Flora and Vegetation Impact Assessment

Karara Iron Ore Project Mine Life Extension

Final

September 2025

umwelt

KARARA MINING LTD

Flora and Vegetation Impact Assessment

Karara Iron Ore Project Mine Life Extension

Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Karara Mining Limited

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Document Status

Rev No.	Reviewer Name	Date	Approved for Issue Name	Date
V1	Marlee Starcevich Ruwani Gilmour	27/08/2025	Cathy Godden	27/08/2025
V2	Marlee Starcevich	4/09/2025	Cathy Godden	4/09/2025

Executive Summary

Karara Mining Limited (KML) operates the Karara Iron Ore Project (KIOP) and Mungada Iron Ore Project (MIOP), both located approximately 225 km east-southeast of Geraldton in the Midwest region of Western Australia (WA).

KIOP was approved under Ministerial Statement (MS) 805 in 2009 and consists of the Karara open-cut magnetite pit, a processing plant to produce magnetite concentrate, a waste rock dump (WRD), tailings storage facility (TSF), rail loading facilities, accommodation facilities, airport, access roads and linear infrastructure corridor.

MIOP was approved under MS 806 in 2009 and consists of the Blue Hills North and Terapod pits and WRDs and regional infrastructure. Mining was completed in 2014, and MIOP is currently in suspension from active mining. However, infrastructure such as pipelines, access roads, laydown areas, powerlines, rail siding and pits for water storage approved under MIOP are currently utilised by KIOP.

KML is proposing to further develop the KIOP with a Mine Life Extension (MLE), which includes an expansion to the MS 805 development envelope, an extension to the WRD and TSF, the incorporation of infrastructure at MIOP and previously cleared areas approved under Native Vegetation Clearing Permits (NVCP) (including the western section of the Yandanooka water pipeline, the rail loop and the Syncline Turner haul road).

An impact assessment was undertaken for flora and vegetation within the proposed expansion area, referred to as the KIOP MLE new disturbance footprint (also referred to as 'the KIOP MLE Proposal'), which has a maximum disturbance area of 1,522 hectares (ha). The KIOP MLE new disturbance footprint is entirely contained within the development envelope (referred to as the Combined Proposal development envelope or Combined Proposal DE), which is approximately 13,557 ha in size and spans approximately 143 km.

Significant Flora Taxa

A total of 41 significant flora taxa have been recorded within the Combined Proposal DE (Umwelt 2025). Of these, the KIOP MLE Proposal will directly and indirectly impact 14 taxa, as well as suitable habitat for an additional taxon. There is no predicted direct or indirect impact to any flora individuals that are listed as threatened under the WA *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

- *Acacia karinae* (P3)
- *Allocasuarina tessellata* (P3)
- *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- *Calandrinia kalanniensis* (P2) (impact to preferred habitat)
- *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3)
- *Crassula* sp. nov. (PU)
- *Drummondita fulva* (P3)

- *Grevillea globosa* (P3)
- *Grevillea scabrida* (P3)
- *Gunniopsis divisa* (P3)
- *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)
- *Micromyrtus trudgenii* (P3)
- *Persoonia pentasticha* (P3)
- *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)
- *Rhodanthe collina* (P3).

An assessment against the *WA Environmental Offsets Guidelines* (GoWA, 2014) residual impact significance model was undertaken for:

- All 14 significant flora taxa that will be directly or indirectly impacted by the KIOP MLE Proposal.
- *Calandrinia kalanniensis* (P2) which has the potential to be present in the KIOP MLE new disturbance footprint and consequently is at risk of impact by the KIOP MLE Proposal.
- The four (4) EPBC Act/BC Act listed flora taxa that do not occur in the KIOP MLE new disturbance footprint, but are known from the Combined Proposal DE.

The assessment determined that residual impacts to *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1) are potentially significant and may require an offset due to a predicted cumulative impact to the taxon of 72% within RAA 1.

Vegetation

Excluding currently cleared or approved to be cleared (CCAC) areas, the KIOP MLE Proposal will impact a total of 1,612 ha of vegetation (1,441 ha directly and 171 ha indirectly). This impact includes 1,587 ha total impact (1,429 ha direct and 158 ha indirect) to preferred habitat for any of the 41 significant flora taxa known from the Combined Proposal DE.

An assessment against the residual impact significance model was undertaken for all 19 remnant vegetation types (VTs) (i.e. excluding VT PL which represents planted non-locally endemic mature *Eucalyptus* species) that will be directly or indirectly impacted by the KIOP MLE Proposal. This assessment found that residual impacts to five VTs are potentially significant and may require an offset due to the high cumulative impact to these vegetation communities at a regional scale:

- VT O: 25% direct and indirect local impact and a predicted cumulative regional impact of 25%. The VT occurs on slopes and crests of banded iron formation (BIF) hills and ridges, as well as on rocky granite, which are restricted landforms in the Combined Proposal DE and the wider landscape (Umwelt 2025). VT O provides preferred habitat for 10 significant flora taxa of the Combined Proposal DE, including *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1) which was identified as having a potentially significant residual impact. VT O also forms a major component of the 'Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)' P1 Priority Ecological Community (PEC), which was identified as having a potentially significant residual impact.

- Highly modified VTs (HMVTs) D, HMVT E, HMVT F and HMVT G): combined direct and indirect local impact of 20 ha, but these four VTs represent pre-European vegetation system association (VSA) Mingenew_354, which has been heavily historically cleared and has 11% of its pre-European extent remaining within the Merredin Interim Biogeographic Regionalisation of Australia (IBRA) subregion. Impact to these VTs could be offset by restoration of other degraded areas of similar vegetation in the local or regional area, such as through planting, weed control, and fencing.

Listed Significant Vegetation

The KIOP MLE Proposal will impact two listed vegetation communities: the 'Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)' PEC (98 ha directly and 20 ha indirectly) and the 'Eucalypt woodlands of the Western Australian Wheatbelt' Threatened Ecological Community (TEC) (1.4 ha directly and 2.3 ha indirectly). The direct impact to these two communities contributes to a total predicted cumulative regional impact of 15% and 85%, respectively.

The residual impact to the Blue Hills PEC is potentially significant and may require an offset due to the PEC's small extent and area of occurrence, the degree of existing impact, and the likelihood of future impacts. The vegetation of the Blue Hills PEC is floristically unique and contains a high number of endemic and near-endemic flora taxa (Markey & Dillon, 2008), and consequently it may not be possible to fully mitigate direct impacts via rehabilitation.

The residual impact to the Eucalypt Woodlands of the Wheatbelt TEC is not likely to be significant as the impact area is small, in Completely Degraded condition, and is not considered to contain habitat necessary to maintain the survival of the community.

Vegetation Condition

The KIOP MLE Proposal is predicted to directly impact 15% of the Excellent rated vegetation of the Combined Proposal DE (Mine Area), and 34% of the Completely Degraded vegetation (Wheatbelt Area). Vegetation outside the KIOP MLE new disturbance footprint will remain outside of direct impacts. At least 85% of vegetation rated as Excellent and 99% of vegetation rated as Very Good will remain in the Combined Proposal DE.

Abbreviations

Abbreviation	Definition
BC Act	*Biodiversity Conservation Act 2016*
BIF	Banded Iron Formation
CCAC	Currently Cleared or Approved to be Cleared (as defined in **Section 1.2**)
CR	Critically Endangered
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DoE	Department of the Environment
DPIRD	Department of Primary Industry and Regional Development
DSO	Direct Shipping Ore
EMP	Environmental Management Plan
EN	Endangered
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FCT	Floristic Community Type
GDE	Groundwater Dependent Ecosystem
GDV	Groundwater Dependent Vegetation
HIOP	Hinge Iron Ore Project
HMVT	Highly Modified Vegetation Type
IBRA	Interim Biogeographic Regionalisation of Australia
IBSA	Index of Biodiversity Assessments
IUCN	International Union for Conservation of Nature
KIOP	Karara Iron Ore Project
KIOP MLE	Karara Iron Ore Project Mine Life Extension
KML	Karara Mining Limited
MIOP	Mungada Iron Ore Project
MNES	Matter of National Environmental Significance
MS	Ministerial Statement
NT	Northern Territory
NVCP	Native Vegetation Clearing Permit
P	Priority
PEC	Priority Ecological Community
PU	Potentially Undescribed
RAA 1	Regional Assessment Area 1
RAA 2	Regional Assessment Area 2
SA	South Australia
SMC	Sinosteel Midwest Corporation Limited

Abbreviation	Definition
T	Threatened
TEC	Threatened Ecological Community
TSF	Tailings Storage Facility
VA	Vegetation Association
VSA	Vegetation System Association
VT	Vegetation Type
VU	Vulnerable
WA	Western Australia
WRD	Waste Rock Dump

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1.0 Introduction

1.1 Overview

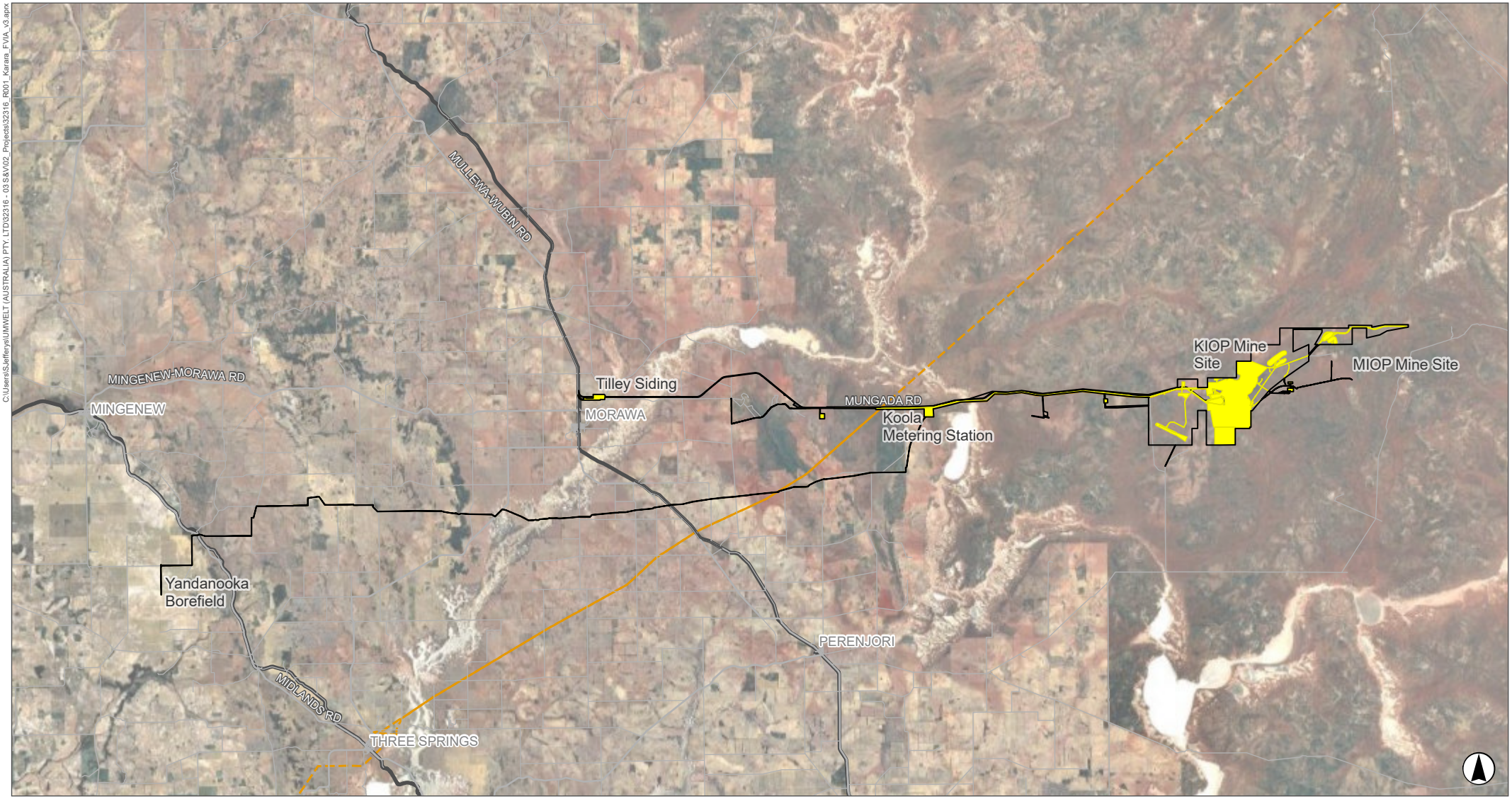
Karara Mining Limited (KML) operates the Karara Iron Ore Project (KIOP) and Mungada Iron Ore Project (MIOP), both located approximately 225 km east-southeast of Geraldton in the Midwest region of Western Australia (WA) (**Figure 1.1**).

KIOP was approved under Ministerial Statement (MS) 805 in 2009 and consists of the Karara open-cut magnetite pit, a processing plant to produce magnetite concentrate, a waste rock dump (WRD), tailings storage facility (TSF), rail loading facilities, accommodation facilities, airport, access roads and linear infrastructure corridor.

MIOP was approved under MS 806 in 2009 and consists of the Blue Hills North and Terapod pits and WRDs and regional infrastructure. Mining was completed in 2014, and MIOP is currently in suspension from active mining. However, infrastructure such as pipelines, access roads, laydown areas, powerlines, rail siding and pits for water storage approved under MIOP are currently utilised by KIOP.

KML is proposing to further develop the KIOP with a Mine Life Extension (MLE), which includes an expansion to the MS 805 development envelope, an extension to the WRD and TSF, the incorporation of infrastructure at MIOP and previously cleared areas approved under Native Vegetation Clearing Permits (NVCP) (including the western section of the Yandanooka water pipeline, the rail loop and the Syncline Turner haul road).

In 2022, Umwelt completed a flora, vegetation and fauna impact assessment for the proposed KIOP MLE project (Umwelt, 2022). However, changes were made to the development envelope since that impact assessment was completed. This current impact assessment report has been prepared to provide an update to the previous impact assessment report. This report incorporates the latest findings of recent flora and vegetation surveys conducted in the development envelope in 2023 and 2024 (Umwelt 2025), addresses regulator comments, and presents an updated assessment of potential impacts to flora and vegetation.



Legend

- Combined Proposal Development Envelope
- Combined Proposal Disturbance Footprint
- Main Road
- Minor Road
- Railway
- Electricity Transmission Powerline

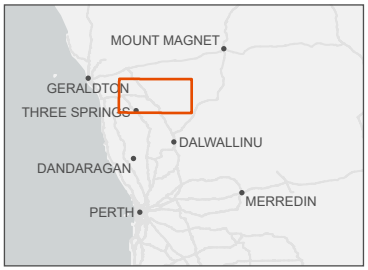


FIGURE 1.1
Proposal Location

Scale: 1:600,000 at A4, GDA2020 MGA Zone 50

0 12 24 km

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1.2 Assessment Areas and Definitions

Multiple areas have been defined to conduct this impact assessment to determine potential direct, indirect and cumulative impacts to vascular flora taxa and vegetation. These areas are defined in the following sections and presented in the subsequent figures (where relevant).

For all potential impacts, this assessment took into account areas that have been previously cleared, as well as areas that have not been cleared but have been previously approved for clearing under (now expired) NVCPs (see **Section 1.4.1**). These areas have been referred to as **currently cleared or approved to be cleared (CCAC), and include:**

- Areas mapped as 'cleared land' by Umwelt (2025) and Woodman Environmental (2012).
- Areas within KML's on-ground disturbance footprint spatial dataset (dated 19 March 2025) (KML, 2025).
- Development footprint areas approved under MS 805 and MS 806.
- For the cumulative impact assessment of the western end of the development envelope: areas outside the Department of Primary Industries and Regional Development (DPIRD) Native Vegetation Extent spatial dataset (DPIRD-005) (last updated 19 June 2023) (DPIRD, 2025)[1].

1.2.1 Direct Impact Assessment

The areas utilised for the assessment of direct impacts to flora and vegetation as a result of the Combined Proposal include:

- **Combined Proposal development envelope (Combined Proposal DE):** This boundary includes the KIOP MLE new disturbance footprint (defined below) and has an area of 13,557 ha (**Figure 1.2**). The Combined Proposal DE spans approximately 143 km, and for the purpose of this assessment has been split into four major areas as per **Figure 1.3**, which are hereafter named:
    - **Karara Area:** from east of Mungada Ridge National Park; encompassing the Karara mine site, airstrip and camp.
    - **Yandanooka Pipeline:** linear corridor extending west along Mungada Road to Koolanooka Hills.
    - **Tilley Siding:** small, disjunct area north of Morawa near Tilley Station.
    - **Borefield Corridor:** linear corridor extending west from near Bowgarder Nature Reserve to near Yandanooka.

