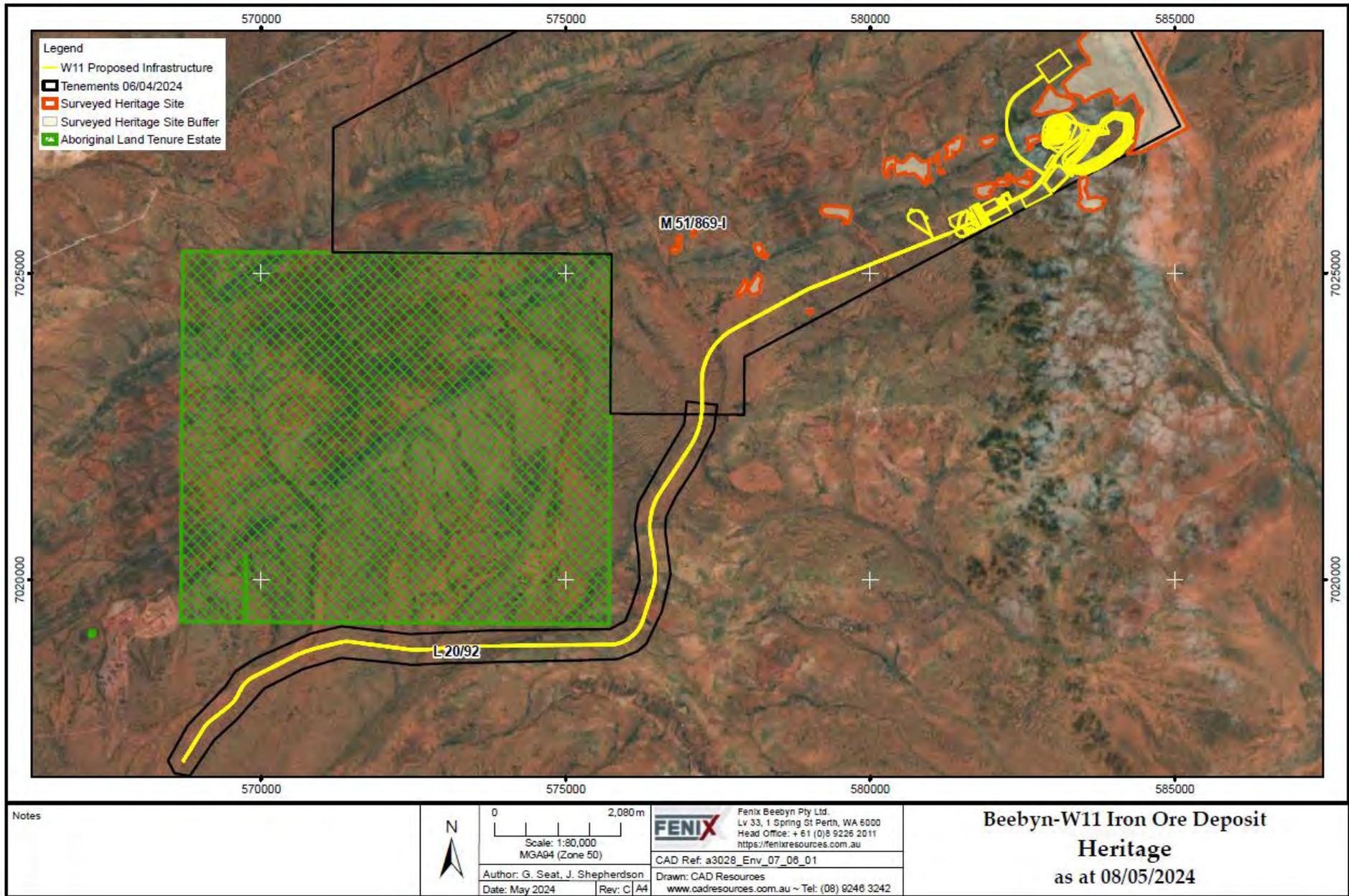


Figure 1.1: Heritage areas in the Beebyn-W11 project area.

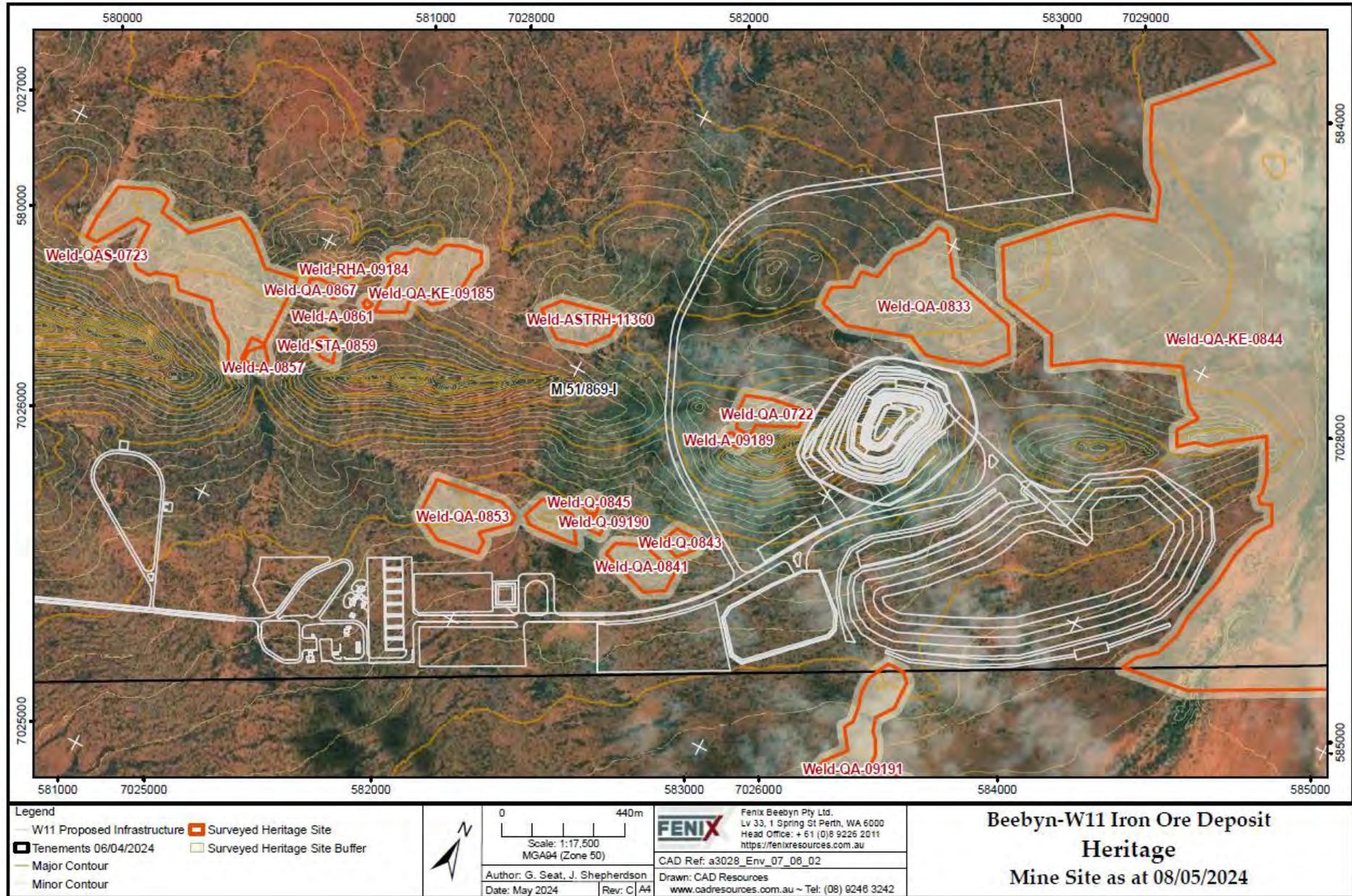


Figure 1.2: Heritage areas in the Beebyn-W11 mining area.

1.3 IBRA 7 Biogeographic subregions

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the Australian continent into regions or bioregions on the basis of similar geology, landform, vegetation, fauna and climate characteristics. The project area is situated within the Murchison Region according to IBRA 7, which is further divided into two subregions: Eastern Murchison and Western Murchison (DAWE 2019b). The study area is situated within the Western Murchison subregion (MUR2).

The West Murchison subregion is in the northern end of the Yilgarn Craton, which experiences an arid climate with bimodal rainfall that usually falls in the winter months. The Western Murchison subregion is characterised by Mulga low woodlands on outcrop and fine textured Quaternary alluvial and eluvial surfaces mantling granitic and greenstone strata. Quaternary plains contain hummock grasslands, saltbush shrublands on calcareous soils and *Halosarcia* low shrublands on saline alluvia (DAWE 2019b).

1.4 Landscape

The Beebyn-W11 Project is located within the Murchison Bioregion of the Interim Biogeographic Regionalisation of Australia (IBRA) and is situated in the Western Murchison subregion (MUR2), close to the boundary of the Eastern Murchison subregion (MUR1).

The MUR2 subregion is described by Desmond et. al. (in DAWE 2019b) as follows:

“Mulga low woodlands, often rich in ephemerals (usually with bunch grasses), on outcrop and fine textured Quaternary alluvial and eluvial surfaces (extensive hardpan wash plains that dominate and characterise the subregion) mantling granitic and greenstone strata of the northern part of the Yilgarn Craton. Surfaces associated with the occluded drainage occur throughout with hummock grasslands on Quaternary sandplains, saltbush shrublands on calcareous soils and Halosarcia low shrublands on saline alluvia. Contains the headwaters of the Murchison and Wooramel Rivers, which drain the subregion westwards to the coast. Arid climate with bimodal rainfall that usually falls in winter. The subregional area is 7,847,996 ha.” (DAWE 2019b).

Laterite or silcrete mesas are usually found at the top of the landscape in areas of granitic basement. These mesas have lateritic breakaways, kaolinised footslopes (often saline) and are surrounded by gently sloping plains. There are also some low hills, domes and tor fields of granite, gneiss and quartz found in upper parts of the landscape. The bulk of the terrain consists of gently undulating wash plains and sandplains sitting below the mesas and hills. Although wash plains are most common in the north-west, they occur throughout the province with the exception of its eastern margin. These wash plains consist of very gently inclined alluvial surfaces that carry sheet flows. Typically, an almost continuous cemented layer of red-brown hardpan has formed in these deposits. There are often small sandy banks and groves across the wash plains and gravelly mantles are sometimes present. Narrow saline drainage tracts may also be found (Tille 2006).

Soils on the plains are typically red loamy earths and red-brown hardpan shallow loams. Red sandy soils are found along the significant drainage channels. Shallow loams and sands and stony soils are found on the hills and mesas with sandy soils more common on granitic hills. Salt lake soils are found on the valley floors (Tille 2006).

1.5 Biological surveys

Flora and fauna surveys have been completed in and around the project area and the wider Weld Range. The project area and surrounds have been quite extensively covered by prior biological surveys.

A summary of the surveys relevant to the project are presented in Table 1.1. More details are provided in the following sections.

Table 1.1 Flora and fauna surveys in and around Weld Range

Survey type and location.	Year	Consultants
Flora and vegetation survey - Weld Range Iron Ore; Atlas Iron	2008	Woodman Environmental
Flora and Vegetation of the banded iron formations of the Yilgarn Craton: The Weld Range	2008	Department of Conservation (DEC)

Survey type and location.	Year	Consultants
Targeted Shield-backed trapdoor spider, SRE Invertebrate and vertebrate fauna survey	2009	Bamford Consulting Ecologists
Weld Range Level 1 Targeted Fauna Survey; Atlas Iron Ltd	2009	Biologic
Weld Range Vegetation and Flora Assessment Unpublished Report for Sinosteel-Midwest Corporation	2009	<i>ecologia</i>
Weld Range Vertebrate Fauna Assessment. Unpublished Report for Sinosteel-Midwest Management	2009	<i>ecologia</i>
SRE Invertebrate habitat survey; Atlas Weld Range Project	2011	Biologic
Weld Range DSO Project, Local and Regional Significant Flora Assessment 2012; Atlas Iron Ltd	2012	Woodman Environmental
Weld Range DSO Project, Flora and Vegetation Assessment; Atlas Iron Ltd	2012	Woodman Environmental
Weld Range <i>Idiosoma nigrum</i> Survey 2012; Atlas Iron Ltd	2012	Biologic
<i>Idiosoma nigrum</i> Status Review	2019	Biologic
Iron Ridge Flora and Fauna Reconnaissance Survey	2019	<i>ecologia</i>
Iron Ridge Biological Survey 2019	2019	<i>ecologia</i>
<i>Micromyrtus placoides</i> Targeted Survey	2020	<i>ecologia</i>
Beebyn 11 Weld Range Flora and Fauna Survey	2023	Animal Plant Mineral (APM)

The BIF ranges of the Mid West and Goldfields regions are generally considered to have significant biodiversity value because of their unique geology, soils and relative isolation. The values of the ranges are related to the presence of endemic plant species, threatened and restricted plant species, highly restricted and distinct plant communities and ecological communities. The ranges also exhibit very distinct features in their regional landscape and in many cases possess outstanding landscape values. They also have fauna conservation values although these are less well documented than for flora. There are, however, differences between the various BIF ranges in terms of their biodiversity conservation and mineral prospectively/resource values.