[1] The spatial data in this dataset was last updated 19 June 2023, but the accompanying metadata was updated more recently in 2025, hence this source is cited as DPIRD '2025'.

- **KIOP MLE new disturbance footprint:** The proposed expansion, referred to as the KIOP MLE new disturbance footprint (also referred to as 'the KIOP MLE Proposal'), has a maximum disturbance area of 1,522 ha (**Figure 1.2**). The KIOP MLE new disturbance footprint is entirely contained within the Combined Proposal DE, and is comprised of two disjunct areas as per **Figure 1.3**, hereafter named:
    - **Mine Area:** comprises infrastructure corridors, Karara pit, TSF, and WRDs. The Mine Area is entirely contained within the Karara Area of the Combined Proposal DE.
    - **Wheatbelt Area:** small linear area along the western end of the Borefield Corridor.
- **Combined Proposal disturbance footprint (Combined Proposal DF):** The Combined Proposal DF has a maximum disturbance area of 5,040 ha and includes the KIOP MLE new disturbance footprint and several areas previously approved under MS 805 and MS 806 (**Figure 1.2**). However, the sum of these individual areas is not equal to the Combined Proposal DF area, which is approximately 571 ha larger than the Combined Proposal DF. This is due to the removal of overlapping areas between the MS 805 and MS 806 disturbance footprints, previously approved areas which are located outside the current development envelope, and several corrections to erroneous spatial data.

1.2.2 Indirect Impact Assessment

Quantification of potential indirect impacts was undertaken using an area surrounding the KIOP MLE new disturbance footprint, which has been referred to as the **indirect impact zone** (**Figure 1.4**). This boundary was generated as described below:

- A buffer of 50 m on the Mine Area, excluding several minor portions of the KIOP MLE new disturbance footprint which are distanced from the main operations (e.g. a small access road northeast of the pit, infrastructure to the north of the WRD and the area around the accommodation village; these excluded areas only received a 10 m buffer). This buffer accounts for edge effects such as dust emissions, saline water impacts from dust suppression, weeds and accidental land clearing.
- A buffer of 10 m applied to the Syncline Turner Haul Road Project and the Borefield Corridor portions of the KIOP MLE new disturbance footprint. This buffer accounts for dust emissions, saline water impacts from dust suppression, and weeds.

The indirect impact zone excludes any CCAC areas, including areas within the KIOP MLE new disturbance footprint previously approved under MS 805 or MS 806. The indirect impact zone extends outside the Combined Proposal DE in some places.

1.2.3 Cumulative Impact Assessment

The cumulative impact assessments considered the areas that would be directly impacted by the Combined Proposal DF (which includes the KIOP MLE new disturbance footprint). The assessment also included existing impacts from CCAC land (where data was available).

Given the distance between the Mine Area and Wheatbelt Area (approximately 97 km), and that the Mine Area and Wheatbelt Area occur within dissimilar landscapes with highly dissimilar historical threatening processes, two separate regional assessment areas were defined:

- **Regional Assessment Area 1 (RAA 1):** defined for the cumulative impact assessment of the Mine Area. RAA 1 is based on the 'Blue Hills Impact Assessment Area' from the Mungada East Expansion Project as further detailed in **Section 6.3.1**.
- **Regional Assessment Area 2 (RAA 2):** defined for the cumulative impact assessment of the Wheatbelt Area. RAA 2 has been defined as the extent of the two Interim Biogeographic Regionalisation of Australia (IBRA) subregions that intersect the Wheatbelt Area; i.e. Merredin and Lesueur Sandplain, as further detailed in **Section 6.3.2**.

1.3 Purpose and Scope

This report presents a summary of the significant characteristics of the Combined Proposal with respect to flora and vegetation, and an assessment of the associated potential aspects that may impact flora and vegetation. It includes discussion of the potential significance of any impacts using information recently collected by the 2023 and 2024 detailed and targeted flora and vegetation survey (Umwelt 2025).

While this report assesses the Combined Proposal DF, the primary focus is the KIOP MLE new disturbance footprint, as the latter comprises vegetation not directly impacted by current (or previously approved) mining activities.

Direct, indirect and cumulative impacts are presented as quantitative data where possible. Where impacts cannot be assessed quantitatively, a qualitative discussion is presented instead.

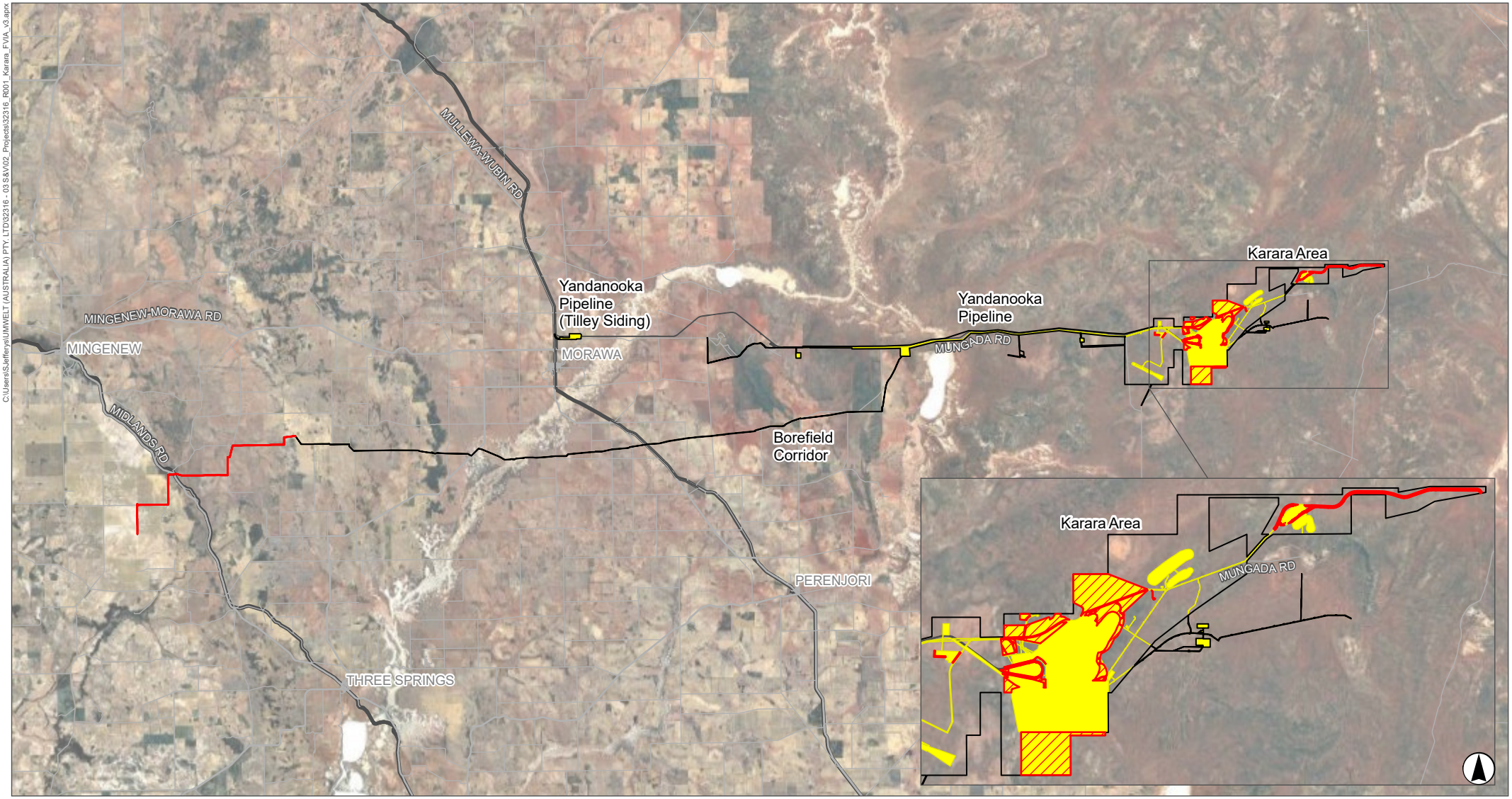
1.4 Background

1.4.1 Historic NVCPs

Table 1.1 lists all previous NVCPs (expired) that intersect the Combined Proposal DF. Of these areas, approximately 194.57 ha (12.78%) overlap the KIOP MLE new disturbance footprint, and 271.30 ha (5.38%) overlap the Combined Proposal DF. Of the 271.30 ha previously approved, 241.32 ha (88.95%) is located within areas currently mapped as cleared or approved to be cleared (under MS 805 and MS 806) (i.e. CCAC).

Table 1.1 Relevant Historic NVCPs

NVCP No.	Colloquial Name or Purpose	Total NVCP Approved Area	Overlap with the Combined Proposal DF
		ha	ha
3399/4	Karara Rail Loop	67.00	34.89
3518/4	'Railway construction or maintenance'	298.10	6.21
3603/2	'Railway construction or maintenance'	243.32	52.37
3740/1	Weelhamby Borrow Pit	12.70	3.22
3867/1	Yandanooka Borefield	76.01	75.96
3961/4	Eneabba to Koolanooka via Three Springs Transmission Lines	973.18	0.63
5605/2	Syncline Turner Haul Road Project	121.33	98.02



Legend

- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Combined Proposal Disturbance Footprint
- Main Road
- Minor Road
- Railway

FIGURE 1.2
Impact Assessment Areas

Scale: 1:600,000 at A4, GDA2020 MGA Zone 50

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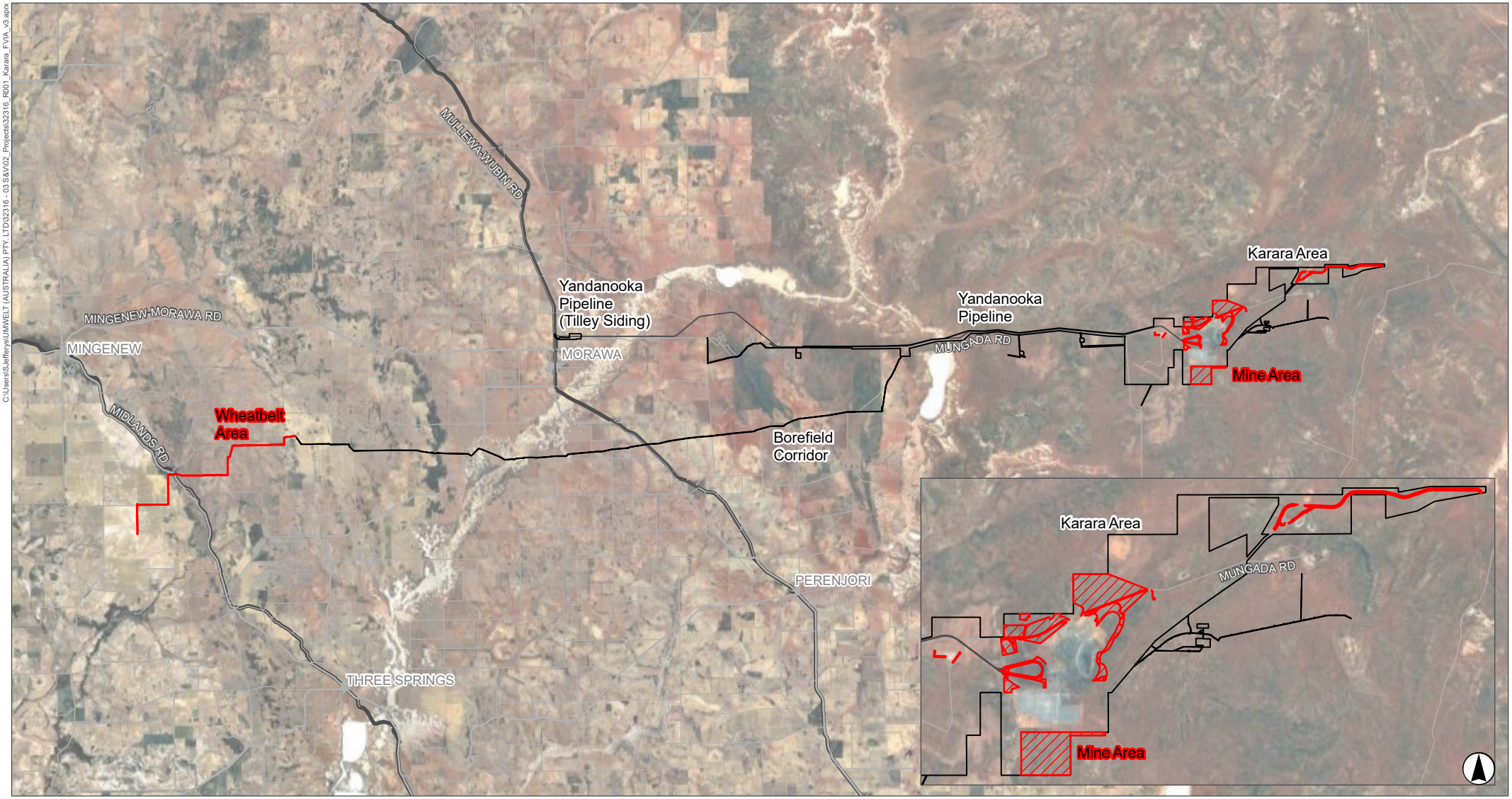

Legend

- KIOP MLE New Disturbance Footprint
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- Minor Road
- Railway

FIGURE 1.3
Combined Proposal Areas

Scale: 1:600,000 at A4, GDA2020 MGA Zone 50

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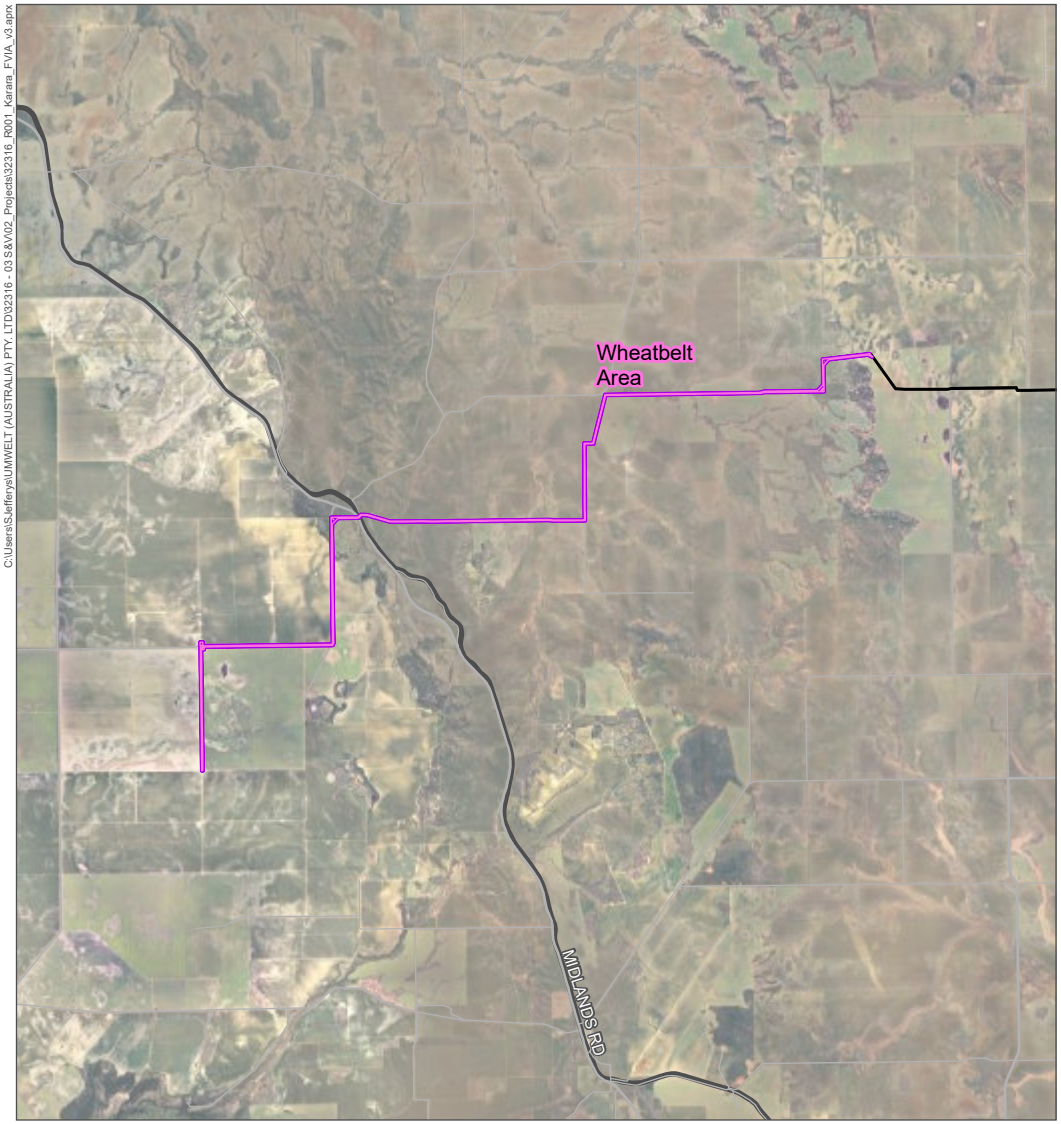

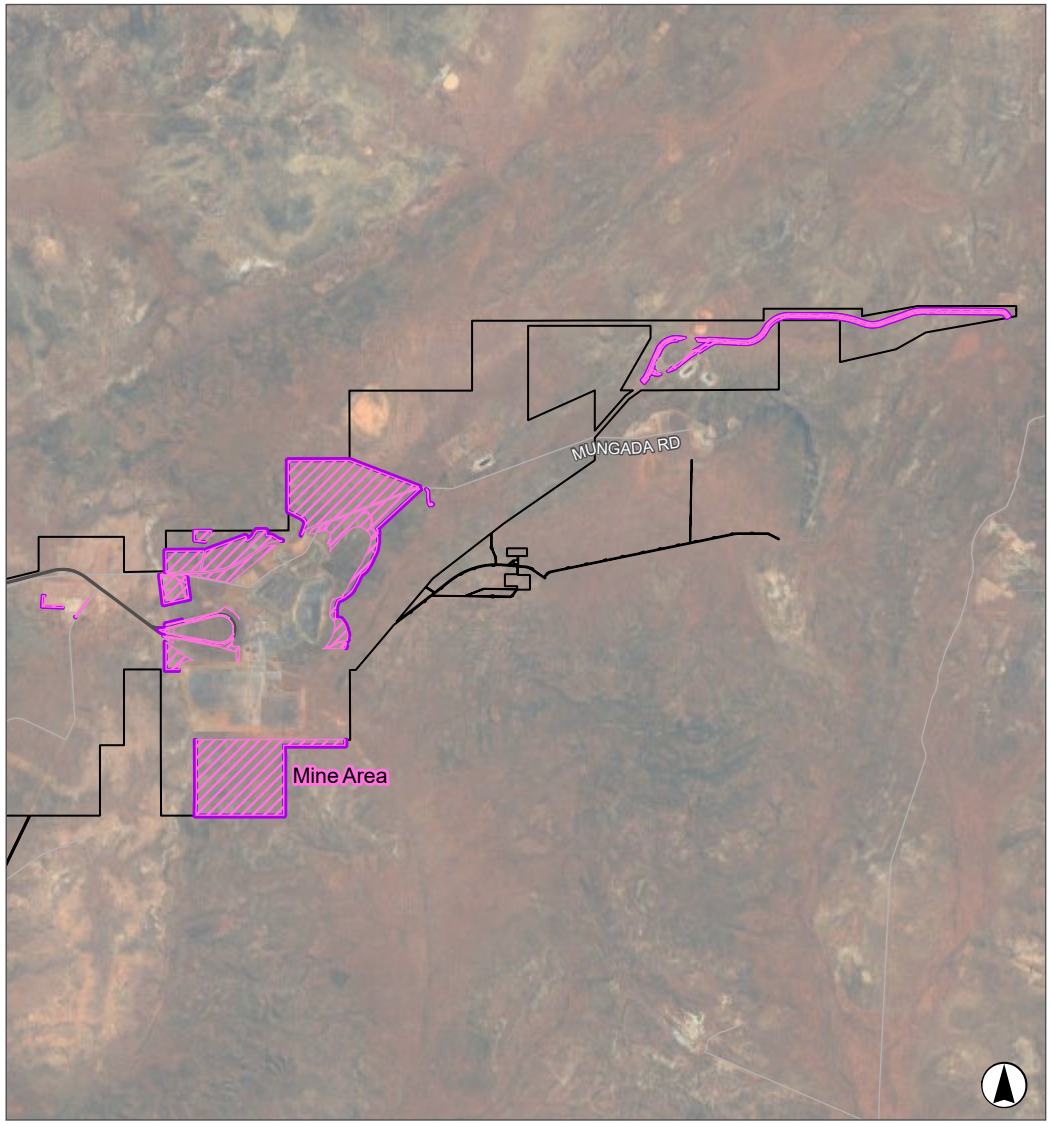

Legend

- KIOP MLE New Disturbance Footprint
- Indirect Impact Zone
- Combined Proposal Development Envelope
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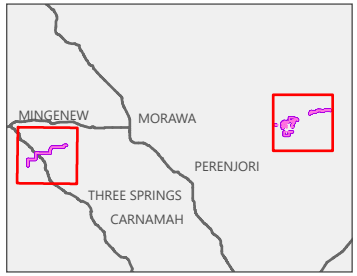

FIGURE 1.4
Indirect Impact Zone

Scale: 1:200,000 at A4, GDA2020 MGA Zone 50

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1.4.2 Other Projects in the Region

KML has other activities in the region, including the Hinge Iron Ore Project (HIOP, MS 968) which is no longer in operation; and several NVCPs including the Karara Rail Loop (NVCP 3399), Yandanooka Borefield (NVCP 3867), Syncline Turner Haul Road Project (NVCP 5605), and part of the Eneabba to Koolanooka via Three Springs Transmission Lines (NVCP 3961/4).

The Blue Hills Mungada East Expansion Project (Mungada East, MS 1071) is the other dominant mining operation in the Blue Hills area. This project is owned by Sinosteel Midwest Corporation Limited (SMC). Approved in late 2017, the project is an extension of the existing Koolanooka/Blue Hills Mungada Direct Shipping Ore Project (DSO Project, MS 811) and is located northeast of the main KIOP site.

Where relevant, these areas have been included as part of the cumulative impact assessment (see **Section 4.3** and **Section 6.3**).

2.0 Relevant Studies

2.1 Umwelt 2025

In 2023 and 2024, Umwelt conducted a detailed flora and vegetation assessment within a study area equivalent to the Combined Proposal DE (13,557 ha), and a targeted flora and vegetation assessment within an area equivalent to the KIOP MLE new disturbance footprint (1,522 ha) (Umwelt, 2025). This assessment is hereafter referred to as 'Umwelt 2025'. The purpose of this assessment was to characterise the flora and vegetation values of the study area, building on existing historical data to provide adequate and updated information to inform a flora and vegetation impact assessment.

The field surveys were completed as a 'detailed' and 'targeted' assessment as defined in sections 4.2 and 4.3 of the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b), as the study area was considered likely to support a high diversity of flora and vegetation, comprise restricted landforms or vegetation types (VTs), and was known to support significant flora and vegetation. In addition, desktop studies as per section 2 of EPA guidance were undertaken prior to field surveys.

The surveys were completed in accordance with current policy and guidelines:

- *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016a).
- *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016b).
- *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments* (IBSA) (EPA 2020).

The assessment methods and effort included:

- Review of previous flora and vegetation assessments and relevant literature, including updating historic data for taxonomic and nomenclatural currency.
- Database searches and review of relevant literature within a 50 km buffer of the Combined Proposal DE.
- Detailed field survey conducted over 34 team days:
    - 2 to 7 October 2023 (6 team days)
    - 6 to 12 August 2024 (14 team days)
    - 21 to 27 August 2024 (7 team days)
    - 16 to 22 September 2024 (7 team days)
- Targeted field survey conducted over 26 team days:
    - 21 to 28 August 2024 (16 team days)
    - 16 to 20 September 2024 (10 team days).
- Assessment of 259 quadrats, 349 relevés and 80 vegetation mapping notes, of which 100, 28 and 68 were newly established in 2023 and 2024 (the remainder having been established for other previous relevant flora and vegetation assessments, as summarised in **Table 2.1**).

- Discussion of significant flora taxa that have been recorded in the study area by the 2023 and 2024 survey and relevant previous surveys (including survey data sourced from Department of Biodiversity, Conservation and Attractions (DBCA) database interrogations; as summarised in **Table 2.1**.
- Assessment of the likelihood of occurrence of all significant flora taxa that have known records within a 50 km buffer of the Combined Proposal DE. Assessments were done separately for the Combined Proposal DE, and for the Mine Area and Wheatbelt Area of the KIOP MLE new disturbance footprint.
- Description and mapping of VTs, significant vegetation communities, and vegetation condition.
- Assessment of the potential limitations of the assessment per the requirements of *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016b).

The number of quadrats established in the study area was considered to be acceptable given the diversity of topography and soil types noted in the study area, as well as its size (approximately one quadrat established per 42 ha of vegetation). Multiple sample sites were established in each remnant vegetation pattern identified in the study area, excluding two highly modified vegetation types (HMVTs). All VTs defined by floristic composition analysis were sampled by at least three quadrats, except for VTs I, J and M, due to the small extents of these VTs being intersected by the study area. Two separate adequacy of survey measures indicated that the study area was well sampled (Umwelt, 2025).

The Umwelt 2025 assessment provides suitable, current information to be used for the assessment of direct impacts to flora and vegetation within the Combined Proposal area. The key results of the assessment with reference to flora and vegetation are presented in **Section 3.0**. The findings of the assessment also informed VT mapping for the potential indirect impact zone (which exceeds the study area boundary by a maximum distance of 10 m). This is discussed further in **Section 4.0**.

Table 2.1 Relevant Historic Data Utilised for the Umwelt 2025 Assessment of the Combined Proposal DE

Title and Author	Survey Year	Scope per Current EPA (2016b) Definitions			Data Utilised	
		Reconnaissance	Detailed	Targeted	Quadrats, Relevés, Mapping Notes	Significant Flora Records
Investigations into Priority Flora Locations: Minjar Project (Woodman Environmental, 2005)	2004			✓		✓
Keronima – Black Dog Flora Survey and Plant Community Mapping (Woodman Environmental, 2004b)	2004	✓		✓	✓	✓
Mt Karara Flora Survey and Plant Community Mapping (Woodman Environmental, 2004c)	2004	✓		✓	✓	✓
Flora and vegetation of the banded iron formations of the Yilgarn Craton: the central Tallering Land System (Markey & Dillon, 2008)	2005		✓		✓	✓
Flora and Vegetation of the Rothsay Survey Area (Woodman Environmental, 2007g)	2005	✓			✓	✓
Haulage Route, Tilley Siding East and Associated Borrow Pits of the Proposed Mungada Ridge Hematite Project (Woodman Environmental, 2007h)	2005-2007	✓		✓	✓	✓
Investigations into the Populations of *Polianthion collinum* (Woodman Environmental, 2007j)	2005-2006			✓		✓
Karara–Mungada Project Survey Area Flora and Vegetation Assessment (Woodman Environmental, 2008d)	2006		✓	✓	✓	✓
Investigations into the Populations of *Acacia woodmaniorum* ms (Woodman Environmental, 2007i)	2006-2007			✓		✓
2007 Spring Annual Species Survey and Impact Assessment Report, Mungada Ridge Hematite Project, Karara–Mungada Project Survey Area (Woodman Environmental, 2007a)	2007			✓		✓
Additional Regional Survey for *Acacia woodmaniorum* (Declared Rare Flora) (Woodman Environmental, 2008a)	2007			✓		✓

Title and Author	Survey Year	Scope per Current EPA (2016b) Definitions			Data Utilised	
		Reconnaissance	Detailed	Targeted	Quadrats, Relevés, Mapping Notes	Significant Flora Records
Exploration Drilling Programme Crescent Prospect Flora and Vegetation Impact Assessment (Woodman Environmental, 2007d)	2007			✓		✓
Exploration Drilling Programme Johnnys Prospect Flora and Vegetation Impact Assessment (Woodman Environmental, 2008c)	2007-2008			✓		✓
Exploration Drilling Programme Blue Hills North Prospect Flora and Vegetation Impact Assessment (Woodman Environmental, 2007b)	2008			✓		✓
Flora and Vegetation Survey of the Railway Corridor and Associated Borrow Pits (Karara to Tilley Siding) (Woodman Environmental, 2009e)	2008	✓			✓	✓
Regional Flora and Vegetation Survey of the Karara to Minjar Block (Woodman Environmental, 2012)	2008-2010		✓		✓	✓
Flora and Vegetation Assessment of the Proposed Linear Infrastructure Corridor: Proposed Karara Iron Ore Project (Woodman Environmental, 2009c)	2009	✓			✓	✓
Flora and Vegetation of the Proposed Camp Site and Airstrip. Old Karara Homestead. Baseline and Impact Assessment (Woodman Environmental, 2009d)	2009	✓	✓		✓	✓
Flora and Vegetation Values of the Proposed Campsite Priority 1 Area (Woodman Environmental, 2009f)	2009		✓		✓	✓
Paleochannels Programme of Works Flora and Vegetation Impact Assessment (Woodman Environmental, 2009g)	2009			✓		✓
Flora and Vegetation Survey of the Yandanooka Borefield Pipeline Routes 5 and 5b (Woodman Environmental, 2010b)	2010	✓			✓	✓
Karara Project Expansion Detailed and Targeted Flora and Vegetation Assessment (Umwelt, 2021)	2020		✓	✓	✓	✓

2.2 Supporting Studies

This impact assessment has been supported by multiple flora and vegetation studies that have been completed within the Combined Proposal DF and surrounding regions (regions defined in **Section 6.3**), including those utilised for the Umwelt 2025 assessment as presented in **Table 2.1.**

Studies and datasets (additional to those presented in **Table 2.1**) that have been specifically utilised to calculate potential direct, indirect, and cumulative regional impacts to flora and vegetation values are listed in **Table 2.2.**

Table 2.2 Studies and Datasets Used to Calculate Potential Impacts to Environmental Values

Title and Author	Description	Environmental Value	Application to Impact Assessment			
			Direct Impacts	Indirect Impacts	Cumulative Impacts	
					RAA 1	RAA 2
2023 and 2024 Detailed and Targeted Flora and Vegetation Assessment: Karara Iron Ore Project Mine Life Extension (i.e. 'Umwelt 2025')	Detailed and targeted flora and vegetation assessment, incorporating data from relevant historical sources as per **Table 2.1**	Significant Flora	✓	✓	-	-
		Vegetation Type	✓	✓	-	-
		Vegetation Condition	✓	N/A	-	-
		Significant Vegetation	✓	✓	-	-
Various flora and vegetation assessments undertaken in the area by Woodman Environmental Consulting Pty Limited (now Umwelt) (Woodman Environmental, 2004a, 2004b, 2004c, 2005, 2007c, 2007g, 2007h, 2007j, 2007i, 2007a, 2007d, 2007e, 2007b, 2007k, 2007l, 2007m, 2007f, 2007n, 2008d, 2008a, 2008c, 2008b, 2008e, 2009b, 2009j, 2009h, 2009a, 2009i, 2009e, 2009c, 2009d, 2009g, 2009f, 2010a, 2010b, 2011a, 2011b, 2011c, 2012)	Various reconnaissance, detailed and targeted flora and vegetation assessments	Significant Flora	✓	✓	✓	✓
Flora and Vegetation: Blue Hills (Bennett, 2004)	Detailed flora and vegetation assessment	Significant Flora	-	-	✓	-
Priority flora search - Gossan Hill and Surrounds (Mattiske, 2004)	Targeted flora and vegetation assessment	Significant Flora	-	-	✓	-
Karara Project Expansion Detailed and Targeted Flora and Vegetation Assessment (Umwelt, 2021)	Detailed and targeted flora and vegetation assessment	Significant Flora	✓	✓	✓	-
DBCA Significant Flora Database (WA Herbarium Specimen Database and Threatened and Priority Flora (TPFL) Database) (DBCA, 2023b)	Point data of all significant flora records contained in DBCA databases within a 20 km buffer of the Combined Proposal DE. Data originating from various sources and previous surveys	Significant Flora	✓	✓	✓	✓

Title and Author	Description	Environmental Value	Application to Impact Assessment			
			Direct Impacts	Indirect Impacts	Cumulative Impacts	
					RAA 1	RAA 2
Regional Flora and Vegetation Survey of the Karara to Minjar Block (Woodman Environmental 2012)	Regional flora and vegetation mapping survey	Vegetation Type	-	-	✓	-
Pre-European Vegetation spatial dataset (DPIRD-006) (DPIRD 2019)	Mapping of original native vegetation presumed to have existed prior to European settlement in WA	Vegetation Type	-	-	-	✓
		Significant Vegetation	-	-	-	✓
Native Vegetation Extent spatial dataset (DPIRD-005) (DPIRD, 2025)	Mapping of the extent of remnant vegetation in WA. Dataset last updated – and therefore presumed current to – 19 June 2023	Vegetation Type	-	-	-	✓
		Significant Vegetation	-	-	-	✓
Mungada East Expansion Project, Revised Impacts to Conservation Significant Flora, Priority Ecological Community and Floristic Community Types (Maia 2017)	Detailed and targeted flora and vegetation assessment over tenements M59/595 and M59/596	Significant Vegetation	-	-	✓	-

3.0 Receiving Environment

The following subsections present a summary of the flora and vegetation values of the Combined Proposal DE as described by Umwelt (2025).