The Midwest BIF ranges are considered to be under represented in the State’s reserve system (Department of Environment and Conservation [DEC] 2007) however, in the report *Banded Ironstone Formation Ranges of the Midwest and Goldfields - Interim Status Report - Biodiversity Values and Conservation Requirements* by DEC (now DBCA), the Weld Range was described as being a “lower biodiversity value site, although still providing refugial habitats with localised species and vegetation communities” (DEC 2007).

The Beebyn-W11 Project partly coincides with the Priority 1 Priority Ecological Community (PEC) “Weld Range vegetation complexes (banded ironstone formation)” and the 500 m administrative buffer that surrounds it. Rather than being defined by a specific plant community, the extent of the Weld Range PEC has been determined on the basis of its extent over the banded iron formation of the Weld Range (*ecologia* 2020a).

A survey of the flora and floristic communities of the Weld Range was undertaken by DEC in 2005 (Markey and Dillon 2008). A total of 239 taxa (species, subspecies and varieties) and five hybrids of vascular plants were collected and identified from within the survey area. Of these, 229 taxa were native and 10 species were introduced. Eight priority species were located in this survey, six of these being new records for the Weld Range.

Eight floristic community types (six types, two of these subdivided into two subtypes each) were identified and described for the Weld Range. There did not appear to be any restricted communities within the landform, but some of these communities may be geographically restricted to the Weld Range (Markey and Dillon 2008).

Table 1.2 lists the floristic communities identified during the DEC survey of Weld Range (Markey and Dillon 2008).

Table 1.2: Floristic communities of the Weld Range, as identified by DEC in 2005.

Reference	Description
Community 1a:	Dominated by <i>Acacia aneura</i> , <i>Acacia ramulosa</i> and/or <i>Acacia</i> sp. Weld Range (A. Markey & S. Dillon 2994) over sparse shrub cover of <i>Eremophila</i> spp., mainly on mid-upper slopes.
Community 1b:	Open shrubland of <i>Acacia aneura</i> , <i>Acacia</i> sp. Weld Range (A. Markey & S. Dillon 2994) and <i>Grevillea berryana</i> over shrub cover of <i>Eremophila</i> spp. on gentle-moderate slopes.
Community 2:	Open Shrubland of <i>Acacia</i> cf. <i>aneura</i> var. <i>microcarpa</i> and/or <i>Acacia</i> cf. <i>aneura</i> var. <i>aneura</i> , over <i>Thryptomene decussata</i> , <i>Philotheca brucei</i> subsp. <i>brucei</i> and <i>Eremophila</i> spp. on BIF on moderate-steep slopes.
Community 3:	Depauperate Shrubland dominated by <i>Acacia aneura</i> on scree slopes.
Community 4:	Open Shrubland of <i>Acacia aneura</i> with <i>Acacia pruinocarpa</i> over shrublands of <i>Philotheca brucei</i> var. <i>brucei</i> and <i>Eremophila</i> spp. on steep rocky hillslopes.
Community 5a:	Open Shrubland of <i>Acacia aneura</i> and <i>Acacia ramulosa</i> with emergent <i>Acacia pruinosa</i> , mainly on lower slopes and outwash areas.
Community 5b:	Open Shrubland of <i>Acacia aneura</i> or <i>Acacia effusifolia</i> over <i>Senna</i> spp. and <i>Tribulus suberosus</i> on lower slopes.
Community 6:	Sparse Shrubland of <i>Acacia</i> sp. Weld Range (A. Markey & S. Dillon 2994), <i>Acacia aneura</i> and <i>Acacia speckii</i> over Shrubland of <i>Eremophila macmilliana</i> , <i>Eremophila mackinleyi</i> subsp. <i>spathulate</i> and <i>Senna</i> spp. on dolerite

Knowledge of the faunal biodiversity significance of the BIF environments is incomplete, however current knowledge indicates that these isolated areas provide important refuges for fauna. Nineteen vertebrate fauna and one invertebrate species of conservation significance were identified from Threatened and Priority Fauna database searches within 100 km of the project area, predominately recorded within the Weld Range.

1.6 Native flora

Database searches indicated that a total of 28 conservation significant flora taxa have been recorded within a 30 km area around the project site. No Threatened flora species have been recorded in the area. Figure 3.1 provides the recorded locations of Priority listed flora within a 30 km radius of the project.

Ecologia Environment Pty Ltd (*ecologia*) were commissioned by Sinosteel to carry out a Level 2 flora and vegetation survey of the project area and surrounds over four surveys between 2006 and 2009 (*ecologia* 2010b); as well as a targeted conservation significant flora survey of a number of proposed exploration drill lines in the area. The surveys recorded 393 vascular flora taxa from 57 families and 140 genera within the Beebyn-W11 area and surrounding region; including six introduced species and 24 Priority listed flora species. No Threatened species were recorded. The *ecologia* report is included in Appendix 1.

Animal Plant Mineral Pty Ltd (APM) undertook a detailed flora and vegetation survey of the proposed Beebyn-W11 area during 2023 (APM 2024), recording 77 vascular flora taxa from 21 families and 40 genera. The reduction in taxa recorded when compared to the earlier surveys is primarily due to the region having been in drought conditions for several years and the prevalence of goats, which have had a significant impact on the vegetation.

No Threatened species were recorded; however, a single potential record of the Priority 3 listed species *Hibiscus krichauffianus* was recorded. Insufficient material was available to definitively determine the species, due to seasonal conditions. *Hibiscus krichauffianus* is common in the central parts of Australia and the Queensland mid coast. The nearest known record is approximately 250 km south west of the project area, with most records in WA from the Pilbara. The species has not previously been recorded in the Murchison Region (APM 2024).

Table 1.3 provides a summary of the conservation significant flora recorded during survey work, as well as those species considered to be possible inhabitants of the immediate project area. Except for *Acacia dilloniorum*, all taxa listed have distributions extending over 100 km, consistent with observations by Markey and Dillon (2008) that most species are not endemic to the Weld Ranges (*ecologia* 2010b). Species that were considered as unlikely to occur following the survey are not included in this summary table. Full discussion is included in the APM report (APM 2024), provided in Appendix 1.

The distribution of Priority species recorded historically and in the APM (2024) survey in relation to the proposed development infrastructure is shown on Figure 1.4 to Figure 1.5.

Table 1.3: Conservation significant flora recorded and potentially occurring in the project area.

Species	Conservation Status	Likelihood of occurrence
<i>Acacia dilloniorum</i>	P1	Possible – suitable habitat exists in the project area, no known records in immediate vicinity.
<i>Beyeria lapidicola</i>	P1	Recorded (<i>ecologia</i> 2010b)
<i>Euphorbia sarcostemmoides</i>	P1	Possible – suitable habitat exists in the project area
<i>Stenanthemum mediale</i>	P1	Possible - suitable habitat exists in the project area, no known records in immediate vicinity.
<i>Acacia burrowsiana</i>	P3	Possible – suitable habitat exists in the project area
<i>Hemigenia virescens</i>	P3	Possible - suitable habitat exists in the project area, no known records in immediate vicinity.
<i>Hibiscus ?krichauffianus</i>	P3	Recorded (APM 2024)
<i>Homalocalyx echinulatus</i>	P3	Possible - suitable habitat exists in the project area, previous records in immediate vicinity (<i>ecologia</i> 2010b)
<i>Micromyrtus placoides</i>	P3	Possible - suitable habitat exists in the project area, known from Iron Ridge project.
<i>Prostanthera petrophila</i>	P3	Recorded (<i>ecologia</i> 2010b)
<i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94)	P3	Possible - suitable habitat exists in the project area, no known records in immediate vicinity
<i>Verticordia jamiesonii</i>	P3	Recorded (<i>ecologia</i> 2010b)
<i>Acacia speckii</i>	P4	Recorded (<i>ecologia</i> 2010b)
<i>Dodonaea amplisemina</i>	P4	Recorded (<i>ecologia</i> 2010b)
<i>Grevillea inconspicua</i>	P4	Possible - suitable habitat exists in the project area, no known records in immediate vicinity.

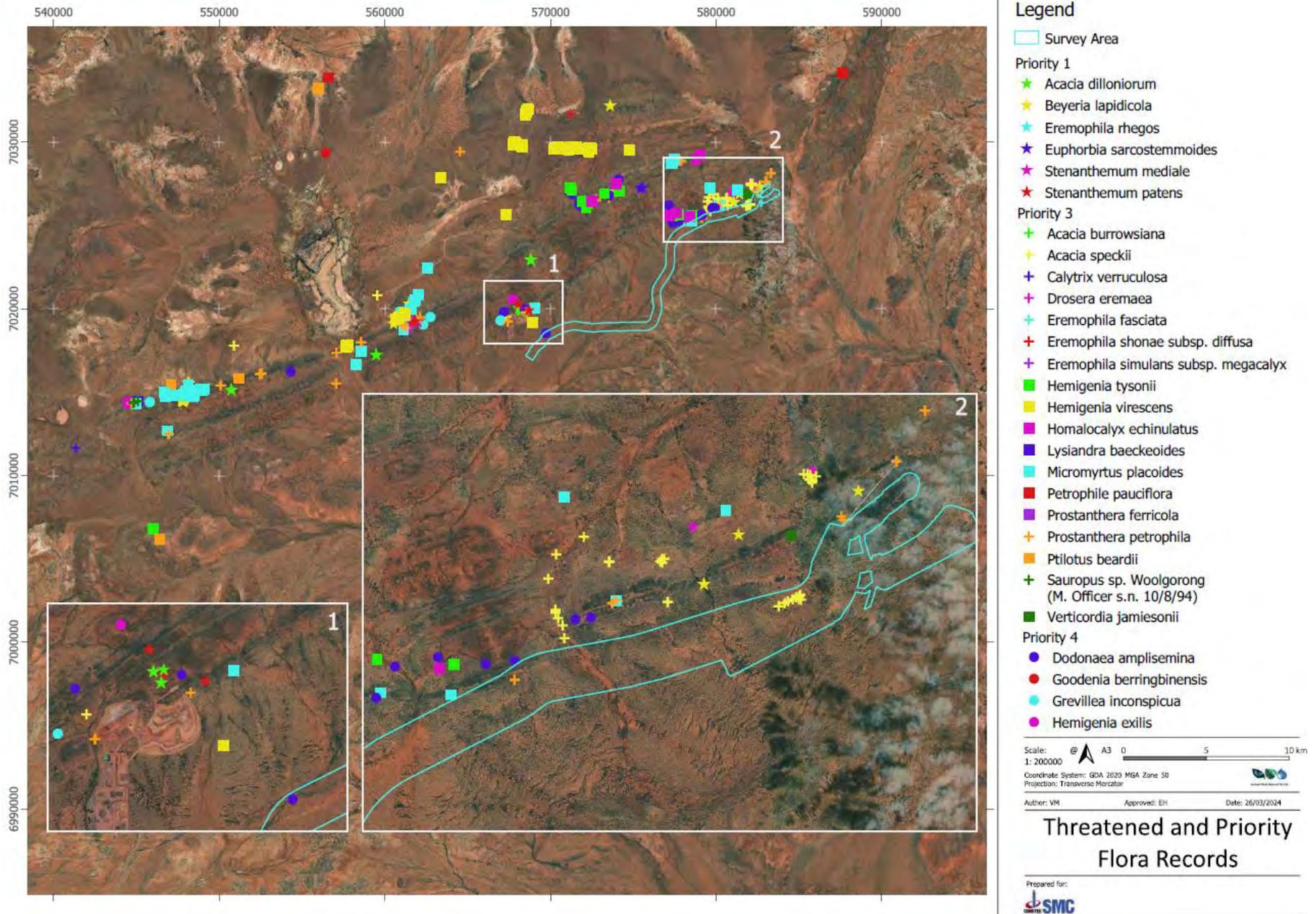


Figure 1.3: Priority flora records within 30 km of the project area.