3.1 Flora Census

A total of 497 vascular plant taxa have been recorded within the Combined Proposal DE, representing 75 families and 286 genera (Umwelt 2025). The most represented families were:

- Asteraceae: 103 discrete taxa.
- Fabaceae: 85 discrete taxa and 2 formally named hybrids (per Florabase (WA Herbarium, 1998-)).
- Chenopodiaceae: 65 discrete taxa and 1 putative hybrid (i.e. not formally named hybrids).
- Myrtaceae: 60 discrete taxa and 1 putative hybrid.
- Poaceae: 51 discrete taxa.

3.2 Significant Flora Taxa

A total of 41 significant flora taxa have been recorded within the Combined Proposal DE (Umwelt 2025). These taxa belong to the following categories as per EPA (2016a, 2016b) definitions of 'significant flora':

- Threatened (T) or priority (P) species (i.e. listed significant taxa, which includes those listed under both State and Commonwealth legislation, and classified as Priority by DBCA).
- New species or anomalous features that indicate a potential new species.

A summary of abundance information for the 41 significant flora taxa of the Combined Proposal DE is presented in **Table 3.1**, as per Umwelt (2025). Note that abundance is presented as the number of individuals for perennial taxa, but the number of locations for annual and ephemeral taxa. This is due to the number of individuals of annual and ephemeral taxa being strongly influenced by seasonal conditions, with fewer individuals usually present at a given location following below-average rainfall. Therefore, discussing abundance in terms of the number of locations is considered more appropriate for annual and ephemeral taxa.

The locations of significant flora taxa known from the Combined Proposal DE are presented in **Figure 3.1**. This figure also includes all known records of these 41 taxa (excluding *Acacia woodmaniorum*, as per **Section 3.2.1**) within a 20 km buffer of the Combined Proposal DE, compiled from the sources presented in **Table 2.2**. These records were used to assist the cumulative impact assessment.

Further detail regarding the significant flora taxa known from the Combined Proposal DE is provided in the subsequent sections.

3.2.1 Listed Flora Taxa

The Umwelt 2025 assessment and previous flora and vegetation assessments have recorded a total of 37 listed flora taxa within the Combined Proposal DE (Umwelt 2025). These include:

- Four (4) Threatened taxa listed under the WA *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):
    - *Acacia woodmaniorum* (WA: Endangered; EPBC: Endangered)
    - *Eucalyptus synandra* (WA: Vulnerable; EPBC: Vulnerable)
    - *Seringia exastia* (EPBC: Critically Endangered; not listed in WA)
    - *Stylidium scintillans* (WA: Vulnerable; not EPBC listed).
- Thirty-three (33) DBCA-classified Priority flora taxa.

Specific discussion regarding *Acacia woodmaniorum* (EN) and *Seringia exastia* is provided below.

Acacia woodmaniorum

According to DBCA databases (DBCA 2023b), three records of *Acacia woodmaniorum* (EN) are present within the Combined Proposal DE. However, two of these three records relate to individuals that have been artificially introduced in March 2017 (via planting cuttings or translocating whole plants) as part of KML's Translocation Proposal. The first of the translocation sites is on the rehabilitated mine area of the Terapod North Pit, and the second on the Blue Hills North rehabilitated WRD. Monitoring of these translocation sites has been undertaken since 2017, with the most recent monitoring from October 2024 demonstrating a survival rate of 100% of cuttings and 83% of salvaged plants at the first translocation site (a total of 15 plants present at October 2024), and a survival rate of 55% for cuttings and 61% for salvaged plants at the second site (a total of 25 plants present at October 2024) (KML 2024). The translocated plants have demonstrated evidence of flowering and fruiting over the history of monitoring, although KML's Translocation Report (KML 2024) does not indicate whether second-generation seedlings have been recorded at the translocation sites.

The third DBCA record of *Acacia woodmaniorum* within the Combined Proposal DE relates to a location of a single individual growing on the edge of the Terapod South pit within the abandonment bund. It is not clear how this individual came to be at this location. According to KML (2024), monitoring of this plant has been ruled out due to safety concerns.

No other records of *Acacia woodmaniorum* are known from the Combined Proposal DE. The taxon is currently only known from three naturally-occurring populations (DBCA, 2023b; WA Herbarium, 1998-), despite extensive survey having been previously undertaken in the region, including within and in the vicinity of the Combined Proposal DE, and in areas that appeared to possess similar habitat to the known populations (Maslin & Buscumb, 2007; Woodman Environmental, 2008a). *Acacia woodmaniorum* is therefore considered unlikely to occur in the Combined Proposal DE or the Combined Proposal DF (Umwelt 2025).

Seringia exastia

Seringia exastia was recorded in the Combined Proposal DE by the Umwelt 2025 assessment, with the new record representing a range extension to the known range of the taxon by approximately 90 km to the west (Umwelt 2025).

Seringia exastia is currently listed as Threatened (Critically Endangered) under the Commonwealth EPBC Act only, as it was recently removed from the list of Threatened flora gazetted under the WA BC Act. The listing of this taxon as Threatened was supported by knowledge at the time of listing, which indicated that the taxon was discrete from all other *Seringia* taxa on morphological grounds, and was known from a single population within the Port of Broome. Recent taxonomic work has determined that *Seringia exastia* is conspecific with (i.e. the same as) *Seringia elliptica*, a taxon widespread across northern and central WA, Northern Territory (NT) and extending into South Australia (SA) (Binks et al., 2020). Consequently, *Seringia elliptica* and *Seringia exastia* were amalgamated. Under international nomenclatural rules, the name applied to amalgamated taxon must be the oldest valid name; in this case this was *Seringia exastia*. This amalgamation has created an anomalous situation whereby *Seringia exastia* as now circumscribed is a common, widespread species that no longer meets the criteria for Threatened status under either of the aforementioned Acts. This taxon is now known from across the arid zone of WA from almost 300 vouchered records, including from within numerous national parks and nature reserves. It also extends well into the NT, and the northwest of SA.

There are now effectively no reasons for *Seringia exastia* to still be listed as a Threatened taxon other than a delayed administrative response to new information concerning its taxonomic and conservation status. Following removal of *Seringia exastia* from the list of Threatened flora, the State of WA did not assign any other conservation rating to this taxon. This reflects the relatively unusual circumstances of this case, as taxa that are delisted in WA are typically by default assigned a Priority 4 conservation rating. It is expected that this taxon will be delisted on a Commonwealth level in the near future given its delisting in WA, but it is unclear when this will occur.

3.2.2 Potentially Undescribed Taxa

The Umwelt 2025 assessment and previous flora and vegetation assessments have recorded a total of four potentially undescribed (PU) entities in the Combined Proposal DE. Given a lack of data for these entities, the total distribution and abundance of the potential new taxa in the region are not known.

Crassula sp. nov.

Two collections were made by Umwelt (2021) in/near the Karara Area of a potentially undescribed *Crassula* entity. As part of that assessment, a representative specimen of the entity was sent to the WA Herbarium for identification, who remarked that the entity is likely undescribed (Hislop 2021). Despite additional searching and collections being made in 2023 and 2024, this entity could not be relocated. Further sampling is required in order to resolve the taxonomic status of this entity. This entity has been recorded within the Combined Proposal DF (Umwelt 2025).

Hemigenia sp. aff. *botryphylla*

A collection of this entity was made by Umwelt (2025) at two locations approximately 17 km west of Weelhamby Lake within the Yandanooka Pipeline area. This collection was sent to the WA Herbarium for identification, who noted that the specimen resembles but is not a complete match for *Hemigenia botryphylla* and does not resemble any of the other recognised taxa in WA (Umwelt 2025). This entity has not been recorded in the Combined Proposal DF, and it was considered unlikely to be present in the Combined Proposal DF due to a potential lack of suitable habitat (VT A in proximity to large, highly saline areas) (Umwelt 2025).

Tecticornia sp. 'Karara 1'

A collection was made by Umwelt (2025) of a *Tecticornia* entity that could not be matched by Umwelt to any currently recognised taxa. The specimen was sent for identification to a *Tecticornia* expert at the WA Herbarium, who noted that the entity potentially represents an unrecognised taxon, but is likely part of the *Tecticornia* aff. *halocnemoides* 'tuberculate seed' species aggregate due to the specimen having the characteristic small vegetative articles of this group. *Tecticornia* sp. 'Karara 1' was recorded at five locations in the Borefield Corridor area, within the chain of salt lakes south-southwest of Morawa. While the identity and significance of this entity was not determined until after completion of the 2024 field survey (and therefore it was not searched for during the Umwelt (2025) targeted assessment), there is no suitable habitat for this taxon within the Combined Proposal DF (samphire salt lakes and saline playas) (Umwelt 2025).

Tecticornia sp. 'Karara 2'

Similarly to *Tecticornia* sp. 'Karara 1', another *Tecticornia* entity was collected that could not be identified by Umwelt. This specimen was also sent to a *Tecticornia* expert at the WA Herbarium, who stated it was also potentially undescribed. While sharing some features with *Tecticornia pruinosa* (thus placing it in the *Tecticornia* aff. *pruinosa* species aggregate), the *Tecticornia* sp. 'Karara 2' collection was distinct from the type specimen. The entity had narrow and glaucous vegetative articles, but with mature fruits that were broader than the typical form of *Tecticornia pruinosa*. *Tecticornia* sp. 'Karara 2' was recorded at five locations in the Borefield Corridor area, four within the chain of salt lakes south-southwest of Morawa, and a fifth 23 km east in a degraded transitional area between Eucalyptus woodland and a saline chenopod/samphire flat. While the identity and significance of this entity was not determined until after completion of the 2024 field survey (and therefore it was not searched for during the Umwelt (2025) targeted assessment), there is no suitable habitat for this taxon within the Combined Proposal DF (samphire salt lakes and saline playas) (Umwelt 2025).

Table 3.1 Significant Flora Recorded in the Combined Proposal DE

Taxon	Status (WA)	Status (EPBC)	Longevity	Individuals (Perennials)	Locations (Annuals & Ephemerals)	Preferred Habitat (VTs^)
Acacia karinae	P3	-	Perennial	9,078	-	A, O, P and S
Acacia woodmaniorum	EN	EN	Perennial	41*	-	N/A
Allocasuarina tessellata	P3	-	Perennial	726	-	A and S
Baeckea sp. Perenjori (J.W. Green 1516)	P2	-	Perennial	29	-	AA and E
Caesia sp. Koolanooka Hills (R. Meissner & Y. Caruso 78)	P1	-	Ephemeral	-	234	A and S
Calotis sp. Perrinvale Station (R.J. Cranfield 7096)	P3	-	Annual	-	40	D and G
Crassula sp. nov.	PU	-	Annual	-	4	B and O
Drummondita fulva	P3	-	Perennial	516	-	O, P and R
Epitriche demissus	P2	-	Annual	-	4	N
Eucalyptus synandra	VU	VU	Perennial	46	-	R
Fitzwillia axilliflora	P2	-	Annual	-	1	N
Gnephosis setifera	P1	-	Annual	-	2	M and N
Grevillea globosa	P3	-	Perennial	704	-	P, Q and R
Grevillea granulosa	P3	-	Perennial	11	-	T
Grevillea scabrida	P3	-	Perennial	981	-	A, D and K
Grevillea subtiliflora	P3	-	Perennial	1	-	F
Gunniopsis divisa	P3	-	Annual	-	23	G and K
Hemigenia sp. aff. *botryphylla*	PU	-	Perennial	2	-	A
Hibbertia cockertoniana	P3	-	Perennial	1	-	Q
Lepidosperma sp. Blue Hills (A. Markey & S. Dillon 3468)	P1	-	Perennial	45,683	-	O and P
Melaleuca barlowii	P3	-	Perennial	9	-	P and T
Menkea draboides	P3	-	Annual	-	2	A, E and S
Micromyrtus acuta	P3	-	Perennial	4,751	-	O
Micromyrtus trudgenii	P3	-	Perennial	1,292	-	O
Millotia dimorpha	P1	-	Annual	-	55	O
Nicotiana salina	P1	-	Annual	-	1	L

Taxon	Status (WA)	Status (EPBC)	Longevity	Individuals (Perennials)	Locations (Annuals & Ephemerals)	Preferred Habitat (VTs^)
Persoonia pentasticha	P3	-	Perennial	532	-	D, G, H and K
Petrophile pauciflora	P3	-	Perennial	22	-	O
Pityrodia viscida	P4	-	Perennial	1	-	HMVT B
Podotheca uniseta	P3	-	Annual	-	1	L
Prostanthera sp. Karara (D. Coultas & K. Greenacre Opp 8)	P1	-	Perennial	9	-	Q
Rhodanthe collina	P3	-	Annual	-	497	A, K and O
Roebuckiella halophila	P3	-	Annual	-	13	E, G and R
Seringia exastia	-	CR	Perennial	10	-	D
Stenanthemum poicilum	P3	-	Perennial	25	-	E
Stylidium scintillans	VU	-	Ephemeral	-	17	O
Swainsona picta	P1	-	Annual	-	2	B
Tecticornia fimbriata	P3	-	Perennial	2	-	L, N
Tecticornia sp. 'Karara 1'	PU	-	Perennial	4	-	N
Tecticornia sp. 'Karara 2'	PU	-	Perennial	5	-	N
Tricoryne soullierae	P3	-	Ephemeral	-	1	I and T

Source: Umwelt (2025).

^ VTs described in **Section 3.3.2**.

**Acacia woodmaniorum* (EN) abundance current to October 2024 according to monitoring undertaken by KML at translocation sites (KML 2024). Taxon known in the Combined Proposal DE from two translocation sites and on the edge of an old mine pit only.