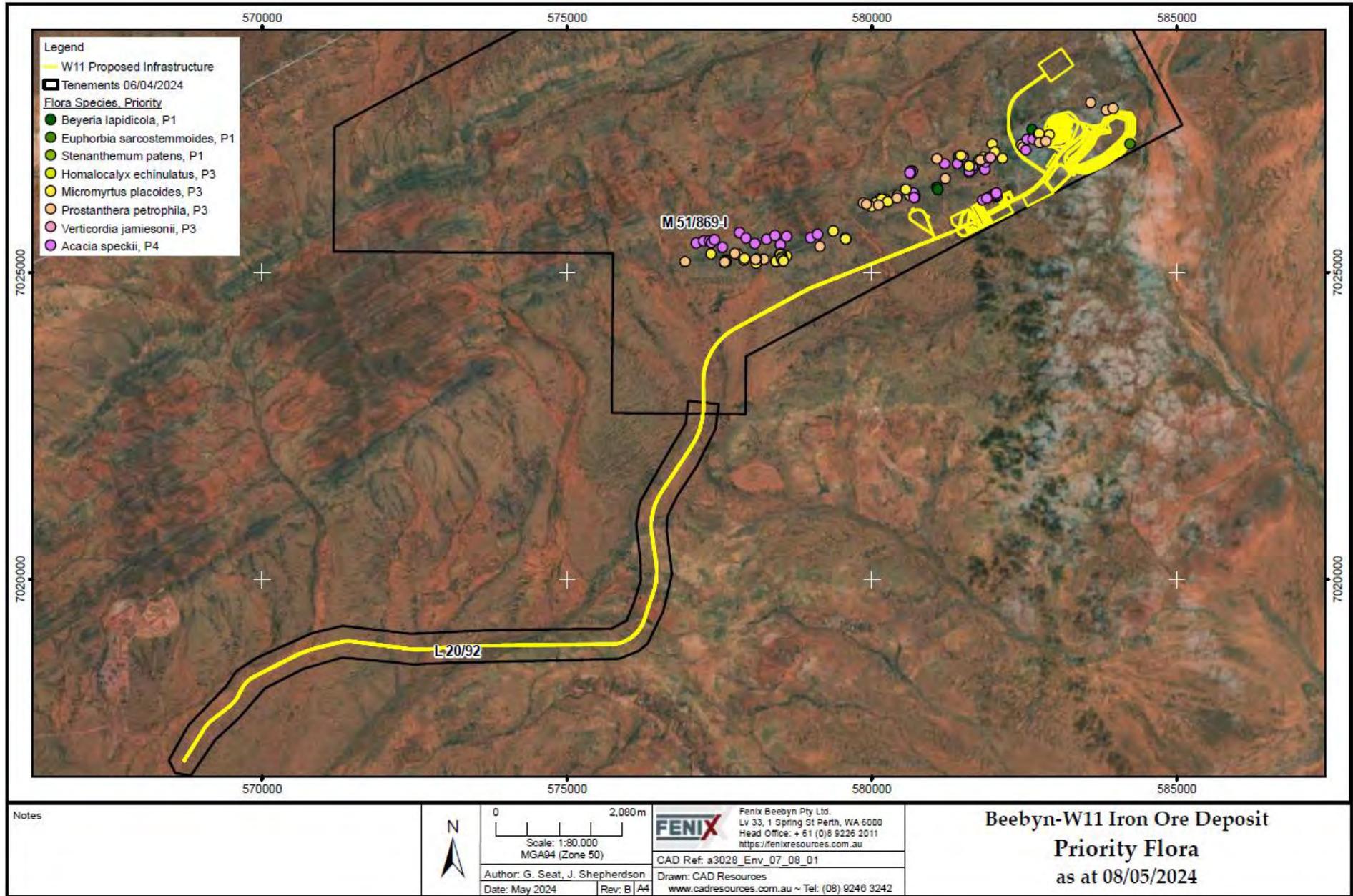


Figure 1.4: Priority flora within the proposed Beebyn-Beebyn-W11 project area.

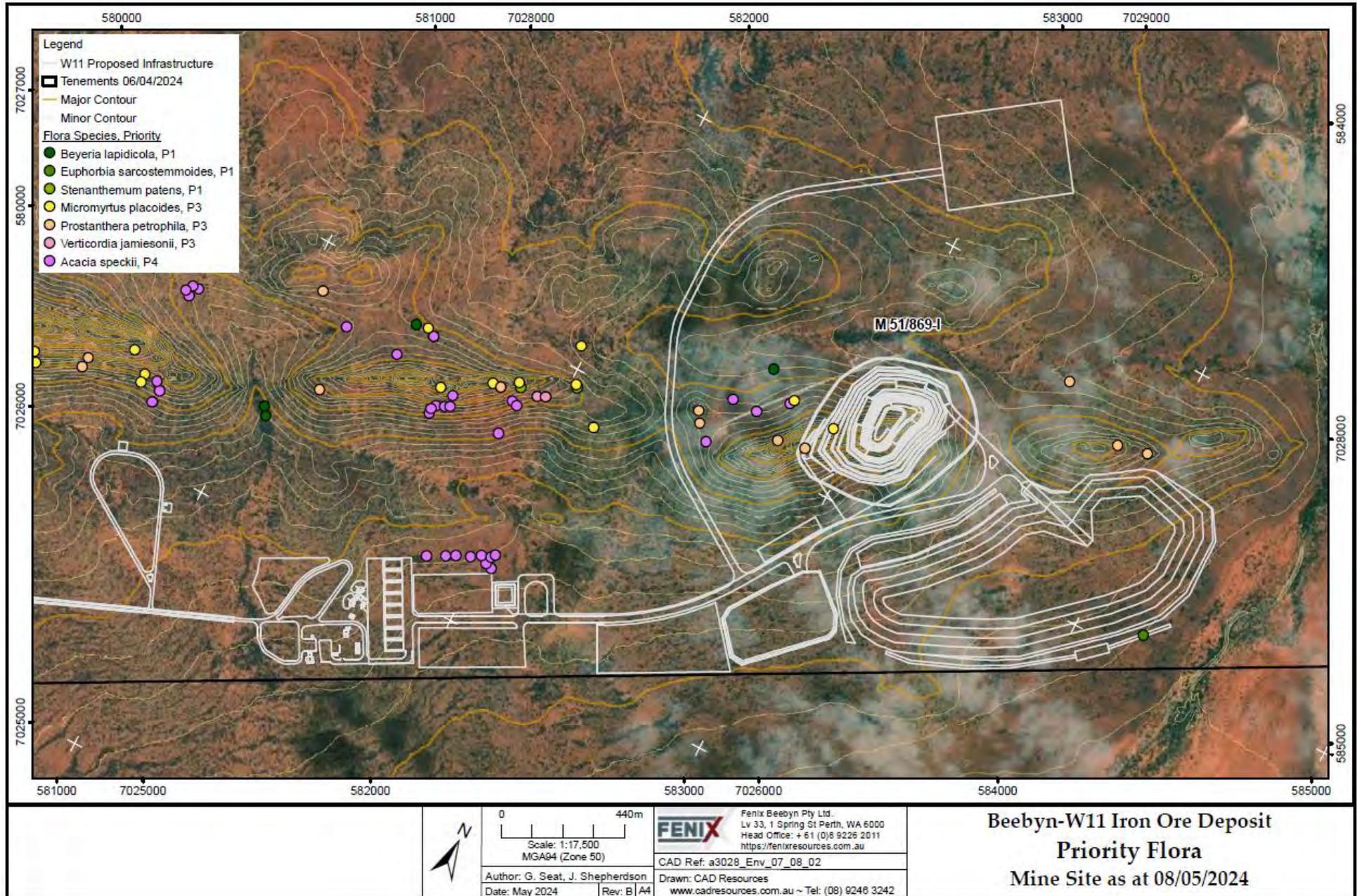


Figure 1.5: Priority flora within the proposed Beebyn-Beebyn-W11 infrastructure area.

Based on historical records (*ecologia* 2009a), individuals from three of the Priority species recorded will be impacted by the proposed development (Figure 1.5). Table 1.4 lists the Priority species and the number of individuals to be impacted. Based on the information currently available, only one individual of each species will be impacted.

It is recognised that the survey data used in preparation of this Works Approval will be considered outdated. The region has been in drought for several years and conditions were not conducive for identification of the Priority flora species during 2023. A targeted survey for conservation significant flora in the Beebyn-W11 disturbance area is scheduled for late July 2024 and it is anticipated that the identification of *Hibiscus ?krichauffianus* will also be confirmed during this survey. The results of the survey will be provided to DEMIRS and the impact assessment of the project will be updated accordingly.

Table 1.4: Priority species records within proposed infrastructure envelope.

Taxon	Vegetation type(s) (<i>ecologia</i> 2009a)	Known number of individuals at Weld Range	Individuals recorded within proposed infrastructure envelope
Priority 1			
<i>Euphorbia sarcostemmoides</i>	3a	42 (<i>ecologia</i> 2012)	1
Priority 3			
<i>Micromyrtus placoides</i>	1 and 2	33,724 (<i>ecologia</i> 2020c)	1
<i>Prostanthera petrophila</i>	1 and 2	2,184 (<i>ecologia</i> 2012)	1

1.6.1 Vegetation

The 2023 APM survey recorded three vegetation types within the project area, which generally corresponded with the floristic communities described by Markey and Dillon (2008) and *ecologia* (2009a). The vegetation types described in the APM report are listed in Table 1.5 and have been recorded over the length of the Weld Range in the DEC survey (Markey and Dillon 2008).

The proposed disturbance footprint was revised after the survey by APM was completed, and a portion of the project occurs in areas where vegetation was not mapped as a result. The vegetation mapping undertaken by *ecologia* (2010b) has been used in areas not assessed by APM (Figure 1.6 and Figure 1.7).

APM (2024) assessed the vegetation condition of the project area and surrounds as ‘Good’ (97%) and ‘Completely Degraded’ (3%). Most of the disturbance was a result of moderate to heavy grazing impact from goats and euro, and historically heavy grazing by sheep that has degraded the land and made it compacted and susceptible to sheet erosion. A lower vegetation cover than expected was present, particularly in the groundcover stratum.

Further detail can be found in the APM and *ecologia* reports, included in Appendix 1.

Table 1.5: Vegetation types identified in the project area.

Code	Landform	Description	Soil type and surface geology	Area mapped by <i>ecologia</i> ¹ (ha)	Beebyn-W11 proposed disturbance (ha)	Beebyn-W11 impact to known area (%)
2a ²	BIF outcrops	Scattered low <i>Acacia aneura</i> , <i>Psyrax latifolia</i> and <i>Acacia pruinocarpa</i> over <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Thryptomene decussata</i> and <i>Philotheca brucei</i> mid sparse shrubland with <i>Ptilotus obovatus</i> , <i>Dodonaea pachyneura</i> and <i>Dysphania rhadinostachya</i> low sparse shrubland.	Light red sandy clay loam; BIF outcrops and rocklands on moderate to steep hillslopes.	1695	3.3	0.2
3a ²	Gravelly plains	<i>Acacia aneura</i> , <i>A. ramulosa</i> subsp. <i>linophylla</i> and <i>Acacia mulganeura</i> tall sparse shrubland over <i>Eremophila punicea</i> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and <i>Eremophila margarethae</i> mid sparse shrubland with <i>Ptilotus obovatus</i> , <i>Eragrostis eriopoda</i> and ? <i>Swainsona purpurea</i> scattered low groundcover.	Red to red-brown clay loam to sandy clay loam with ironstone gravel to small stones at the surface; sandy outwash and gravelly plains and footslopes of BIF ranges, on gentle mid and lower slopes.	16,779	28.1	0.2
3a ¹	Sandy outwash plains	+/- <i>Corymbia lenziana</i> scattered medium trees over <i>Acacia ramulosa</i> var. <i>linophylla</i> and <i>A. aneura</i> sparse tall shrubland over mixed <i>Eremophila</i> spp. open mid shrubland over scattered low shrubs of <i>Ptilotus obovatus</i> over mixed open tussock grassland.	Sandy outwash and gravelly plains and footslopes of BIF ranges.		50.0	0.3
3b ²	Sandy outwash plains	<i>Acacia aneura</i> , <i>Acacia pruinocarpa</i> and <i>Acacia ramulosa</i> var. <i>linophylla</i> low open woodland over <i>Eremophila forrestii</i> ssp. <i>forrestii</i> , <i>Eremophila latrobei</i> and <i>Grevillea obliquistigma</i> mid open shrubland and <i>Ptilotus obovatus</i> , <i>Sida calyxhymenia</i> and <i>Abutilon cryptopetalum</i> sparse low shrubs.	Lower slopes and outwashes of ironstone colluvium; drainage lines and low-lying areas on sandy outwash plains.	8,085	99.2	1.2
3b ¹	Sandy outwash plains	<i>Acacia pruinocarpa</i> scattered trees over <i>A. aneura</i> woodland over <i>A. ramulosa</i> var. <i>linophylla</i> and <i>A. aneura</i> shrubland over mixed <i>Eremophila</i> closed shrubland over <i>Ptilotus obovatus</i> var. <i>obovatus</i> open low shrubland.	Drainage lines and low lying areas on sandy and outwash plains.		62.8	0.8
4a ¹	Granite/dolerite slopes and plains	<i>Acacia</i> sp. Weld Range and <i>A. aneuria</i> var. <i>microcarpa</i> open tall shrubland over <i>Eremophila macmillaniana</i> and mixed <i>Senna</i> spp. open mid shrubland over <i>Ptilotus obovatus</i> var. <i>obovatus</i> open low shrubland.	Undulating scree plains and mid to low slopes of granite and dolerite.	8,412	8.5	0.1

Code	Landform	Description	Soil type and surface geology	Area mapped by <i>ecologia</i> ¹ (ha)	Beebyn-W11 proposed disturbance (ha)	Beebyn-W11 impact to known area (%)
5a ¹	Various	<i>Acacia</i> low woodland over <i>Solanum ashbyae</i> / <i>lasiophyllum</i> and <i>Ptilotus obovatus</i> var. <i>obovatus</i> low shrubland over mixed low tussock grassland.	Ridge tops and upper slopes of BIF ridges, low lying semi saline flats, riparian areas and ironstone scree flat plains.	9,324	1.3	<0.1
D	Disturbed – clear of vegetation			30.4	8.9	29.3
Total				44,325.4	262.1	0.6