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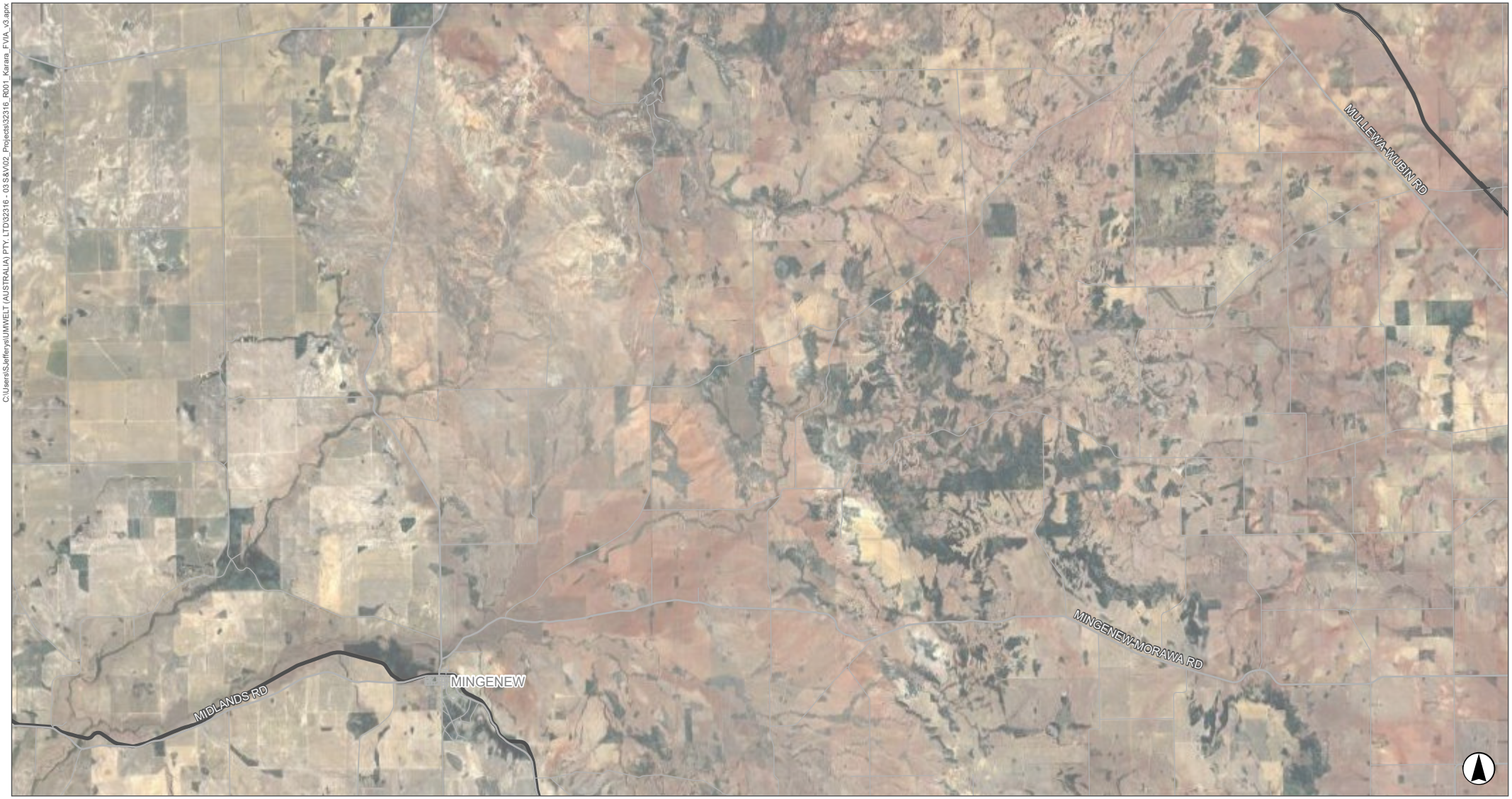

Legend

- Main Road
- Minor Road
- Railway

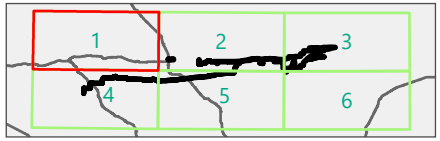

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (T, P1, P2) – Sheet 1

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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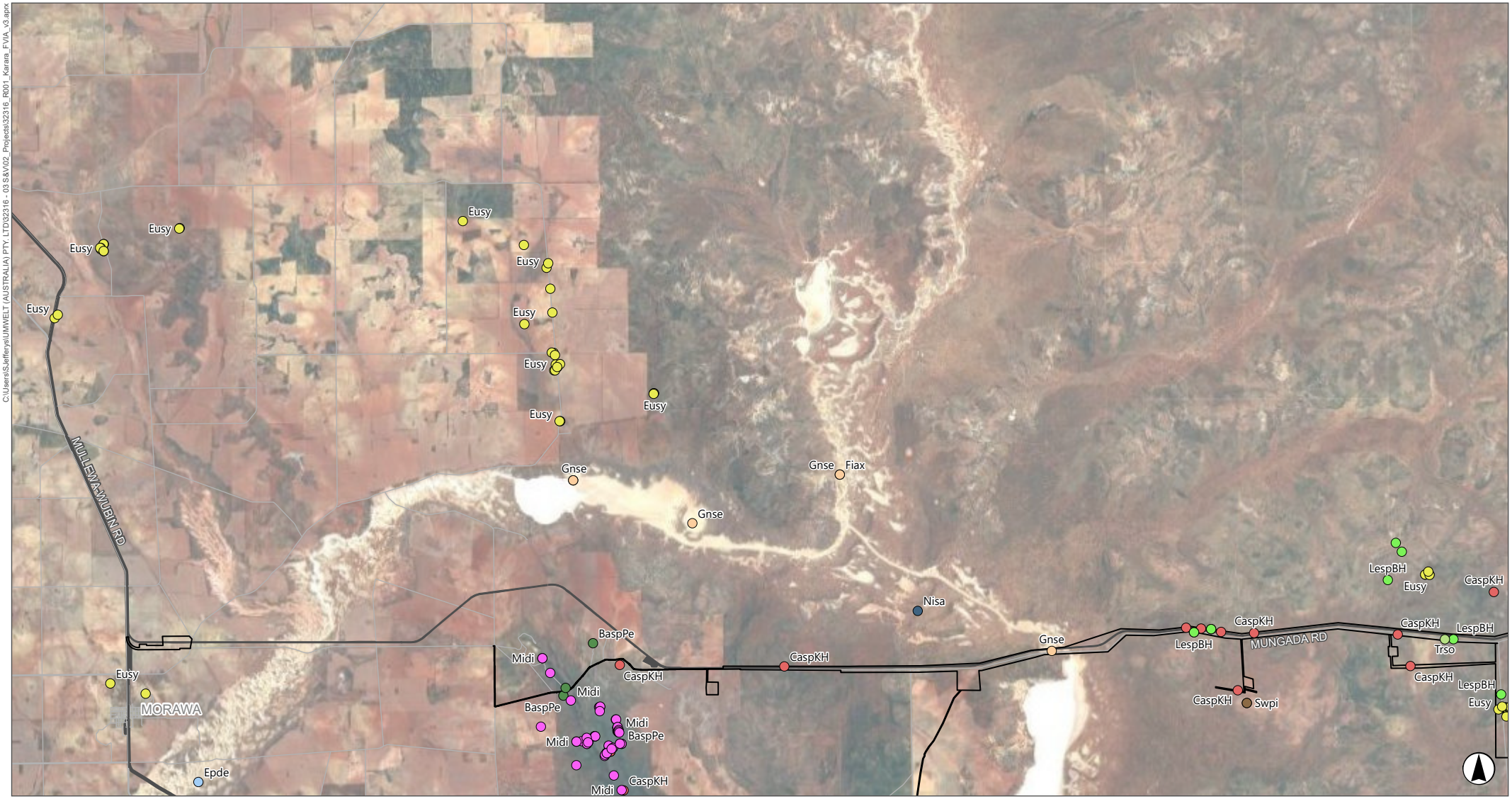
Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)



Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Significant Flora Taxa

- BaspPe *Baeckea* sp. Perenjori (J.W. Green 1516) (P2)
- CaspKH *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- Epde *Epitriche demissus* (P2)
- Eusy *Eucalyptus synandra* (T)
- Fiax *Fitzwillia axilliflora* (P2)
- Gnse *Gnephosis setifera* (P1)
- LespBH *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)
- Midi *Millotia dimorpha* (P1)
- Nisa *Nicotiana salina* (P1)
- Swpi *Swainsona picta* (P1)
- Trso *Tricoryne soullierae* (P1)

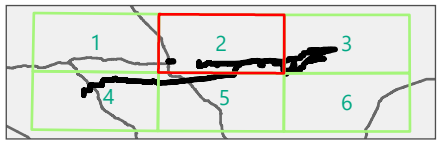


FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (T, P1, P2) – Sheet 2

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

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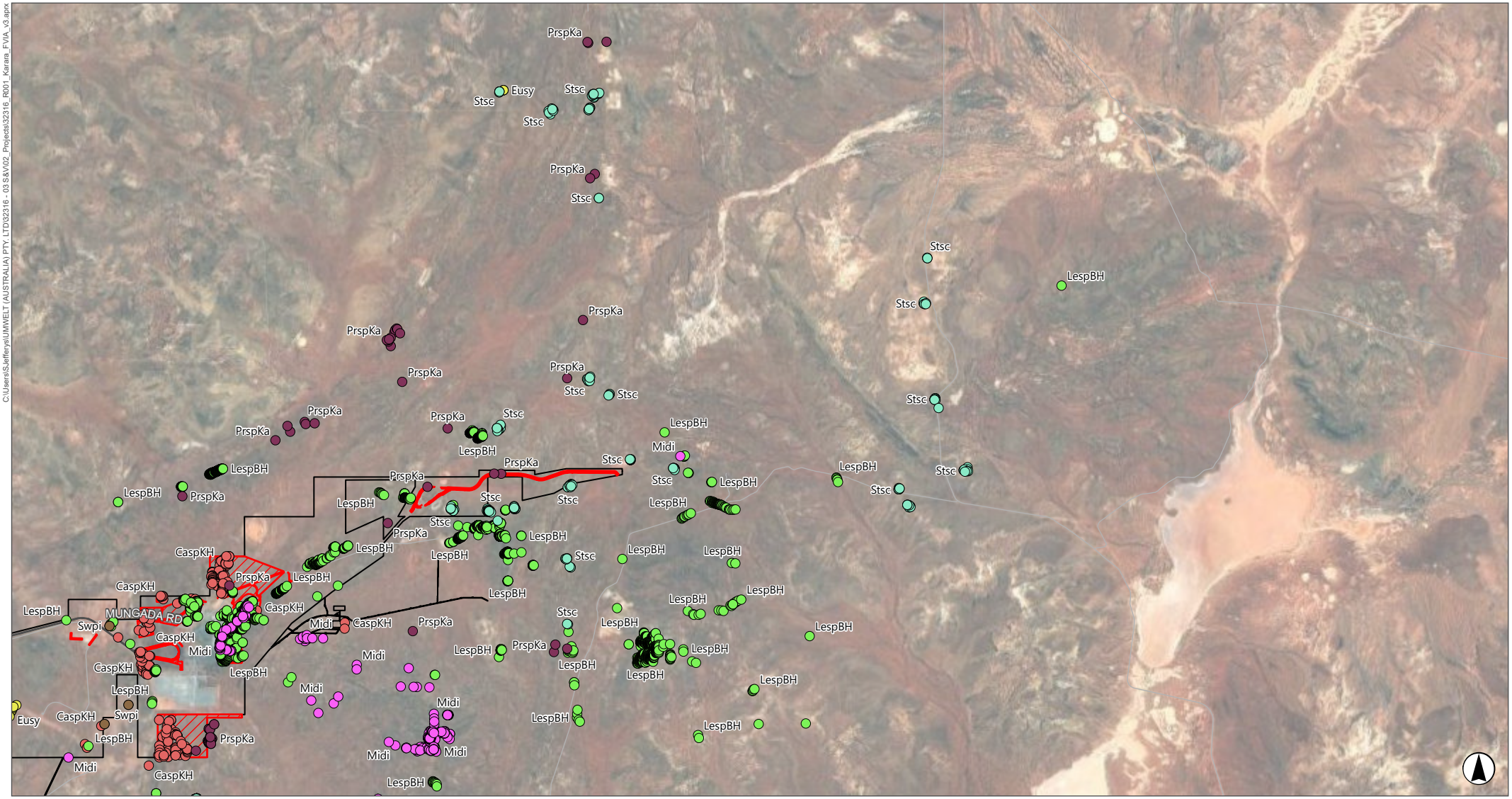

Legend

- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Minor Road

Significant Flora Taxa

- CaspKH *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- Eusy *Eucalyptus synandra* (T)
- LespBH *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)
- Midi *Millotia dimorpha* (P1)
- PrspKa *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)
- Stsc *Stylidium scintillans* (T)
- Swpi *Swainsona picta* (P1)

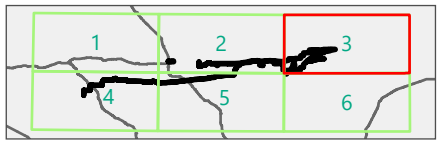

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (T, P1, P2) – Sheet 3

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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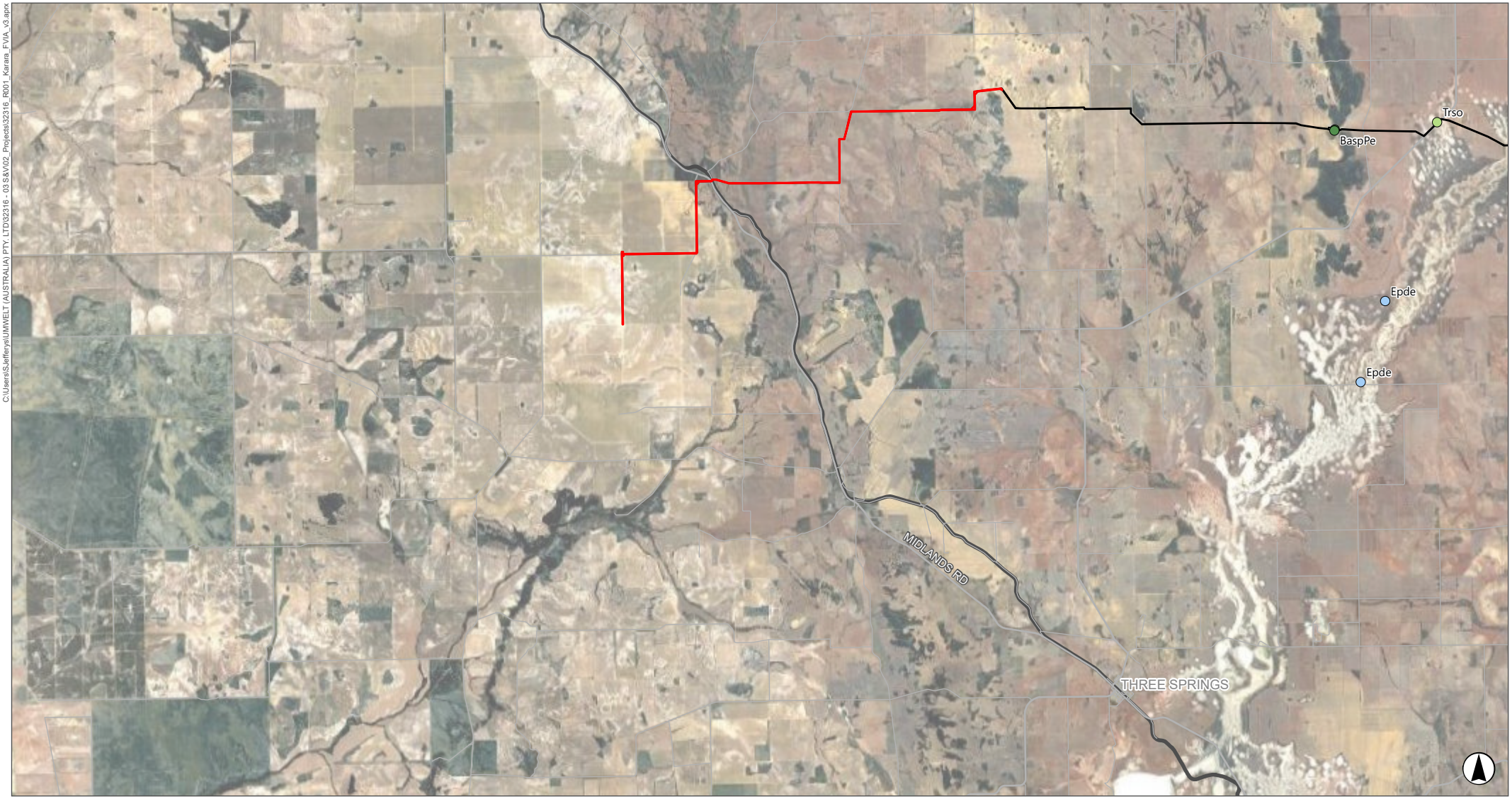

Legend

- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Significant Flora Taxa

- BaspPe *Baeckea* sp. Perenjori (J.W. Green 1516) (P2)
- Epde *Epitriche demissus* (P2)
- Trso *Tricoryne soullierae* (P1)