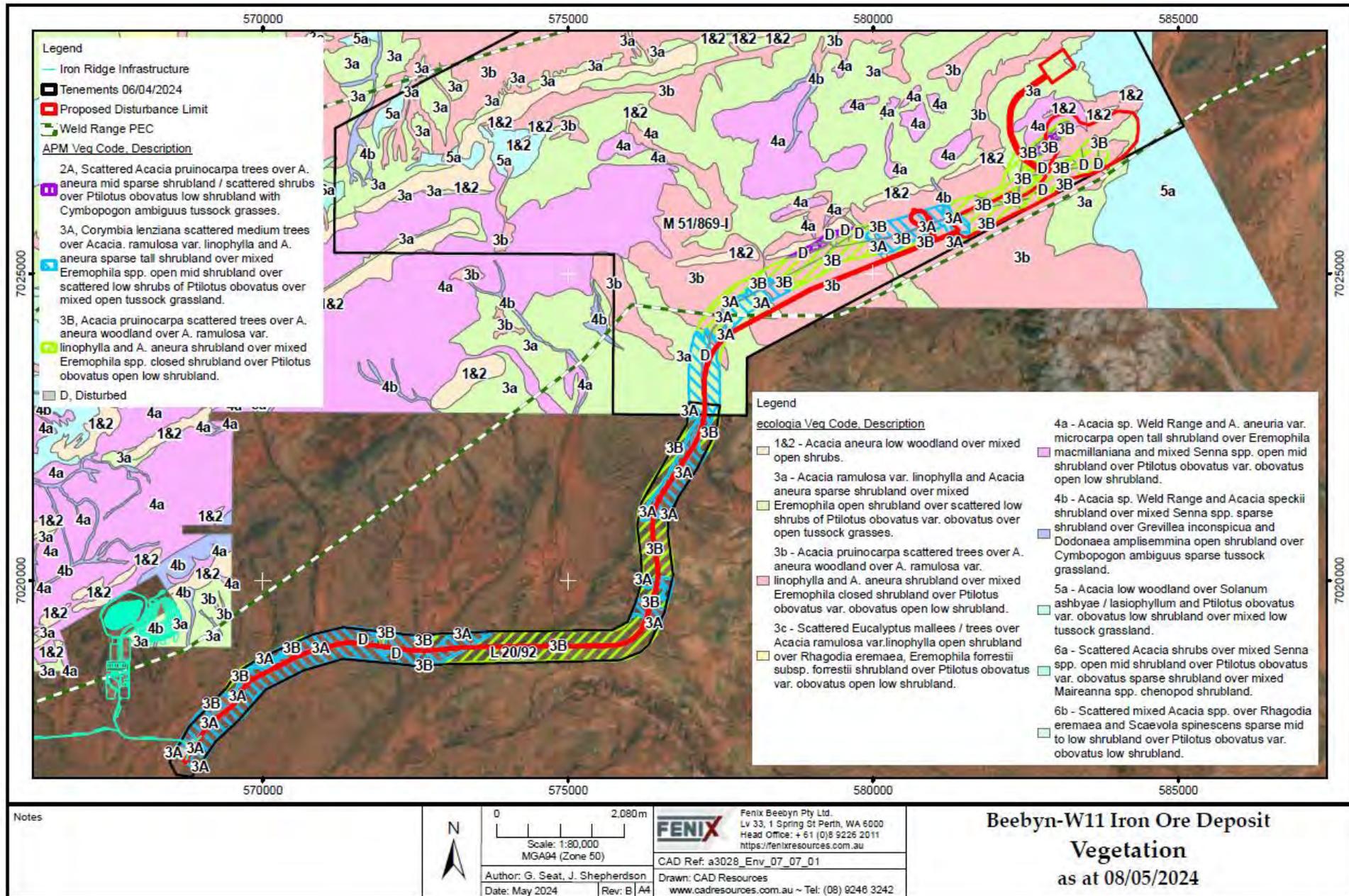


Figure 1.6: Vegetation types associated with the project area.

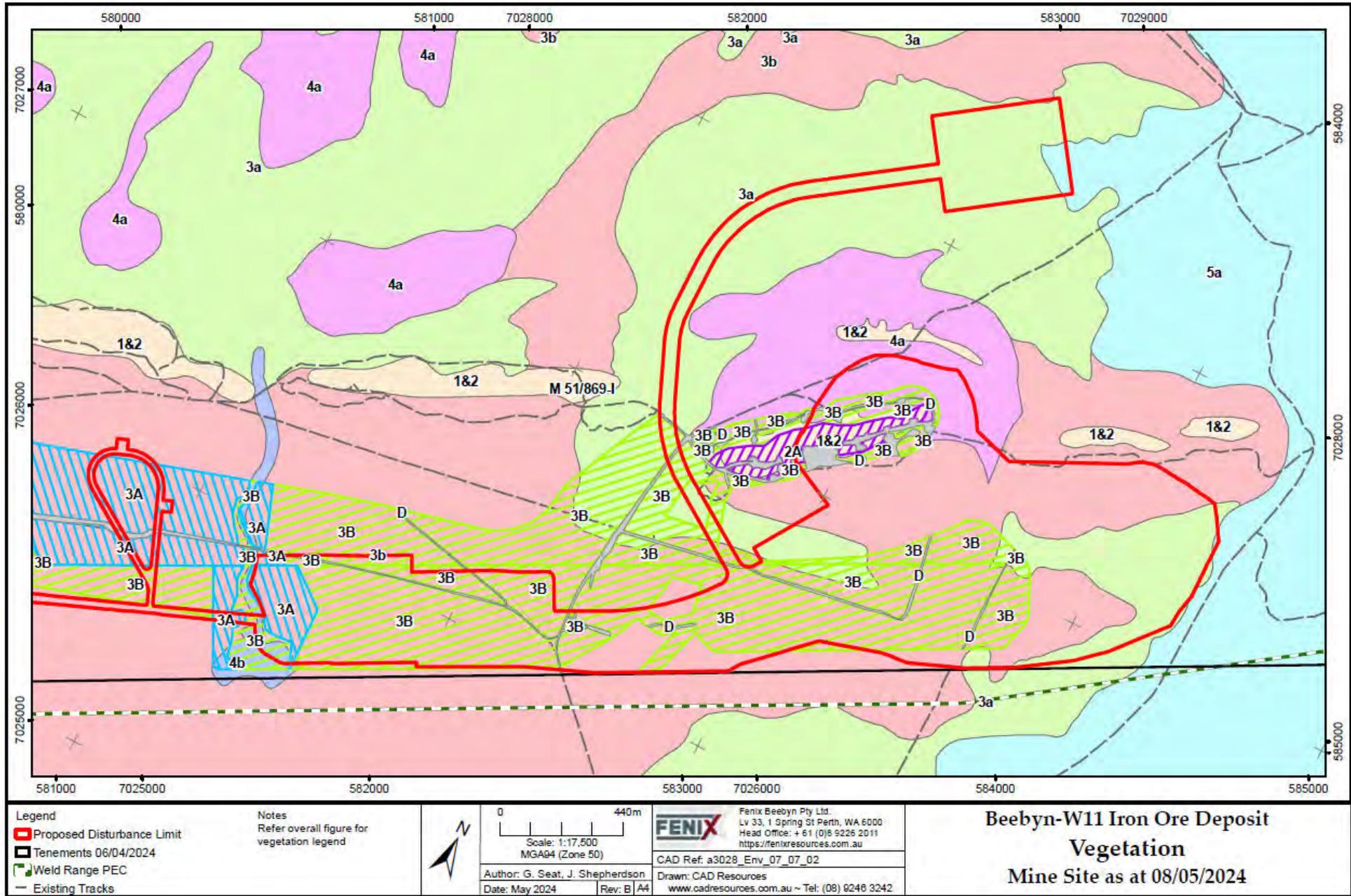


Figure 1.7: Vegetation types associated with the infrastructure area.

1.7 Introduced flora

The desktop survey identified nine introduced (weed) species as potentially occurring within a 30km radius of the project area. No introduced flora were recorded in the project area during the survey by APM (2024); however, *ecologia* (2010b) recorded five introduced (weed) species in the surrounding area and Ecotec (2021 and 2022) recorded eight weed species at the nearby Iron Ridge project. None of the weed species are considered to be Weeds of National Significance. While not previously recorded in the Beebyn-W11 project area, *Rumex vesicarius* is listed as a Declared Pest on the Western Australian Organism List (Department of Primary Industries and Regional Development [DPIRD] 2024) and has been recorded at the Iron Ridge project (Ecotec 2022).

Table 1.6 lists the weed species recorded during the surveys as well as those considered likely to be in the area.

Table 1.6 Weed species recorded and potentially occurring in the project area.

Scientific name	Common name	Known occurrence
<i>Lysimachia arvensis</i>	Pimpernel	Iron Ridge (Ecotec 2022)
<i>Brassica napus</i>	Canola	Iron Ridge (Ecotec 2022)
<i>Cenchrus ciliaris</i>	Buffel grass	Surrounding area (<i>ecologia</i> 2010b)
<i>Centaurea melitensis</i>	Maltese cockspur	Iron Ridge (Ecotec 2022)
<i>Cuscuta epithymum</i>	Lesser Dodder	Surrounding area (<i>ecologia</i> 2010b)
<i>Cuscuta planiflora</i>	Small seeded dodder	Iron Ridge (Ecotec 2021)
<i>Portulaca oleracea</i>	Purslane	Surrounding area (<i>ecologia</i> 2010b)
<i>Rostraria pumila</i>	Rough cats' tail	Iron Ridge (Ecotec 2021)
<i>Rumex vesicarius</i>	Ruby dock	Iron Ridge (Ecotec 2022)
<i>Solanum nigrum</i>	Black berry nightshade	Surrounding area (<i>ecologia</i> 2010b)
<i>Sonchus asper</i>	Rough sow thistle	Iron Ridge (Ecotec 2022)
<i>Sonchus oleraceus</i>	Common sow thistle	Iron Ridge (Ecotec 2022), surrounding area (<i>ecologia</i> 2010b)

1.8 Fauna and habitat

ecologia (2010a) undertook a Level 2 vertebrate survey of the project area and surrounds over four site visits between 2006 and 2007; recording 148 vertebrate species in and around the project area, including 80 bird species, 44 reptiles, 23 mammals (17 native and six introduced) and one amphibian.

Twenty vertebrate fauna species and two invertebrate species of conservation significance were identified from database searches of a 30 km radius from the study area including seven mammals, 11 birds and two reptiles (APM 2024). Species listed as Marine or species not known to inhabit terrestrial environments are considered very unlikely to inhabit the project area and have been excluded from further discussion.

Table 1.7 provides a summary of those conservation significant species occurring or likely to occur within the Project area. Previously recorded locations of conservation significant fauna are presented in Figure 1.8.

At the Weld Range, the long-tailed dunnart has been recorded on exposed rock and stony soils with hummock grasses and shrubs, flat-topped hills, lateritic plateaus, sandstone ranges and breakaways, generally with a vegetation of sparse mulga over spinifex (*ecologia* 2009a). Within the project area, APM (2024) found suitable habitat exists in the Banded Ironstone and Drainage Line habitats.

Old, inactive malleefowl mounds have been recorded in the project area; however, mounds may last decades after abandonment and the presence of inactive mounds is not a reliable indication of current presence. The species is not expected to be a resident at Weld Range but may persist in surrounding areas of unburnt habitat (APM 2024).

The project area contains some large trees that may be suitable for development of hollows by the Southern whiteface (a bird listed as Vulnerable); however, the area is previously disturbed with grazing impacts from both the Beebyn Station and feral goats, and historic clearing for mining exploration. The understory is sparse and the litter layer sparse to absent, but thicker in narrow bands around the drainage lines. Due to the poor condition of the understory, the area is unlikely to host habitat critical to the survival of the Southern whiteface (APM 2024).

Suitable foraging habitat for the grey falcon is present within the area, however no suitable nesting habitat is present and preferred nesting habitat is not available in the surrounding local area. Known records are more than 50 km away and whilst the grey falcon may occasionally visit the locality, it is unlikely to provide an important habitat for this species (APM 2024).

The Western spiny-tailed skink has not previously been recorded in BIF; however, the species is poorly known, and crevices are present in the Banded Ironstone Ridge habitat. The West Coast mulga slider has been recorded in Weld Range including locations close to the project area; however, APM (2024) found the habitats within the project area were generally of poor quality. Leaf litter is scarce within the project area and soils are degraded and likely poor for burrowing. Higher quality microhabitats occur in the Drainage Line habitat however, soils may be too stony to be suitable.

ecologia conducted a targeted *Idiosoma nigrum* survey at Weld Range (ecologia 2009b), which included a collection of detailed data on the spider's demography, population structure and habitat preference. A total of 76 ha was surveyed for *Idiosoma nigrum*, with 1,708 burrows found, all within the boundaries of drainage lines and underneath Acacia vegetation, predominately on the southern face of hill slopes. Within the Beebyn-W11 project area, 393 burrows were recorded, with an estimated population size of 274 ± 197 individuals (ecologia 2009b).

Biologic Environmental Survey Pty Ltd (Biologic) undertook a status review of the species in April 2019 and confirmed that the trapdoor spider found in the Weld Range area is now regarded as *Idiosoma clypeatum*, a Priority 3 species under the *WA Biodiversity Conservation Act* (Biologic 2019). The letter report provided by Biologic is included in Appendix 1.

Intensive targeted surveys have previously been conducted throughout the Weld Range when the northern shield-backed trapdoor spider was regarded as *I. nigrum* and listed as a Vulnerable species under the *WA Wildlife Conservation Act 1950*. Over 1800 trapdoor burrows have been identified from database searches, the majority of which are from within the Weld Range. Biologic (2012) estimated the population size of *I. clypeatum* across the Weld Range to be more than 14,000 individuals. The Biologic report is included in Appendix 1.

Recorded locations of *I. clypeatum* are shown on Figure 1.9. The proposed Beebyn-W11 project avoids disturbance to all known burrows (as recorded by ecologia 2009b). A targeted survey is planned for late July to update the information available.

Table 1.7: Conservation significant fauna likelihood of occurrence.

Common name	Scientific name	EPBC status	WA status	Comments	Likelihood of occurrence
Mammals					
Bilby	<i>Macrotis lagotis</i>	VU	VU	The local record has a low level of certainty and was recorded in 1984.	Unlikely
Black-flanked rock-wallaby	<i>Petrogale lateralis lateralis</i>	EN	EN	Historical local record is a fossilised specimen	Unlikely
Brush-tailed mulgara	<i>Dasyercus blythi</i>		P4	Historical local record is a fossilised specimen	Unlikely
Ghost bat	<i>Macroderma gigas</i>	VU	VU	Historical local record is a fossilised specimen	Unlikely
Gould's mouse	<i>Pseudomys gouldii</i>	VU	VU	Historical local record is a fossilised specimen	Unlikely
Greater stick-nest rat	<i>Leporillus conditor</i>	VU	CD	Historical local record is a fossilised specimen	Unlikely
Long-tailed dunnart	<i>Antechinomys longicaudata</i>		P4	Suitable habitat present in the BIF	Recorded
Birds					
Curlew sandpiper	<i>Calidris ferruginea</i>	CR, MI	CR	No suitable habitat present	Unlikely
Fork-tailed swift	<i>Apus pacificus</i>	MI	IA	All habitats suitable	Possible
Grey falcon	<i>Falco hypoleucos</i>	VU	VU	Suitable foraging habitat present. No suitable nesting habitat.	Possible
Grey wagtail	<i>Motacilla cinerea</i>	MI	MI	No suitable habitat present	Unlikely
Malleefowl	<i>Leipoa ocellata</i>	VU	VU	Inactive mounds have been recorded	Possible
Night parrot	<i>Pezoporus occidentalis</i>	EN	CR	No suitable habitat present	Unlikely
Pectoral sandpiper	<i>Calidris melanotos</i>	MI	IA	No suitable habitat present	Unlikely
Peregrine falcon	<i>Falco peregrinus</i>		OS	Foraging habitat present	Possible
Sharp-tailed sandpiper	<i>Calidris acuminata</i>	VU, MI	IA	No suitable habitat present	Unlikely
Southern whiteface	<i>Aphelocephala leucopsis</i>	VU	-	All habitats suitable, project area unlikely to host habitat critical to survival.	Possible
Yellow wagtail	<i>Motacilla flava</i>	MI	MI	No suitable habitat present	Unlikely

Common name	Scientific name	EPBC status	WA status	Comments	Likelihood of occurrence
Reptiles					
West coast mulga slider	<i>Lerista eupoda</i>		P1	Suitable habitat is present in the Mulga Woodland on Hill Slope habitat.	Possible
Western spiny-tailed skink	<i>Egernia stokesii badia</i>	EN	VU	No granite outcrops are present but suitable habitat may be present in the BIF outcrops	Possible
Invertebrate					
Northern shield-backed trapdoor spider	<i>Idiosoma clypeatum</i>		P3	Recorded within the study area, then identified as <i>I. nigrum</i>	Recorded
Shield-backed trapdoor spider	<i>Idiosoma nigrum</i>	VU	EN	All specimens in the Murchison region determined to be <i>I. clypeatum</i>	Unlikely

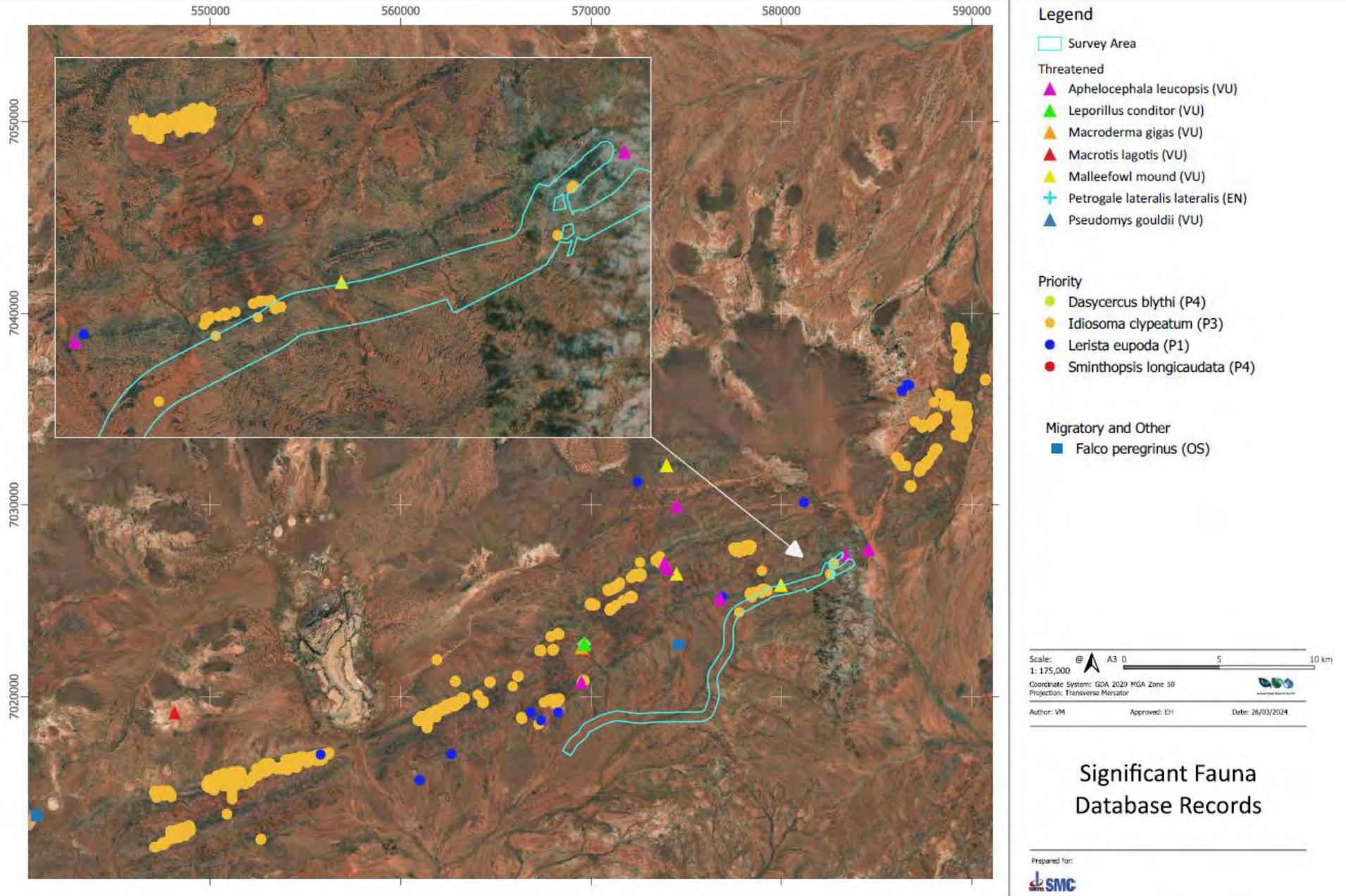


Figure 1.8: Database search records of conservation significant fauna within 30 km of the project area.

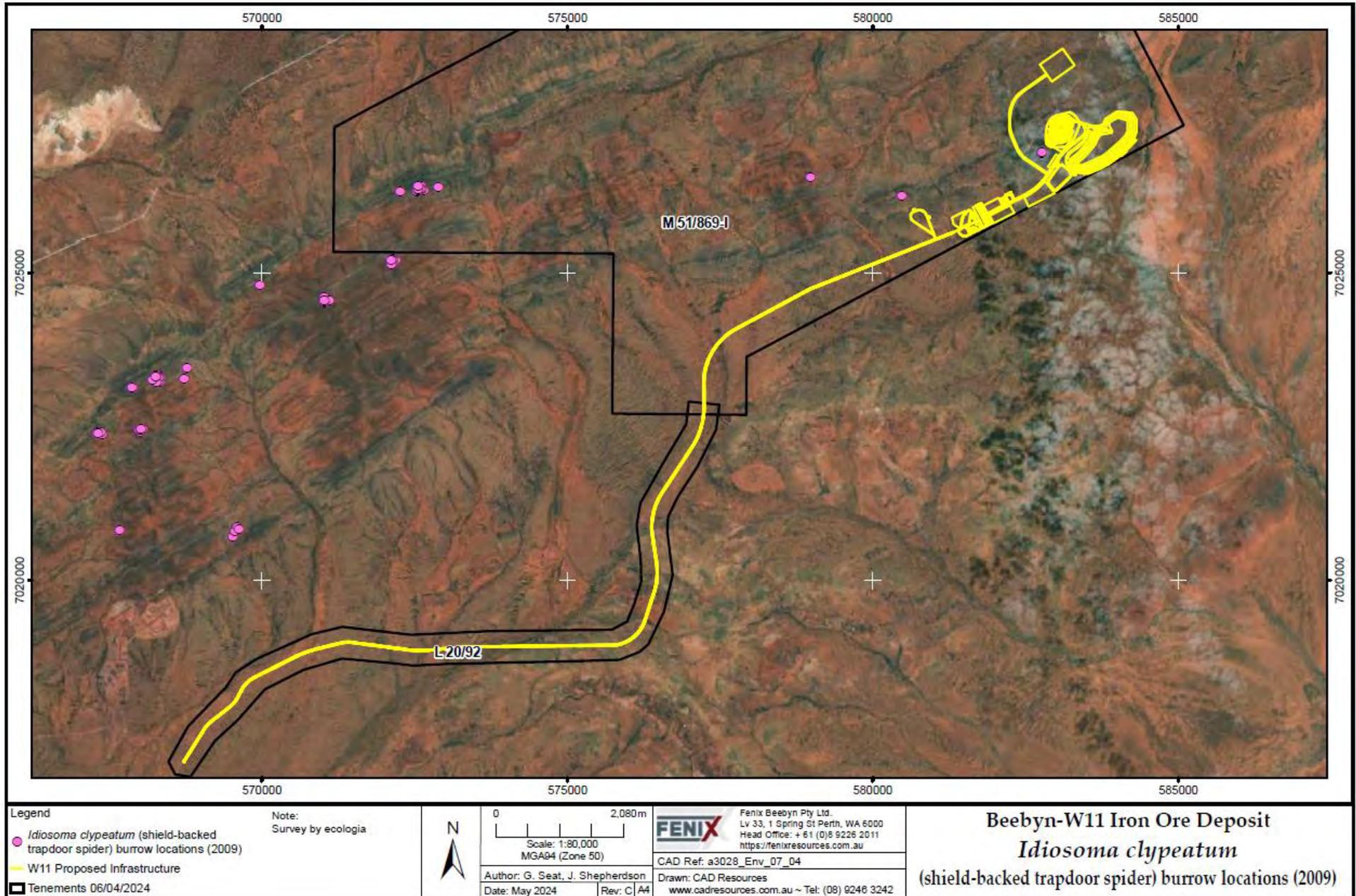


Figure 1.9: Recorded *Idiosoma clypeatum* (then *I. nigrum*) locations in the Beebyn-W11 project area and surrounds.

APM (2024) identified four main habitat types in the project area, described in described in Table 1.8 and shown on Figure 1.10. The habitat types are similar to those identified at the nearby Iron Ridge project (*ecologia* 2020a, Appendix 1).

Table 1.8: Fauna habitat recorded in the study area.