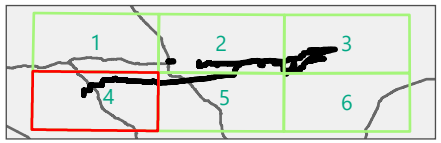

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (T, P1, P2) – Sheet 4

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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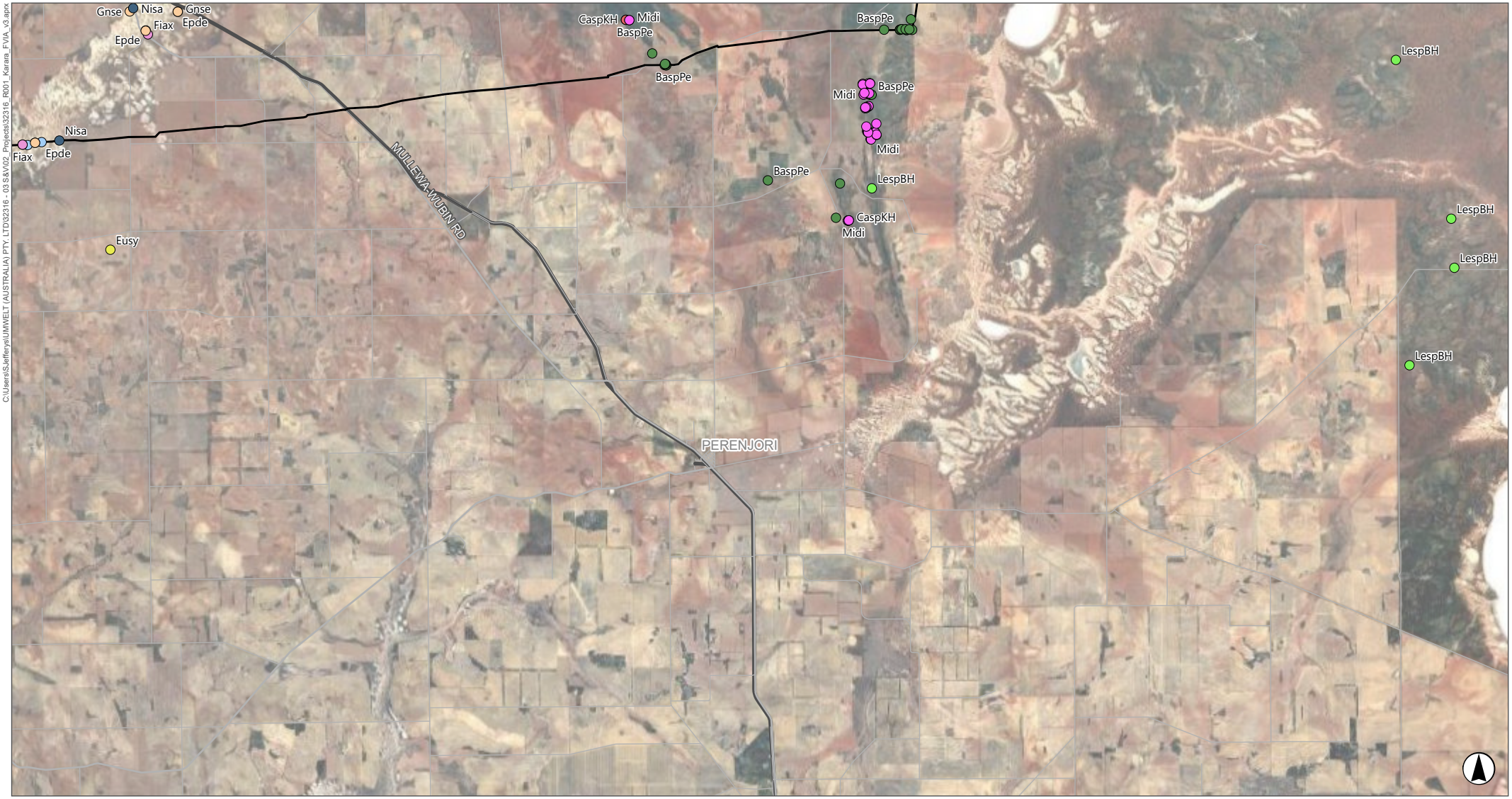

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Significant Flora Taxa

- BaspPe *Baeckea* sp. Perenjori (J.W. Green 1516) (P2)
- CaspKH *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- Epde *Epitriche demissus* (P2)
- Eusy *Eucalyptus synandra* (T)
- Fiax *Fitzwillia axilliflora* (P2)
- Gnse *Gnephosis setifera* (P1)
- LespBH *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)
- Midi *Millotia dimorpha* (P1)
- Nisa *Nicotiana salina* (P1)

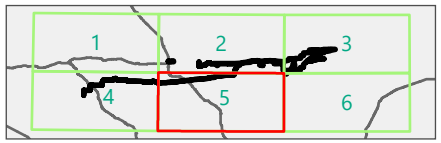

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (T, P1, P2) – Sheet 5

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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Legend

- Combined Proposal Development Envelope
- Highway
- Minor Road

Significant Flora Taxa

- CaspKH *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- Eusy *Eucalyptus synandra* (T)
- Gnse *Gnephosis setifera* (P1)
- LespBH *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)
- Midi *Millotia dimorpha* (P1)
- Stsc *Stylidium scintillans* (T)
- Swpi *Swainsona picta* (P1)

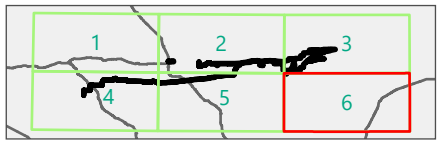

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (T, P1, P2) – Sheet 6

umwelt

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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Legend

- Main Road
- Minor Road
- Railway

Significant Flora Taxa

- Meba *Melaleuca barlowii* (P3)
- Pepe *Persoonia pentasticha* (P3)
- Poun *Podotheca uniseta* (P3)
- Rhco *Rhodanthe collina* (P3)

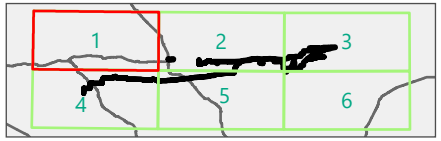

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (P3, P4, PU) – Sheet 1

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Significant Flora Taxa

- Drfu *Drummondita fulva* (P3)
- Grgr *Grevillea granulosa* (P3)
- Hebo *Hemigenia* sp. aff. *botryphylla* (Pot)
- Meba *Melaleuca barlowii* (P3)
- Medr *Menkea draboides* (P3)
- Mitru *Micromyrtus trudgenii* (P3)
- Pepe *Persoonia pentasticha* (P3)
- Rhco *Rhodanthe collina* (P3)
- Roha *Roebuckiella halophila* (P3)
- Stpo *Stenanthemum poicilum* (P3)
- Tefi *Tecticornia fimbriata* (P3)

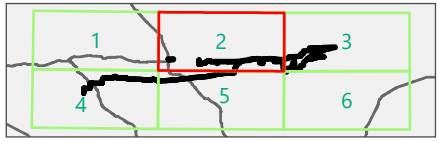

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (P3, P4, PU) – Sheet 2

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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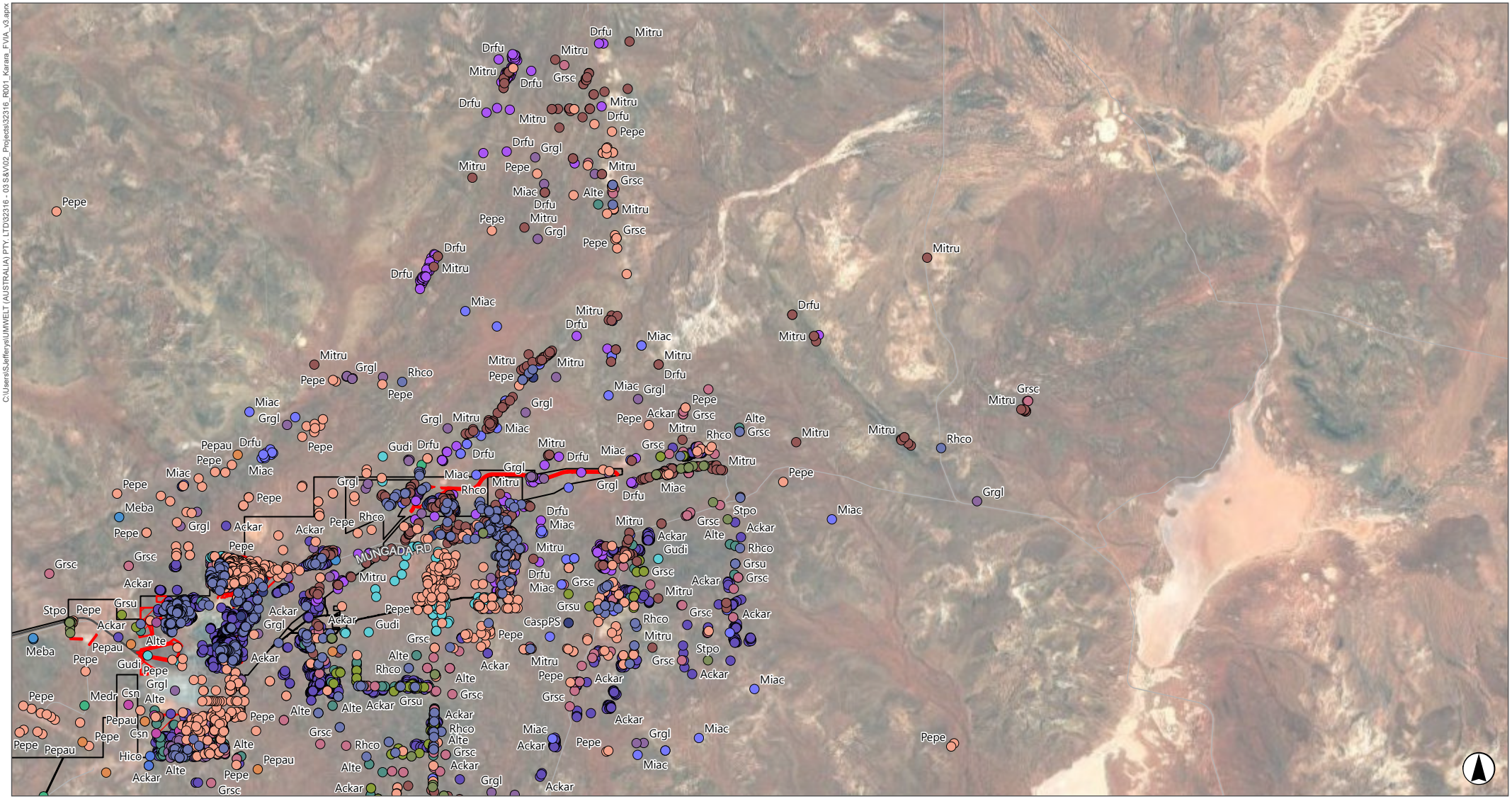

Legend

- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Minor Road

Significant Flora Taxa

- Ackar *Acacia karinae* (P3)
- Alte *Allocasuarina tessellata* (P3)
- CaspPS *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3)
- Csn *Crassula sp. nov.* (Pot)
- Drfu *Drummondita fulva* (P3)
- Grgl *Grevillea globosa* (P3)
- Grsc *Grevillea scabrida* (P3)
- Grsu *Grevillea subtiliflora* (P3)
- Gudi *Gunniopsis divisa* (P3)
- Hico *Hibbertia cockertoniana* (P3)
- Meba *Melaleuca barlowii* (P3)
- Medr *Menkea draboides* (P3)
- Miac *Micromyrtus acuta* (P3)
- Mitru *Micromyrtus trudgenii* (P3)
- Pepe *Persoonia pentasticha* (P3)
- Pepau *Petrophile pauciflora* (P3)
- Rhco *Rhodanthe collina* (P3)
- Seex *Seringia exastia* (EPBC – CR)
- Stpo *Stenanthemum poicilum* (P3)

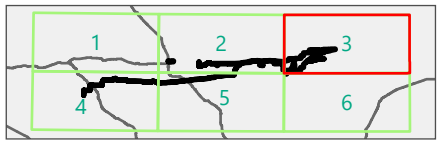

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (P3, P4, PU) – Sheet 3

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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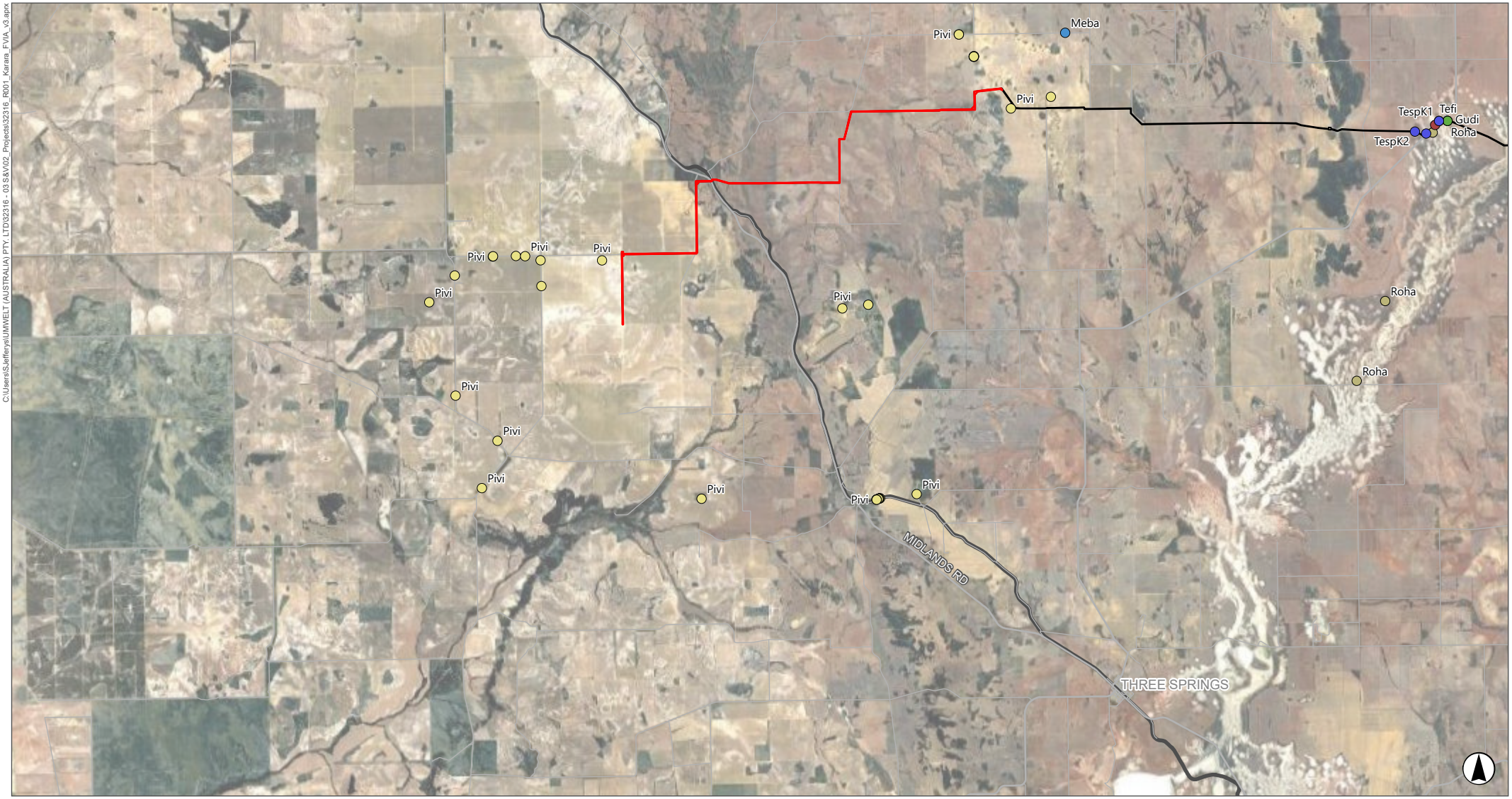

Legend

- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Significant Flora Taxa

- Gudi *Gunniopsis divisa* (P3)
- Meba *Melaleuca barlowii* (P3)
- Pivi *Pityrodia viscida* (P4)
- Roha *Roebuckiella halophila* (P3)
- Tefi *Tecticornia fimbriata* (P3)
- TespK1 *Tecticornia* sp. 'Karara 1' (Pot)
- TespK2 *Tecticornia* sp. 'Karara 2' (Pot)

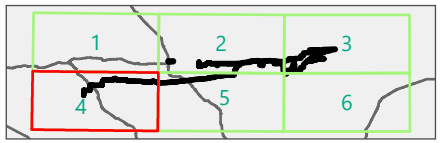

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (P3, P4, PU) – Sheet 4

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Significant Flora Taxa

- Grgr *Grevillea granulosa* (P3)
- Gudi *Gunniopsis divisa* (P3)
- Meba *Melaleuca barlowii* (P3)
- Pepe *Persoonia pentasticha* (P3)
- Pepau *Petrophile pauciflora* (P3)
- Pivi *Pityrodia viscida* (P4)
- Poun *Podotheca uniseta* (P3)
- Roha *Roebuckiella halophila* (P3)
- Stpo *Stenanthemum poicilum* (P3)
- Tefi *Tecticornia fimbriata* (P3)
- TespK1 *Tecticornia* sp. 'Karara 1' (Pot)
- TespK2 *Tecticornia* sp. 'Karara 2' (Pot)

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (P3, P4, PU) – Sheet 5

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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Legend

- Combined Proposal Development Envelope
- Highway
- Minor Road

Significant Flora Taxa

- Ackar *Acacia karinae* (P3)
- Alte *Allocasuarina tessellata* (P3)
- Grgl *Grevillea globosa* (P3)
- Grsc *Grevillea scabrida* (P3)
- Grsu *Grevillea subtiliflora* (P3)
- Gudi *Gunniopsis divisa* (P3)
- Medr *Menkea draboides* (P3)
- Miac *Micromyrtus acuta* (P3)
- Mitru *Micromyrtus trudgenii* (P3)
- Pepe *Persoonia pentasticha* (P3)
- Pepau *Petrophile pauciflora* (P3)
- Rhco *Rhodanthe collina* (P3)
- Stpo *Stenanthemum poicilum* (P3)

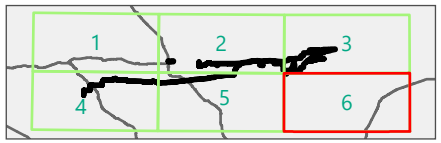

FIGURE 3.1

Significant Flora Recorded in the Combined Proposal Development Envelope and Surrounds (P3, P4, PU) – Sheet 6

umwelt

Scale: 1:250,000 at A4, GDA2020 MGA Zone 50

0 5 10 km

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3.2.3 Listed Flora Likelihood of Occurrence

Umwelt (2025) prepared a likelihood of occurrence assessment for the Combined Proposal DE and the KIOP MLE new disturbance footprint. This assessment was undertaken for all significant flora taxa known within a 50 km buffer of the Combined Proposal DE, ranking the likelihood of each taxon being present within the Combined Proposal DE and the KIOP MLE new disturbance footprint. The assessment considered whether a taxon was theoretically identifiable at the time of survey, the known range of the taxon, proximity of known records, and the potential presence of appropriate habitat in the Combined Proposal DE and KIOP MLE new disturbance footprint.

A summary of the results of the Umwelt (2025) likelihood of occurrence assessment for significant flora taxa in the Combined Proposal DE is presented in **Table 3.2**. Of the 372 significant flora taxa assessed, 41 are known to occur, 3 were considered 'likely' to occur, and a further 78 could 'possibly' occur in the Combined Proposal DE, including 5 taxa that are listed as Threatened under the BC Act and/or EPBC Act. This result was not unexpected, given no targeted flora survey was undertaken across the Yandanooka Pipeline or the Borefield Corridor (with the exception of the very western end of the latter) (Umwelt 2025).

Table 3.2 Summary of Significant Flora Taxa Likelihood of Occurrence for the Combined Proposal DE

Likelihood of Occurrence	Number of Taxa				Reasoning
	WA / EPBC Threatened	DBCA Priority	Potentially Undescribed	Total	
Known	4	33	4	**41**	Existing locations within Combined Proposal DE
Likely	-	3	-	**3**	Combined Proposal DE clearly within or in close proximity to known range of taxa, and habitat possibly present
Possible	5	73	-	**78**	Combined Proposal DE potentially within or in relatively close proximity to known range of taxa, and habitat possibly present
Unlikely	60	190	-	**250**	Combined Proposal DE not within or in close proximity to known range of taxa, and/or habitat unlikely to be present
Not considered to occur	-	-	-	**-**	Combined Proposal DE > 200 km from known range of taxa, and/or habitat not considered to be present

Source: Umwelt (2025).

An additional likelihood of occurrence assessment was then undertaken by Umwelt (2025) for the KIOP MLE new disturbance footprint. Given the KIOP MLE new disturbance footprint is entirely contained within the Combined Proposal DE, this second assessment was only undertaken for the 122 taxa that were rated 'known', 'likely' or 'possible' for the Combined Proposal DE (as summarised in **Table 3.2**). This second assessment was undertaken twice for each taxon: once for the Mine Area and once for the Wheatbelt Area. The results of the second assessment are summarised in **Table 3.3**.

In summary, no significant flora taxa are known from the Wheatbelt Area or were rated 'likely' or 'possible', mostly because suitable habitat is unlikely to be present in this area. One taxon 'possibly' occurs in the Mine Area of the KIOP MLE new disturbance footprint despite a lack of existing records, *Calandrinia kalanniensis* (P2): this taxon is a tuberous perennial that is only detectible from October to January, and thus was likely not detectible during the targeted flora survey (August to October 2024), however suitable habitat may be present within the Mine Area (brown, red gritty sandy clay over granite; shallow rock hollows on large granite rocks) (Umwelt 2025). Suitable habitat in the Combined Proposal DE is likely represented by VTs A, B, F and O.

Table 3.3 Summary of Significant Flora Taxa Likelihood of Occurrence for the KIOP MLE New Disturbance Footprint

Likelihood of Occurrence	Number of Taxa				Reasoning
	WA / EPBC Threatened	DBCA Priority	Potentially Undescribed	Total	
Mine Area					
Known	-	13	1	**14**	Existing locations within Mine Area
Likely	-	-	-	**0**	Mine Area clearly within or in close proximity to known range of taxa, habitat possibly present, AND taxon likely not detectible during targeted survey
Possible	-	1	-	**1**	Mine Area potentially within or in relatively close proximity to known range of taxa, habitat possibly present, AND taxon likely not detectible during targeted survey
Unlikely	8	95	3	**106**	Mine Area not within or in close proximity to known range of taxa, and/or habitat unlikely to be present, OR habitat possibly present but taxon not recorded by targeted survey
Not considered to occur	-	-	-	**0**	Mine Area >200 km from known range of taxa, and/or habitat not considered to be present
Wheatbelt Area					
Known	-	-	-	**0**	Existing locations within Wheatbelt Area
Likely	-	-	-	**0**	Wheatbelt Area clearly within or in close proximity to known range of taxa, habitat possibly present, AND taxon likely not detectible during targeted survey
Possible	-	-	-	**0**	Wheatbelt Area potentially within or in relatively close proximity to known range of taxa, habitat possibly present, AND taxon likely not detectible during targeted survey

Likelihood of Occurrence	Number of Taxa				Reasoning
	WA / EPBC Threatened	DBCA Priority	Potentially Undescribed	Total	
Unlikely	8	109	4	**121**	Wheatbelt Area not within or in close proximity to known range of taxa, and/or habitat unlikely to be present, OR habitat possibly present but taxon not recorded by targeted survey
Not considered to occur	-	-	-	**0**	Wheatbelt Area >200 km from known range of taxa, and/or habitat not considered to be present

Source: Umwelt (2025).

3.3 Vegetation

3.3.1 Regional Vegetation

The Combined Proposal is located across the Tallering, Merredin and Lesueur Sandplain IBRA subregions located within the Yalgoo, Avon Wheatbelt and Geraldton Sandplains IBRA regions, respectively. The typical vegetation communities associated with these IBRA regions and subregions are summarised in **Table 3.4**.

The pre-European Vegetation Spatial Dataset maps WA's vegetation at a 1:250,000 scale as presumed to have existed prior to European settlement (Beard et al. 2013; DPIRD 2019). According to this dataset, the Combined Proposal DE occurs across 27 vegetation system associations (VSAs), as summarised in **Table 3.5**. Also presented in **Table 3.5** is the current extent of each VSA in relation to its pre-European extent within the respective IBRA subregion, and the percentage of the current extent of each VSA currently protected for conservation (as a proportion of the current extent) within the respective IBRA subregion (DBCA, 2019). Note that as per DBCA's Statewide Vegetation Statistics Report (DBCA, 2019), protected areas in this context are considered to be any areas listed in DBCA's Legislated Lands and Waters dataset as either Crown reserves or lands managed under Section 8A of the *Conservation and Land Management Act 1984* that have an International Union for Conservation of Nature (IUCN) category of I to IV. Note that this dataset was last updated in 2018, and it is understood that no further updates are currently planned.

All VSAs that occur within the Tallering IBRA subregion have greater than 84% of their pre-European extents remaining, but the VSAs in the Merredin and Lesueur Sandplain subregions are generally less well represented, with a minimum of 7.9% and an average of 42.5%. Conservation coverage is limited in the subregions, with 12 VSAs lacking any protected areas (**Table 3.5**).

Table 3.4 Typical Vegetation of IBRA Regions and Subregions Intersected by the Combined Proposal DE

Region	Region Characteristics	Subregion	Subregion Characteristics	Location in Relation to Proposal
Geraldton Sandplains	Proteaceous scrub-heaths, rich in endemics. Extensive York Gum and Jam woodlands on outwash plains associated drainage	Lesueur Sandplain	Scrub-heath on sandplain near the coast; *Acacia-Casuarina* thickets further inland. *Acacia* scrub with scattered trees of *Eucalyptus loxophleba* on hard-setting loams	Western end of Borefield Corridor (approx. 9.0 km)
Avon Wheatbelt	Proteaceous scrub-heaths, rich in endemics; mixed eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands on alluvials and eluvials	Merredin	Scrub-heath on sandplain; *Acacia-Casuarina* thickets on ironstone gravels; York gum (*Eucalyptus loxophleba*), salmon gum (*Eucalyptus salmonophloia*) and wandoo (*Eucalyptus wandoo*) woodlands on loams; halophytes on saline soils	Tilley Siding, western half of Yandanooka Pipeline and majority of Borefield Corridor
Yalgoo	Mainly *Acacia* scrub and low woodland becoming tree and shrub steppe in the north, and with halophytes along the lower river courses	Tallering	Low woodlands to open woodlands of *Eucalyptus*, *Acacia* and *Callitris* on the Western Yilgarn Craton and southern Carnarvon Basin. Mulga, *Callitris- Eucalyptus salubris*, and Bowgada open woodlands and scrubs in the western Yilgarn Craton. The subregion is particularly rich in ephemerals	Entirety of Karara Area and eastern half of Yandanooka Pipeline

Source: 'A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002' (CALM, 2003); 'Plant Life of Western Australia' (Beard, 2015).

Table 3.5 Vegetation System Associations of the Combined Proposal DE

IBRA Subregion	VSA	Description*	Extent (ha)			Pre-European Extent Remaining (%)*	Current Extent Protected for Conservation (%)*
			Development Envelope^	Pre-European*	Current*		
Lesueur Sandplain	Tathra_379	Shrublands; scrub-heath on lateritic sandplain in the central Geraldton Sandplain Region	28.5	369,252	111,607	30.2	5.6
Merredin	Billeranga_692	Shrublands; casuarina & melaleuca thicket	5.3	2,639	1,633	61.9	2.8
	Jibberding_352	Medium woodland; York gum	198.1	89,070	53,997	60.6	0.1
	Jibberding_374	Shrublands; bowgada scrub with scattered York gum	240.0	4,930	2,256	45.8	2.2
	Jibberding_420	Shrublands; bowgada & jam scrub	113.3	7,623	6,980	91.6	0
	Jibberding_437	Shrublands; Mixed acacia thicket on sandplain	25.5	163,512	143,130	87.5	1.4
	Jibberding_551	Shrublands; *Allocasuarina campestris* thicket	2.0	15,479	6,106	39.5	0
	Jibberding_631	Succulent steppe with woodland and thicket; York gum over *Melaleuca thyoides* & samphire	43.9	47,781	28,437	59.5	0.7
	Mingenew_352	Medium woodland; York gum	3.5	2,631	1,238	47.1	0
	Mingenew_354	Shrublands; jam and *Acacia rostellifera* (+ hakea) scrub with scattered York gum	42.1	91,100	10,353	11.4	1.0
	Nanekine_684	Mosaic: Shrublands; Shrublands; jam scrub with scattered York gum in the valleys / *Allocasuarina campestris* thicket	25.6	124,221	33,139	26.7	1.0

IBRA Subregion	VSA	Description*	Extent (ha)			Pre-European Extent Remaining (%)*	Current Extent Protected for Conservation (%)*
			Development Envelope^	Pre-European*	Current*		
Merredin	Perenjori_1155	Mosaic: Medium woodland; York gum / Shrublands; *Allocasuarina campestris* thicket	15.6	14,384	1,342	9.3	1.4
	Perenjori_352	Medium woodland; York gum	78.2	194,632	15,336	7.9	0.4
	Perenjori_358	Shrublands; bowgada & *Acacia quadrimarginea* on stony ridges	0.1	274	213	77.9	0
	Perenjori_551	Shrublands; *Allocasuarina campestris* thicket	90.9	107,903	12,547	11.6	0.4
	Perenjori_631	Succulent steppe with woodland and thicket; York gum over *Melaleuca thyoides* & samphire	17.0	30,707	13,390	43.6	0.2
	Perenjori_693	Mosaic: Low woodland: *Allocasuarina huegeliana* over mallee and acacia scrub / *Allocasuarina campestris* thicket	4.6	4,219	3,077	72.9	0
	Yarra Yarra_142	Medium woodland; York gum & salmon gum	56.4	107,152	11,857	11.1	0.2
	Yuna_380	Shrublands; scrub-heath on sandplain	24.7	17,464	2,143	12.3	1.5
Tallering	Yalgoo_125	Bare areas; salt lakes	64.5	25,181	21,377	84.9	0
	Yalgoo_355	Shrublands; bowgada & jam scrub with scattered York gum & red mallee	58.9	55,020	54,692	99.4	0
	Yalgoo_358	Shrublands; bowgada & *Acacia quadrimarginea* on stony ridges	2,814.6	55,530	55,448	99.9	0
	Yalgoo_363	Shrublands; bowgada scrub with scattered cypress pine	4,210.5	11,915	11,729	98.5	0

IBRA Subregion	VSA	Description*	Extent (ha)			Pre-European Extent Remaining (%)*	Current Extent Protected for Conservation (%)*
			Development Envelope^	Pre-European*	Current*		
Tallering	Yalgoo_364	Shrublands; bowgada scrub with scattered eucalypts & cypress pine	2,552.9	108,810	108,535	99.8	0
	Yalgoo_41	Shrublands; Teatree scrub	102.7	287	287	100	0
	Yalgoo_419	Shrublands; bowgada, jam and *Melaleuca uncinata* thicket	1,989.6	302,322	289,440	95.7	0
	Yalgoo_420	Shrublands; bowgada & jam scrub	748.1	455,832	454,715	99.8	0

* Source: 2018 DBCA Statewide Vegetation Statistics report (DBCA, 2019). Values presumed current to 2018.

^ Source: Pre-European Vegetation spatial dataset (DPIRD-006) (DPIRD, 2019)

3.3.2 Vegetation Types

A total of 38 VTs were identified and mapped within the Combined Proposal DE. Of these 38 VTs, but excluding CL (cleared land), 14 VTs were mapped in the Mine Area of the KIOP MLE new disturbance footprint and 5 in the Wheatbelt Area. With the exception of CL, no VTs occur in both the Mine Area and the Wheatbelt Area (Umwelt 2025).

The 38 VTs of the Combined Proposal DE comprise:

- 20 VTs defined via floristic composition analysis of quadrat data (VTs A to T)
- 8 VTs defined structurally using data recorded at quadrats and relevés (VTs U to AA, and VT CP)
- 7 HMVTs defined structurally using data recorded at quadrats and relevés, within areas with a long history of disturbance where the vegetation still possessed tree or large shrub taxa but were highly modified otherwise (HMVTs A to G)
- 1 VT representing planted non-native or non-endemic tree or shrub taxa (VT PL)
- Water in salt lakes and clay pans
- Cleared land.

The 38 VTs of the Combined Proposal DE are defined in **Table 3.6** and presented in **Figure 3.2.** Also presented in **Table 3.6** are the Woodman Environmental (2012) Floristic Community Types (FCTs) and pre-European VSAs that potentially correspond to each VT, following statistical analysis and review by Umwelt (2025) of the FCT/VSA descriptions and mapped extents against those of the VTs (discussed more in **Sections 6.3.1.1** and **6.3.2**). Note that the Woodman Environmental FCTs are only relevant to VTs within the Karara Area and the very eastern end of the Yandanooka Pipeline.

Note that **Table 3.6** provides a description for VT AB, which was not presented in the Umwelt 2025 assessment. This VT was mapped for the purpose of this impact assessment as it occurs within the indirect impact zone but not within the Combined Proposal DE and was therefore outside the study area of the Umwelt 2025 assessment. The mapping and description of VT AB was done by the same Principal Ecologist – Botanist who undertook the floristic analyses and vegetation definitions, descriptions and mapping for the Umwelt 2025 assessment. The mapping and description was done using the same datasets utilised for the Umwelt 2025 assessment (**Section 2.1**).