Habitat type	APM study area (ha)	Project area (ha)	Beebyn-W11 impact to local area (%)
Acacia Sand Plains	500.5	28.9	5.8
Banded Ironstone Ridge	6.1	3.3	54.1
Drainage Line	186.1	7.0	3.8
Mulga Woodland on Hill Slope	333.0	91.6	27.5
Disturbed	30.5	8.7	28.5
Not mapped (portion of M51/869)	-	122.6	-
Total	1,056.2	262.1	-

Acacia Sand Plains habitat occurs predominantly on the lower slopes of the study area, where the haul road is proposed to be developed. Associated soils include sandy to lightly rocky clay loam. The project will result in localised impact to this habitat.

Mulga Woodland on Hill Slope habitat is dominated by *Acacia pruinocarpa* trees and *Acacia aneura* shrublands over on sandy or stony clay loam on hill slopes and is the most widespread habitat present in the area. This habitat type provides suitable substrates, vegetation and habitat to support the Priority 3 (BC Act) northern shield-backed trapdoor spider. This habitat is considered widespread in the Weld Range area. Most disturbance associated with the project will occur in this habitat type; therefore, impact to a localised area will result from the proposed development.

Drainage Line habitat provides suitable habitat for the west coast mulga slider. Known from the arid interior of the Midwest of WA and endemic to the Murchison bioregion, this species has previously been recorded within Weld Range in leaf litter fringing drainage lines. A limited extent of this habitat exists around the project area and impact is expected to be minimal.

Banded Ironstone Ridge habitat occurs in a small portion in the north of the project area and is the least widespread habitat present in the area. The long-tailed dunnart has been recorded from widely scattered localities in the arid zone where it inhabits rugged, rocky areas, such as this habitat type. It typically occurs on plateaus near breakaways and scree slopes, and on rugged boulder-strewn scree slopes. Widely separated populations occur in the Pilbara, Murchison, Gibson Desert, southern Carnarvon Basin and in the Western MacDonnell Ranges (Northern Territory). The species was once considered rare but has recently been shown to be relatively common and widespread within rocky habitats, especially banded iron formation ranges within the Midwest. A limited extent of this habitat exists around the project area and impact is expected to be minimal.

Approximately 122 ha were not covered in the survey undertaken by APM; however, based on the surveyed area, this unmapped portion is expected to be *Mulga Woodland on Hill Slope* habitat. This will be confirmed during the targeted survey for *Idiosoma clypeatum*, scheduled for late July 2024.

1.9 Introduced fauna

Seven species of introduced mammal have previously been recorded around the project area. These include the dog, European red fox, feral cat, rabbit, house mouse, goat and cow. Goats, both feral and raised as pastoral stock, are known to generate high grazing pressure on the native vegetation of parts of the Weld Range.

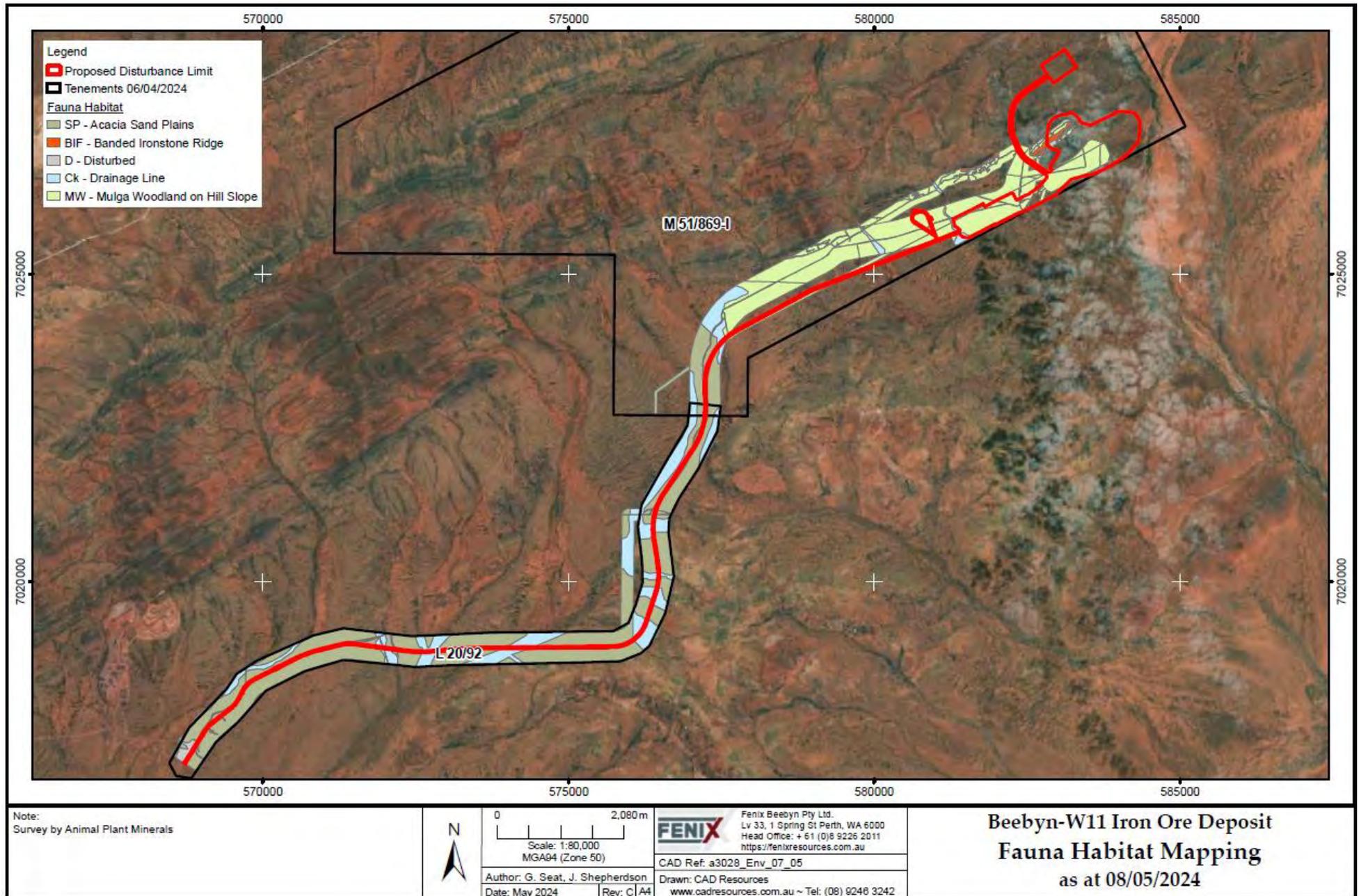


Figure 1.10: Fauna habitat in the project area.

1.10 Short-range endemics and subterranean fauna

Short-range endemics (SREs) are those fauna that have a naturally small range of less than 10,000 km². In addition, these species possess similar ecological traits including poor powers of dispersal, confinement to specialised often discontinuous habitats, slow growth and low fecundity (*ecologia* 2020b).

A potential SRE from a species complex *Cethegus* 'fugax' (curtain web spider) was identified during the *ecologia* survey (2010a). The geographic distribution of *Cethegus* fugax complex extends from the sub coastal areas along the Nullabor Plain to south-western Australia and near the coast as far north as Geraldton. Both morphological and genetic studies confirmed that *Cethegus* at Weld Range belonged to a new, undescribed species. Aerial dispersal may possibly enable *Cethegus* to escape disturbance on a very local scale (i.e. < 1km) but it does not function as a long - distance vector (*ecologia* 2010a).

Three records of *Cethegus* 'fugax' were recorded in the project area, to the west of the proposed laydown area and outside the disturbance footprint. An additional 33 records occur further to the west of the Beebyn-W11 project area (*ecologia* 2010a). Impact to this species as a result of project implementation is expected to be negligible.

In 2009 *ecologia* conducted a baseline stygofauna survey at Weld Range and surrounding pastoral land, which included sampling 84 drill holes (26 at Beebyn-W11, 40 at Madoonga and 18 at the surrounding pastoral land outside the proposed area of impact), laboratory identifications and reporting, interpretation of the potential impacts and an associated risk assessment of the various project components on stygofauna communities or species (*ecologia* 2010a and 2020b).

No stygobitic species or communities were identified during the stygofauna survey within the Beebyn-W11 impact area or in the regional pastoral bores, although stygophylic representatives of two crustacean orders (Ostracoda and Copepoda) and one annelid sub-class were recorded from nine pastoral wells. One stygobitic copepod from the order Calanoida found in a troglifauna trap at Madoonga suggests that stygofauna may be present in the wider area, though this was not able to be confirmed by stygofauna sampling in nearby bores. The stygophilic copepod found in regional bores, *Mesocyclops brooksi*, is known from both surface waters and ground waters, and it is widespread in Western Australia. The ostracods, *Cypridopsis vidua* and *Sarscypridopsis oschracea* are often found in wells in arid Western Australia but are typically surface species inhabiting open freshwater bodies in southern Western Australia. The results of the 2009 survey suggest that the groundwater habitat in and around the Beebyn impact area is depauperate of true stygofauna and therefore no risk assessment or management recommendations were necessary (*ecologia* 2010a and 2020b).

The *ecologia* stygofauna report is included in Appendix 2.

Ecologia also conducted a two phase troglifauna study of the project area and surrounds in 2007 and 2008, sampling 143 bore holes (50 at Beebyn-W11, 51 at Madoonga and 42 outside the then proposed area of impact).

A single centipede specimen (likely from the Cryptopidae family) was collected from a single bore within the Beebyn-W11 area. Cryptopids have been collected elsewhere in Western Australia; however, no records exist near Weld Range or other ranges in the Midwest region (*ecologia* 2011). The presence of this species was not confirmed elsewhere in the survey despite a comprehensive number of bores being sampled. Furthermore, no other troglitic species were found in the survey area.

Examination of the bore hole with the troglifauna record showed that the hole contained at least two geological strata with voids suitable for troglifauna habitation. The most common stratum was dolerite, and this habitat has been classified as 'suitable' due to its common fractures. The other stratum was Banded Iron Formation (BIF), which showed some degree of porosity but was mostly located below the water table and thus its use for troglifauna was assessed as not suitable. The suitable troglitic habitat (dolerite) is widespread throughout the range. Additionally, both dolerite and BIF strata are continuous to the west from the project area and also occur in the Wilgie Mia Aboriginal Reserve. Impact on the potential troglifauna habitat at Weld Range as a result of the Beebyn-W11 project is expected to be low.

1.11 Hydrology

1.11.1 Surface water

Weld Range rises above the centre of a drainage basin that is surrounded in the north by topographically higher flat-topped breakaways. The main drainage lines converge at the southeastern part of the basin on its western path to form the Sanford River, a tributary of the Murchison River. The major drainage line (Berhing Creek) drains through the Weld Range to the west of the proposed project area (*ecologia* 2010a).

Rainwater falling in the area drains quickly off the Weld Range ridges through narrow channels which widen substantially as the water drains onto the flatter areas, in some cases forming pans. In the flatter areas the flow of water can become ambiguous with streams dividing, in some cases the divisions flow in quite different directions. The bed conditions of the main channels of all watercourses comprise of coarse sand, rocks and cobbles; whilst the banks comprise silty sand which is easily eroded.

Pentium Water Pty Ltd (Pentium) was commissioned by Fenix to undertake a surface water assessment of the potential impact of flood flows on the mining area and to determine any bunding and drainage requirements for the mining area and infrastructure (Pentium 2024).

The infrastructure area lies on the southern end of one major catchment (Beebyn Creek) with an area of approximately 225 km² (Figure 1.11). The ephemeral watercourse draining this catchment area flows south through Beebyn Gap (Pentium 2024).

Detailed flood flows using the HECRAS model found the Beebyn Creek comprised one main channel running south past the proposed Beebyn-W11 infrastructure. Critical duration for the Beebyn Creek was 36 hours (Pentium 2024). The estimated 20, 50 and 100 year average recurrence interval (ARI) design peak flows are shown in Table 1.9.

Table 1.9: Adopted design flows from HECRAS modelling.

ARI (years)	Adopted design flows (m ³ /sec)
20	150
50	235
100	312

Analysis of the impact of a 1% AEP rainfall event found that Beebyn Creek floods to about 1m deep as it flows past the Beebyn-W11 project site but does not impact mine infrastructure. The 1% AEP flood extent encroaches to within approximately 170m of the pit and waste dump (Figure 1.12).

The mine generally lies near the top of a ridge, and catchments and surface water flows impacting site infrastructure are relatively small. A standard pit bund will be sufficient to prevent surface water flows from entering the pit (Pentium 2024).

Minor flow paths run through the site and the proposed pit, waste dump and plant boundaries; therefore, these areas will require drainage management to prevent ponding. The diversion channel and bunds required are all minor. Ponding against the northern side of the waste dump may occur, depending on the development and configuration of the waste dump, and in the operational phase, will evaporate and infiltrate in situ (Pentium Water 2024). Provision has been made for a diversion channel in this area if required.

The borrow pit was included in the mine design after the surface water assessment was completed. The borrow pit lies outside any catchment flow paths and will not impact surface water flows or require surface water management infrastructure.

Several flow paths cross the proposed road route (Figure 1.13), with a 1% AEP peak flow ranging from 0.7 (CS_08) to 28 m³/s (CS_04). Fenix is currently undertaking a lidar survey to accurately design the road and waterway, however, due to the short life of mine and relatively small catchments, Pentium (2024) concluded that floodways (with culverts if required) would be suitable. The length of floodways may be determined by the selected design flood event and permissible water depth of road trains.

The Pentium report is included in Appendix 3.

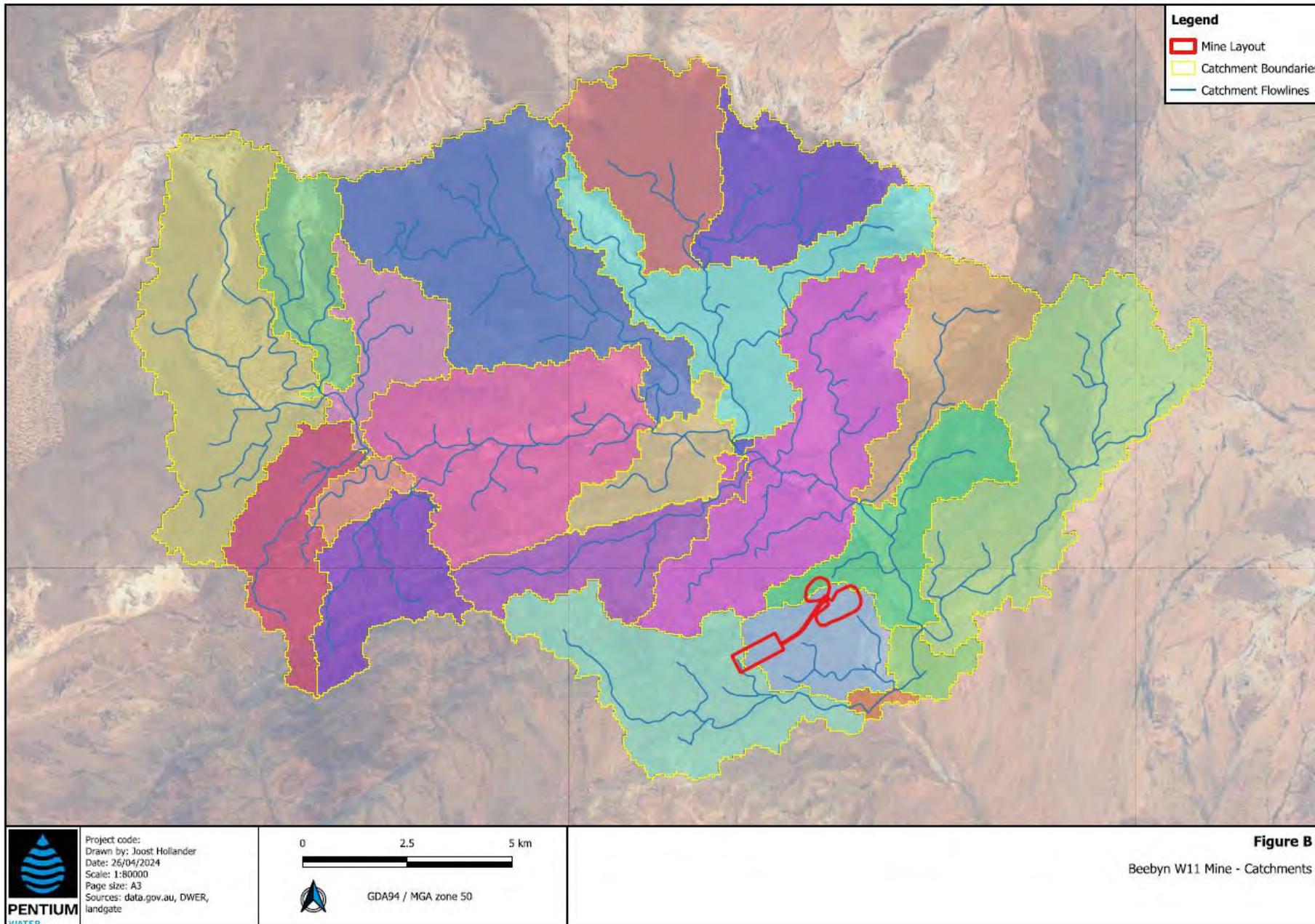


Figure 1.11: Surface water catchments of the infrastructure area.

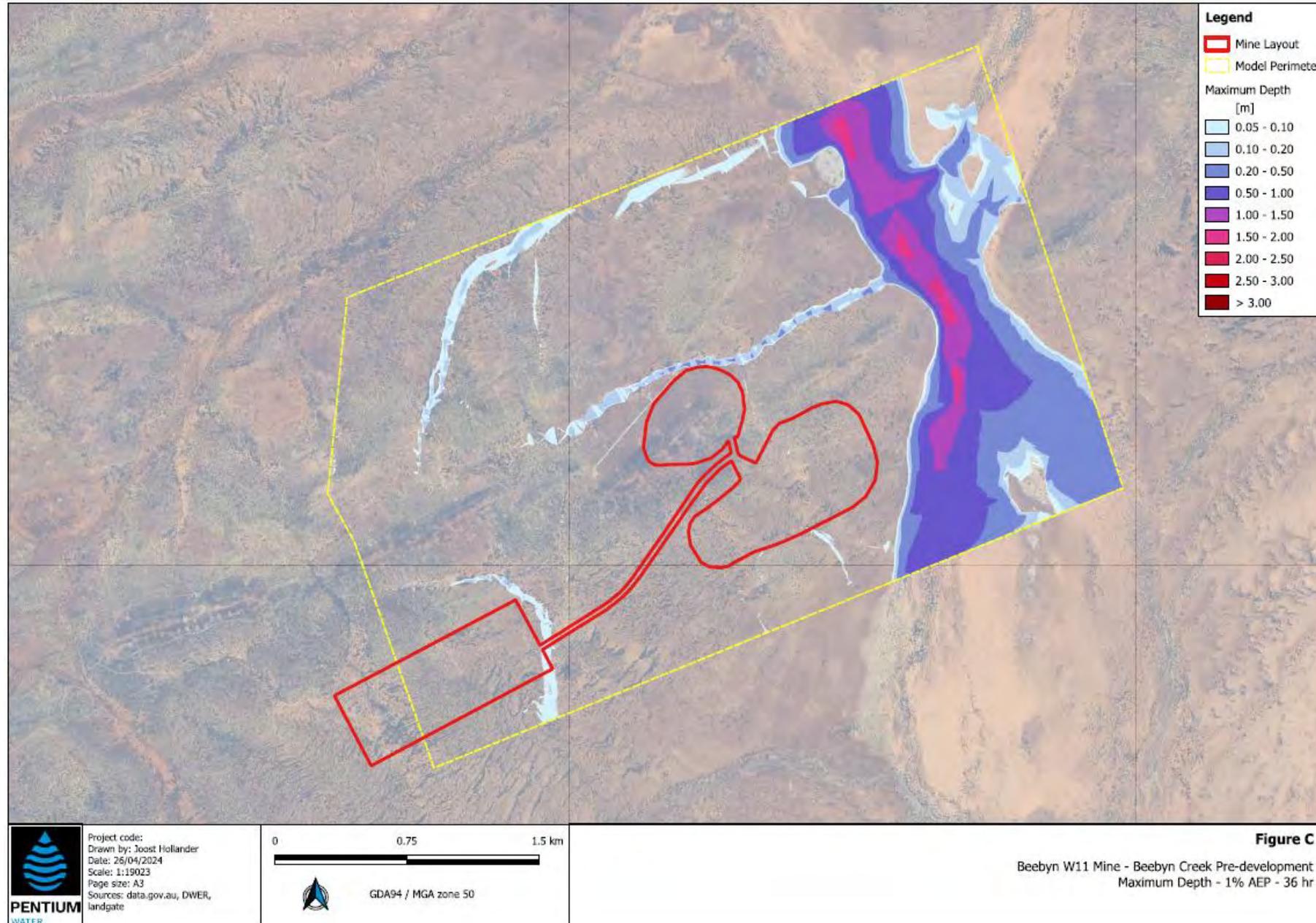


Figure 1.12: Beebyn-W11 project flood risk (infrastructure area) for a 1 in 100-year AE.

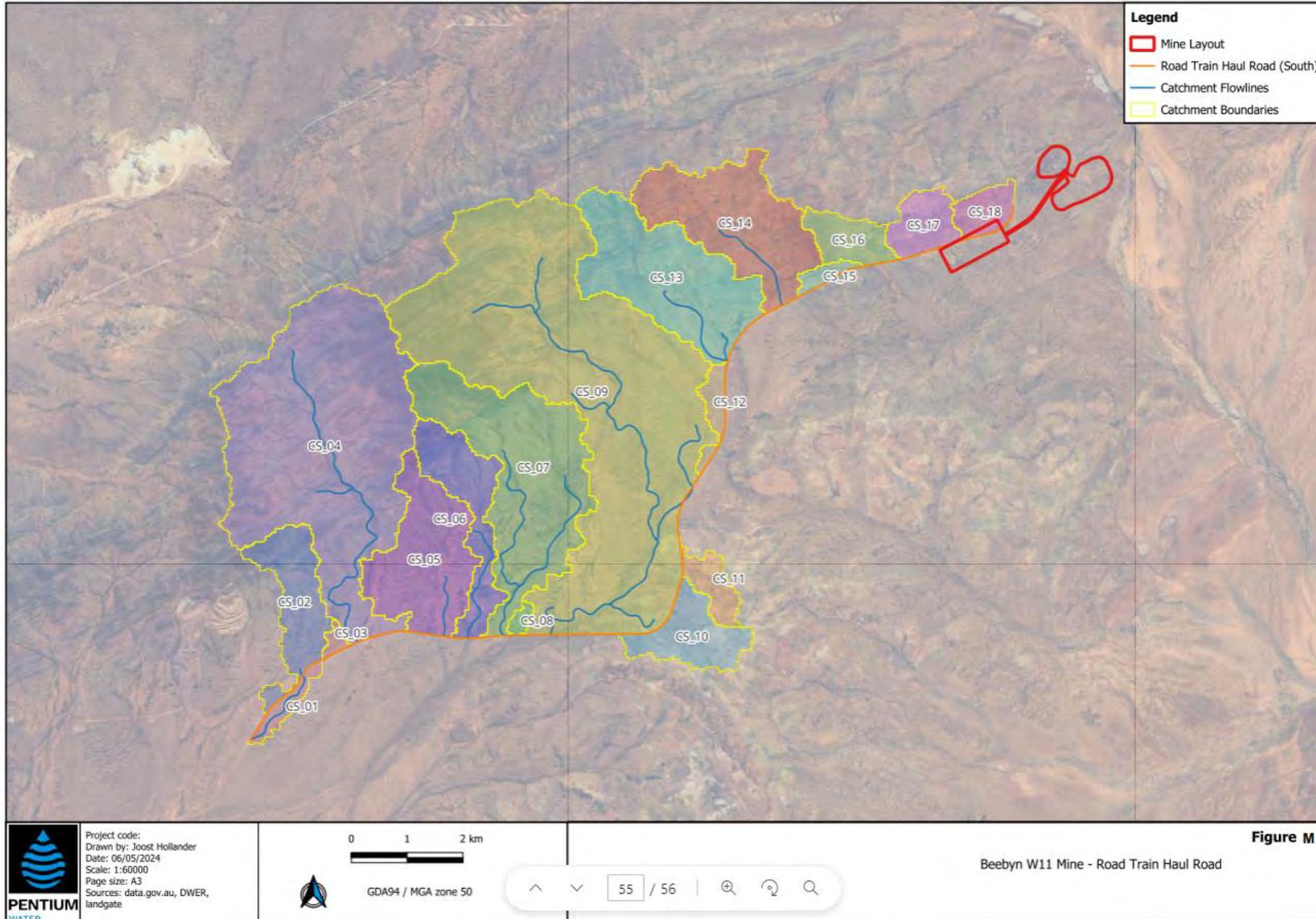


Figure 1.13: Surface water catchments of the haul road area.

1.11.2 Groundwater

The Weld Range is located in the East Murchison groundwater management unit. The groundwater in this area is characterised by fractured-rock and palaeochannel aquifers, alluvium and localised calcrete aquifers. Groundwater from fractured-rock aquifers can vary widely in terms of quality and quantity. At Weld Range, groundwater occurs at relatively shallow depths (typically 5 – 50 m below ground level (bgl)) beneath the alluvial plain and occurs within the bedrock sequence that forms Weld Range. The groundwater is fresh to slightly brackish in the BIF and shallow alluvial aquifers and is highly saline in alluvium and the palaeochannel aquifer west and south of the project area (ecologia 2010a).

The main aquifers in the region are alluvium and colluvium with a tertiary palaeochannel passing through the Weld Range. The Banded Iron Formation (BIF) strata which include the Beebyn-Beebyn-W11 deposit are commonly fractured, jointed and vuggy, and constitute aquifers of moderate to high permeability. The granitic and greenstone basement rocks (other than BIF) are generally of low permeability, including the dolerite associated with the BIF. The groundwater is recharged by the infiltration of rainfall and streamflow following high rainfall events. Groundwater flows in a north to southeast direction through the Weld Range and discharges into Lake Austin or a smaller temporary lake to the north.

Existing groundwater extraction in the area consists of water for domestic use and stock watering at homesteads and on stations, and dewatering associated with the Iron Ridge project to the west. The nearest recorded wells are Wilgie Mia and Yallon Wells, approximately 5 km to the south and south-south-east respectively.

The three bores constructed for water abstraction encountered the water table between 29.6 m (hole ID B_WB2_01) and 49.7 m (hole ID B_WB2_02). The water level in the project area was found to be around 480 m RL, with salinity of 690 – 1,400 mg/L TDS and neutral to slightly alkaline pH between 7.6 and 8.6.

The Pentium report is included in Appendix 3.

1.11.3 Groundwater Dependent Ecosystems

No Groundwater Dependent Ecosystems (GDE's) have been identified within the project area and no vegetation considered to be groundwater dependent has been recorded in the various surveys completed. Phreatophytic vegetation types were recorded by ecologia (2010a) approximately 10 km north east and 20 km south west of the proposed project, outside the disturbance area and extent of predicted drawdown associated with the proposal.

1.11.4 Pit lake formation

Once mining is completed, the water level in the pit will rapidly rise for the first five years, followed by a slower recovery over time until a balance is established between the groundwater inflows plus rainfall accumulation and evaporation losses. The pit will extend down from ground levels of approximately 520 m AHD to a base elevation of 395 m AHD, 125 m below the average natural ground level.

The water recharge predicted post mining is given in Table 1.10. The water level in the pit lake will rise up to approximately 466 m RL post mining. It is predicted that a rapid recovery of the water table will occur in the first five years and then plateau after this time.

Groundwater modelling indicates that the pit will function as a sink, with groundwater flowing towards it. Therefore, there would be no flow from the pit lake to groundwater and so there is no potential for groundwater contamination.

The concentration of solutes within the pit lakes will increase over time due to high evaporation and low precipitation in the area. The salinity of the pit water would gradually increase from about 900 mg/L TDS when the pit first begins to fill with water, to about 12,000 mg/L TDS 100 years after the end of mining (Pentium 2024).

The Pentium report is included in Appendix 3.

Table 1.10: Pit recharge water balance.

Time post mining (yr)	Pit lake water level (m RL)
1	419
2	428
5	443
10	454
25	463
100	466

2.0 IMPACTS AND MANAGEMENT

2.1 Impact to conservation significant flora

15 Priority listed flora species have been recorded in and around the project area. Based on historical records (ecologia 2009a), individuals from three of the Priority species recorded will be impacted by the proposed development.

All three species are widespread and well represented in the Weld Range and surrounding area (refer to Figure 1.3 and Figure 1.4). Table 2.1 provides the number of individuals of each species to be impacted, the number of individuals in the local population and the percentage impact to that population as a resulting of development of the project. Note that “local population”, as described by *ecologia* (2020a) refers to the population of the species within and nearby the surveyed area.

Table 2.1: Impact to Priority flora.

Taxon	Individuals recorded within proposed disturbance footprint	Known number of individuals at Weld Range	Project impact to local population (%)
Priority 1			
<i>Euphorbia sarcostemmoides</i>	1	42	2.4
Priority 3			
<i>Micromyrtus placoides</i>	1	33,724	<0.01
<i>Prostanthera petrophila</i>	1	2,184	<0.05

2.1.1 Management actions

A targeted survey for conservation significant flora in the Beebyn-W11 disturbance area is scheduled for July 2024 and it is anticipated that the identification of *Hibiscus ?krichauffianus* will also be confirmed during this survey. The results of the survey will be provided to DEMIRS and the impact assessment of the project will be updated accordingly.

To minimise potential impacts to Priority flora species, Fenix Beebyn will:

- implement a Site Disturbance Permit system with strict survey controls and requiring sign off by the Registered Manager prior to clearing commencing.
- clearly delineate areas to be cleared using survey pegs and coloured flagging tape and record (“pick up”) cleared areas on completion.
- maintain records of clearing undertaken.
- provide information to site personnel by way of an induction and specific training where necessary to identify conservation significant species and highlight the importance of clearing protocols.

2.2 Impact to significant vegetation and ecological systems

No State (BC Act) or Commonwealth (EPBC Act) listed Threatened Ecological Communities (TECs) occur within the project area.

A portion of the Beebyn-W11 Project area coincides with the Priority 1 PEC Weld Range Vegetation Complexes (banded ironstone formation) (ecologia 2020a). APM (2024) determined that vegetation units 2a, 3a and 3b correspond to previously identified vegetation of this PEC, with ecologia (2009a) also identifying vegetation codes 4a and 5a as occurring with the PEC (refer to Section 1.6.1).

The Priority 1 PEC Weld Range Vegetation Complexes (banded ironstone formation) occupies an area of 20,318 ha. Table 2.2 summarises the significance of each of the vegetation types in the project area that are associated with the PEC, the planned area of disturbance to each and the percentage impact to the PEC as a result.

Table 2.2: Impact to PEC vegetation.

Vegetation Code ^{1,2}	Project area in PEC (ha)	Total mapped in PEC by <i>Ecologia</i> (2009a)	Proportion (%)
2a ²	3.3	1360	0.2
3a ²	7.2	462	1.6
3a ¹	48.5		10.5
3b ²	85.1	666	12.8
3b ¹	62.3		9.3
4a ¹	8.5	3225	0.3
5a ¹	1.3	461	0.3
Total	216.4	6174	-

¹ - *ecologia* (2010b)

² – APM (2024)

The area of project disturbance (excluding existing disturbance in the area) to vegetation associated with the Weld Range PEC equates to less than 1.1% of the PEC (20,318 ha) and is therefore not considered to be a significant impact.

2.2.1 Management actions

To minimise further impact to vegetation associated with the Weld Range PEC, Fenix Beebyn will:

- implement a Site Disturbance Permit system with strict survey controls and requiring sign off by the Registered Manager prior to clearing commencing.
- clearly delineate areas to be cleared using survey pegs and coloured flagging tape and record (“pick up”) cleared areas on completion.
- maintain records of clearing undertaken.
- provide information to site personnel by way of an induction and specific training where necessary to identify conservation significant vegetation and highlight the importance of clearing protocols.
- a targeted survey will be undertaken in late July 2024 to confirm the location and numbers of conservation significant flora.

2.3 Impacts to vegetation and flora as a result of dust emissions

Dust emissions from mining and related activities can cause vegetation death resulting from high levels of dust settling on plant leaves, preventing photosynthesis and respiration.

Public amenity, health and safety can also be impacted by dust generation. These impacts are not specifically addressed in this environmental risk assessment, however can be effectively managed utilising the same controls.

Sources of dust include:

- vehicle and machinery movement on dry road surfaces
- mining and blasting of dry material

- topsoil stripping
- unmanaged crushing and processing of ore in the plant
- materials handling on the ROM and stockpile areas
- open areas such as laydowns, hardstands and the ROM, as well as freshly cleared ground.

2.3.1 Management actions

To minimise dust generation from the Beebyn-W11 operations management actions will include:

- dust suppression using water carts will be in operation on unsealed roads, in the pit, on the ROM and other open areas to minimise dust generation.
- water sprays will be utilised for crushing and conveying activity within the plant.
- land clearing will be undertaken progressively and only when required.
- land clearing and handling of topsoil in windy conditions will be avoided as far as practical.
- progressive rehabilitation of waste dumps and other disturbed areas will be carried out to minimise areas that may generate dust in windy conditions.
- addition of dust suppression products (i.e. polymer additives) will be considered for long term stockpiles and exposed surfaces in the event the site goes into care and maintenance.

2.4 Impacts to surface water

Downstream quantity and quality of surface water runoff can be impacted by mining, infrastructure and associated activities. This can result in offsite environmental impacts.

Placement of infrastructure or materials across drainage lines may result in impacts to the volume and quality of surface water runoff.

Removal of, and placement of infrastructure over, catchment areas can result in alteration of runoff volumes, potentially impacting downstream environments.

Deposition of material or runoff containing sediment and other contaminants entering drainage lines has potential to adversely impact the quality of water flowing offsite. Impacts to the downstream environment may occur as a result.

2.4.1 Management actions

To ensure there are no impacts to the quality and quantity of surface water flows, and to minimise the potential for downstream impacts, Fenix Beebyn will:

- minimise direct impacts to catchment areas and drainage lines by avoiding alteration of catchment areas and drainage lines (via clearing or infrastructure development) as far as practicable
- construct appropriate diversion drains and bunding to prevent upstream runoff entering the waste dump
- install culverts at road embankments where necessary to provide continuity of surface water flows
- construct appropriate drainage and containment infrastructure to control runoff from hardstand areas, roads and other cleared surfaces
- ensure hydrocarbons and chemicals are appropriately stored and spills are immediately addressed to prevent surface runoff carrying contaminants downstream.

2.5 Impacts resulting from groundwater use

Dewatering of the open pit will be required. The mine dewater will be discharge to a storage dam and used for dust suppression. Overspray and inappropriate discharge of saline groundwater can result in vegetation death and soil sterilisation.

Groundwater will be sourced from production bores and the open pit which will extend below the natural groundwater table. It will be transferred to the 25,000 m³ lined water storage dam and then applied to roads and other surfaces for dust suppression. A pipeline will also conduct water from the storage dam to the RO plant for treatment and domestic use.

The groundwater to be utilised by the Beebyn-W11 project is fresh to brackish (600-1,400 mg/L TDS) and is suitable for stock watering. Due to the low salinity of the groundwater, contact with vegetation is unlikely to result in any adverse impact.

2.5.1 Management actions

While groundwater use is not expected to result in adverse impacts to vegetation and soil, Fenix Beebyn will implement management actions including:

- constructing appropriate drainage and containment infrastructure to control runoff from hardstand areas, roads and other cleared surfaces
- ensuring groundwater is not discharged directly to vegetation
- placing pipelines in V drains or sub-surface to minimise the potential for damage and contain spills resulting from breaches
- minimise the potential for salt build up in the soil by not over-watering roads and hardstand areas
- ensure groundwater abstraction is undertaken in accordance with the approved groundwater licence.

2.6 Impacts from spills of hydrocarbons and other chemicals

Spills of hydrocarbons and other chemical substances have potential to contaminate soil, waterways and groundwater if not managed correctly.

Small leaks or regular small spills in a confined area (i.e. refuelling bay) can result in deep soil contamination over the life of an operation.

Hydrocarbon and chemical spills most commonly occur during transfer (i.e. refuelling vehicles or filling bulk tanks). Diesel will be stored in bulk tanks at the workshop. Refuelling and fuel transfer will occur at the site fuel farm, as well as via a fuel truck servicing mining equipment in the field.

Minor quantities of lubricants and other chemicals will be stored at the workshop.

The project will require a small mining fleet and therefore only require relatively small volumes of hydrocarbon storage.

No processing of ore, other than crushing will be carried out on site. There will be no bulk chemical storage requirements. The risk of a major fuel or chemical spill is considered low.

2.6.1 Management actions

To minimise the risk of hydrocarbon and chemical spills Fenix Beebyn will:

- ensure storage and refuelling facilities are constructed in accordance with relevant legislation and Australian Standards.
- construct bunding, drainage and containment to ensure potentially contaminated surface water does not reach the surrounding environment.

- ensure waste oil and hydrocarbon contaminated wastes (filters, rags, hydrocarbon absorbent materials) are stored in appropriate containers and removed from site by a licensed service provider for reprocessing or disposal at an appropriate facility.
- ensure washdown from hardstand areas (e.g. workshop area floors and vehicle washdown pads) is directed to an oil water separator for treatment. Sludge from the washdown pad is removed from the settling sump for treatment in the bioremediation area.
- provide appropriate spill response kits and training for site personnel.
- immediately clean up spills and contaminated soil and dispose of the material appropriately.
- maintain a register of stored substances and storage locations.
- ensure no areas of contamination remain post-closure.

3.0 MONITORING PROGRAM

3.1 Flora and vegetation

Flora and vegetation monitoring will be undertaken across the project area as requirements of the Mining Proposal and Mine Closure Plan. While the data collected will be primarily intended to provide comparison to revegetation and assessment against closure criteria, vegetation and specific species health will also be monitored.

A series of reference sites will be established around the site and baseline monitoring conducted prior to commencement of mining activity and annually thereafter. Monitoring parameters will include:

- Species richness
- Species abundance
- % vegetative cover at 0-1 m, 1-5 m and >5 m
- Tree health
- Weed abundance
- Observations of dust deposition on foliage
- Observations of erosion and/or sediment deposition.

Monitoring site locations have not yet been selected, pending assessment of the other approvals.

3.2 Groundwater drawdown

Groundwater abstraction volumes and groundwater level will be recorded and reported in accordance with the Groundwater Licence. This activity is regulated by DWER and the results reported annually in the DWER Annual Environmental Report.

Water sampling will be undertaken in accordance with the appropriate sample collection standards. Analysis and reporting will be undertaken by a NATA accredited laboratory.

3.3 Dust

Monitoring of dust emissions from the site will be predominately by regular visual inspection.

Vegetation and flora monitoring will include observations of dust present on foliage.