Table 3.6 Vegetation Types of the Combined Proposal DE

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
A	Tall sparse shrubland to isolated shrubs of mixed species including *Acacia acuminata*/*Acacia burkittii*, *Acacia tetragonophylla*, *Melaleuca hamata* and/or *Acacia umbraculiformis* over mid sparse shrubland of mixed species including *Thryptomene costata* and *Malleostemon tuberculatus*, over low sparse shrubland of mixed species including *Mirbelia microphylla*, *Solanum lasiophyllum* and *Eremophila eriocalyx*, over low sparse forbland of mixed species including *Schoenia cassiniana*, *Borya sphaerocephala*, *Erodium cygnorum* and *Rhodanthe chlorocephala* subsp. *splendida*, on red-brown clay loam, sometimes with granite surface stones, on plains and gentle slopes.	Y	-	29, 31, 32	Jibberding_352 Jibberding_374 Jibberding_420 Jibberding_551 Perenjori_352 Perenjori_1155 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420
B	Low open forbland of *Borya sphaerocephala* and other species including *Rhodanthe chlorocephala* subsp. *splendida*, *Calandrinia granulifera*, *Calotis hispidula* and *Chthonocephalus pseudevax*, in pockets of red clayey sand on and immediately adjacent to granite sheet outcropping.	Y	-	16	Yalgoo_358 Yalgoo_364 Yalgoo_419
C	Low open woodland of *Eucalyptus kochii* subsp. *plenissima* or *Eucalyptus loxophleba* subsp. *supralaevis*, over occasional tall isolated clumps of shrubs of *Acacia ramulosa* var. *ramulosa*, *Melaleuca eleuterostachya*, *Acacia assimilis* subsp. *assimilis*, *Acacia burkittii*, and/or *Acacia colletioides*, over low isolated clumps of shrubs of *Ptilotus obovatus* and *Solanum lasiophyllum*, over low open tussock grassland of *Monachather paradoxus*, over low isolated clumps of forbs of mixed species including *Erodium cygnorum*, *Crassula colorata* var. *colorata*, *Helipterum craspedioides*, *Cephalipterum drummondii* and *Chthonocephalus pseudevax*, on red clayey sand or clay loam, sometimes with ironstone or quartz surface stones, on flats and plains.	Y	-	21b, 24	Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
D	Occasional low woodland to open woodland of *Eucalyptus kochii*, *Callitris columellaris*, and/or *Eucalyptus loxophleba* subsp. *supralaevis*, over tall open shrubland of mixed species including *Acacia tetragonophylla*, *Acacia ramulosa* var. *ramulosa*, *Acacia acuminata*, *Acacia obtecta* and *Exocarpos aphyllus*, over mid sparse shrubland of mixed species including *Hakea recurva* subsp. *recurva*, *Senna artemisioides* subsp. *filifolia*, *Eremophila clarkei* and *Acacia assimilis* subsp. *assimilis*, over low sparse shrubland of mixed species including *Rhagodia drummondii*, *Ptilotus obovatus* and *Olearia humilis*, over low sparse tussock grassland of *Austrostipa elegantissima* and *Monachather paradoxus*, over low sparse forbland of mixed species including *Erodium cygnorum*, *Cephalipterum drummondii* and *Gilruthia osbornei*, on red or red-brown sandy clay loam, sometimes with occasional ironstone or quartz surface stones, on flats and plains.	Y	-	25, 26, 27	Jibberding_374 Jibberding_631 Yalgoo_41 Yalgoo_355 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420
E	Tall open to sparse shrubland of mixed species including *Acacia ramulosa* var. *ramulosa*, *Acacia tetragonophylla*, *Hakea recurva* subsp. *recurva*, *Acacia assimilis* subsp. *assimilis* and *Eremophila clarkei*, over low isolated clumps of shrubs of mixed species including *Maireana planifolia*, *Ptilotus obovatus*, *Solanum lasiophyllum* and *Sida* sp. dark green fruits (S. van Leeuwen 2260), over low isolated clumps of grasses of *Austrostipa elegantissima*, over low sparse forbland of mixed species including *Erodium cygnorum*, *Gilruthia osbornei*, *Cephalipterum drummondii*, *Calotis multicaulis* and *Panaetia lessonii*, on red clay loam, usually with ironstone, granite and/or quartz surface stones, on undulating plains and flats.	Y	-	23, 28	Jibberding_352 Jibberding_374 Jibberding_420 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420
F	Tall sparse shrubland of *Acacia tetragonophylla*, *Acacia umbraculiformis*, *Acacia ramulosa* var. *ramulosa* and occasionally *Acacia burkittii* and *Thryptomene costata*, over mid isolated shrubs of mixed species including *Hakea recurva* subsp. *recurva* and *Acacia kochii*, over low sparse shrubland of *Solanum lasiophyllum* and *Ptilotus obovatus*, over low sparse forbland of mixed species including *Borya sphaerocephala*, *Rhodanthe chlorocephala*, *Myriocephalus gueriniae* and *Goodenia cycnopotamica*, on red or red-brown clay loam or silty loam, sometimes with small amounts of granite outcropping and granite surface stones, on simple slopes and plains.	Y	-	23, 32	Yalgoo_358 Yalgoo_364 Yalgoo_419 Yalgoo_420

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
G	Mid to low woodland to open woodland of *Eucalyptus loxophleba* subsp. *supralaevis* and occasionally *Eucalyptus kochii*, over tall sparse shrubland of mixed species including *Acacia tetragonophylla* and occasionally *Acacia ramulosa* var. *ramulosa*, *Exocarpos aphyllus*, *Acacia obtecta* and *Acacia burkittii*, over an occasional mid sparse shrubland of *Senna* sp. Austin (A. Strid 20210), *Scaevola spinescens* and/or *Dodonaea inaequifolia*, over low isolated clumps of shrubs of mixed species including *Senna artemisioides* subsp. *filifolia*, *Ptilotus obovatus* and *Pimelea microcephala* subsp. *microcephala*, over low isolated clumps of chenopod shrubs of mixed species including *Rhagodia drummondii*, *Sclerolaena fusiformis*, *Maireana georgei*, *Maireana carnosa* and *Enchylaena lanata*, over low isolated clumps of tussock grasses of *Austrostipa elegantissima*, over low isolated clumps of forbs of mixed species including **Mesembryanthemum nodiflorum*, *Cephalipterum drummondii*, *Erodium cygnorum* and *Gilruthia osbornei*, on red or red-brown clay loam or silty clay loam, usually with ironstone and/or granite and/or quartz surface stones, on flats and plains.	Y	-	15, 19a	Jibberding_352 Jibberding_374 Jibberding_420 Jibberding_437 Perenjori_352 Perenjori_693 Perenjori_1155 Yalgoo_355 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420 Yarra Yarra_142
H	Occasional low open woodland to isolated trees of mixed species including *Eucalyptus loxophleba* subsp. *supralaevis*, *Eucalyptus salubris*, *Eucalyptus clelandiorum* or *Eucalyptus kochii* subsp. *amaryssia*, over tall open to sparse shrubland of mixed species including *Acacia obtecta*, *Acacia ramulosa* var. *ramulosa*, *Acacia latior* and *Melaleuca leiocarpa*, over mid isolated shrubs of mixed species including *Acacia tetragonophylla*, *Exocarpos aphyllus* and *Acacia exocarpoides*, over occasional low isolated clumps of shrubs of *Ptilotus obovatus*, *Senna charlesiana*, *Persoonia pentasticha* (P3) and *Olearia pimeleoides*, over low isolated clumps of chenopod shrubs of mixed species dominated by *Rhagodia drummondii* and *Sclerolaena fusiformis* and occasionally *Maireana georgei* and *Enchylaena lanata*, on red-brown clay loam, with occasional ironstone surface stones, on flats and plains.	Y	-	24, 25, 26, 27	Yalgoo_358 Yalgoo_363 Yalgoo_420
I	Low open woodland of *Eucalyptus horistes* and *Eucalyptus loxophleba* subsp. *supralaevis*, over tall open shrubland of *Melaleuca stereophloia*, over mid sparse shrubland of mixed species including *Acacia acuaria* and *Scholtzia uniovulata*, over mid sparse tussock grassland of *Austrostipa elegantissima*, over low isolated forbs of mixed species including *Goodenia rosea*, *Rhodanthe chlorocephala* subsp. *splendida*, *Lawrencella davenportii*, *Podolepis aristata* subsp. *aristata* and *Waitzia acuminata* var. *acuminata*, on red sandy clay, on plains and low rises.	-	-	-	Jibberding_352 Jibberding_420 Perenjori_352 Perenjori_631

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
J	Occasional tall to mid isolated shrubs of *Acacia obtecta*, *Duma florulenta*, *Exocarpos aphyllus* and *Eremophila glabra*, over low sparse shrubland of *Ptilotus obovatus* and *Corchorus* sp., over mid open to sparse samphire shrubland of *Tecticornia disarticulata*, over low sparse chenopod shrubland of mixed species including *Maireana carnosa*, *Sclerolaena diacantha*, *Sclerolaena fusiformis*, *Atriplex semilunaris* and *Maireana brevifolia*, on brown or red-brown clay loam or silty clay loam, in saline claypans.	-	-	19b	Yalgoo_41 Yalgoo_125
K	Occasional low woodland to open woodland of mixed species including *Eucalyptus clelandiorum*, *Eucalyptus loxophleba* subsp. *supralaevis* and/or *Eucalyptus salubris*, over tall sparse shrubland of mixed species including *Eremophila oppositifolia* subsp. *angustifolia*, *Acacia erinacea*, *Exocarpos aphyllus* and *Eremophila pantonii*, over low isolated clumps of shrubs of mixed species including *Senna stowardii*, *Scaevola spinescens*, *Ptilotus obovatus* and *Olearia pimeleoides*, over low isolated clumps of chenopod shrubs of *Sclerolaena fusiformis*, *Rhagodia drummondii*, *Maireana thesioides*, *Maireana georgei* and *Maireana marginata*, on red-brown silty clay loam or clay loam, sometimes with ironstone surface stones, on plains.	Y	-	19a, 21a	Yalgoo_355 Yalgoo_358 Yalgoo_363
L	Tall sparse shrubland of *Melaleuca acutifolia* and occasionally *Melaleuca eleuterostachya*, *Acacia eremaea* and *Melaleuca stereophloia*, over low sparse chenopod shrubland of *Atriplex vesicaria*, *Rhagodia drummondii*, *Maireana eriosphaera*, *Enchylaena tomentosa* var. *tomentosa* and *Sclerolaena diacantha*, over low isolated clumps of tussock grasses of *Austrostipa elegantissima*, over low isolated clumps of forbs of mixed species including *Gunniopsis quadrifida*, *Rhodanthe chlorocephala* subsp. *splendida*, *Calandrinia granulifera*, *Gnephosis angianthoides* and **Mesembryanthemum nodiflorum*, on slightly saline brown sandy clay, on flats and lower slopes	-	-	-	Perenjori_631 Yalgoo_364 Yarra Yarra_142
M	Occasional low isolated clumps of shrubs of *Lawrencia squamata* and *Frankenia pauciflora*, over low open to sparse samphire shrubland of mixed species including *Tecticornia disarticulata*, *Tecticornia loriae*, *Tecticornia* sp. 'Karara 4' and *Tecticornia peltata*, over low sparse chenopod shrubland of *Atriplex vesicaria*, *Maireana eriosphaera*, *Maireana glomerifolia* and *Maireana atkinsiana*, over isolated clumps of forbs of mixed species including *Senecio lacustrinus*, *Pogonolepis muelleriana*, *Stenopetalum salicola*, *Lawrencia squamata*, *Siemssenia capillaris* and *Cotula cotuloides*, on brown or orange sandy clay, in saline depressions.	-	-	-	Jibberding_631

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
N	Low sparse samphire shrubland of mixed species, including *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. 'Karara 1' (PU), *Tecticornia* sp. 'Karara 2' (PU), and occasionally *Tecticornia peltata*, over low isolated clumps of forbs of mixed species including *Triglochin mucronata*, *Senecio lacustrinus*, *Cotula cotuloides*, **Parapholis incurva* and *Gunniopsis septifraga*, on grey-brown or brown sandy clay, in saline depressions.	-	-	-	Jibberding_631 Perenjori_631
O	Occasional low isolated trees of *Allocasuarina acutivalvis* subsp. *prinsepiana*, over tall sparse shrubland of mixed species including *Acacia assimilis* subsp. *assimilis*, *Calycopeplus paucifolius*, *Melaleuca nematophylla*, and/or *Acacia ramulosa* var. *ramulosa*, over mid sparse shrubland of mixed species including *Eremophila clarkei*, *Philotheca brucei* subsp. *brucei*, *Philotheca sericea*, *Aluta aspera* subsp. *aspera* and *Eremophila latrobei* subsp. *latrobei*, over low isolated shrubs of *Xanthosia kochii*, *Sida* sp. dark green fruits (S. van Leeuwen 2260) and *Hibbertia arcuata*, over low isolated clumps of forbs of mixed species including *Waitzia acuminata* var. *acuminata*, *Podolepis lessonii* and *Lawrencella rosea*, on red-brown silty loam or silty clay loam with ironstone, BIF or granite stones, and sometimes with ironstone, BIF or granite outcropping, on slopes and crests.	Y	-	1, 2, 3, 4, 12	Jibberding_374 Jibberding_437 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420
P	Occasional low isolated trees of *Allocasuarina acutivalvis* subsp. *prinsepiana*, over tall shrubland to open shrubland of mixed species including *Acacia assimilis* subsp. *assimilis*, *Melaleuca nematophylla*, *Acacia latior*, *Calycopeplus paucifolius* and *Acacia sibina*, over mid shrubland to open shrubland dominated by *Aluta aspera* subsp. *hesperia* and occasionally with *Philotheca sericea*, *Hibbertia arcuata* and/or *Grevillea paradoxa*, over occasional low open shrubland of mixed species including *Philotheca deserti* subsp. *deserti* and *Xanthosia kochii*, over low isolated clumps of tussock grasses of *Monachather paradoxus* and *Amphipogon caricinus* var. *caricinus*, over low sparse forbland of mixed species including *Erodium cygnorum*, *Bellida graminea*, *Trachymene ornata*, *Cheilanthes sieberi* subsp. *sieberi* and *Lawrencella rosea*, on red or red-brown clay loam or silty loam with ironstone or BIF surface stones, and occasionally with ironstone or BIF outcropping, on lower to upper slopes.	Y	-	6, 8, 10	Jibberding_420 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
Q	Occasional low open woodland of *Eucalyptus arctata* and/or *Eucalyptus kochii* subsp. *amaryssia*, over tall shrubland to open shrubland of mixed species dominated by *Acacia latior*, *Acacia sibina*, and occasionally *Melaleuca leiocarpa*, *Acacia longispinea* and *Melaleuca hamata*, over occasional mid isolated shrubs of mixed species including *Aluta aspera* subsp. *hesperia* and *Hakea recurva* subsp. *recurva*, over low isolated shrubs of mixed species including *Philotheca deserti* subsp. *deserti*, *Cryptandra imbricata*, *Prostanthera prostantheroides* and *Enekbatus stowardii*, over low sparse tussock grassland of *Monachather paradoxus*, *Amphipogon caricinus* var. *caricinus* and occasionally *Austrostipa elegantissima*, over low sparse forbland to isolated clumps of forbs of mixed species including *Bellida graminea*, *Erodium cygnorum*, *Dianella revoluta* var. *divaricata* and *Cheilanthes sieberi* subsp. *sieberi*, on brown or red clay loam, sandy clay loam or silty loam with ironstone surface stones, on lower slopes, plains and flats.	Y	-	7, 9, 13	Jibberding_374 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420 Yarra Yarra_142
R	Occasional low open woodland of *Allocasuarina acutivalvis* subsp. *prinsepiana* and/or *Eucalyptus kochii*, over tall shrubland to open shrubland of mixed species including *Acacia ramulosa* var. *ramulosa*, *Melaleuca hamata*, *Acacia latior*, *Acacia incognita* and *Acacia sibina*, over mid sparse shrubland to isolated clumps of shrubs of mixed species including *Eremophila clarkei*, *Acacia tetragonophylla*, *Eremophila eriocalyx*, *Aluta aspera* subsp. *hesperia* and *Eremophila latrobei* subsp. *latrobei*, over low sparse shrubland to isolated clumps of shrubs of mixed species including *Philotheca deserti* subsp. *deserti*, *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207), *Hibbertia arcuata*, and occasionally *Chamelaucium pauciflorum* subsp. Perenjori (B.J. Conn 2181) and *Olearia humilis*, over low sparse tussock grassland of *Amphipogon caricinus* var. *caricinus*, over low sparse forbland to isolated clumps of forbs of mixed species including *Erodium cygnorum*, *Cheilanthes sieberi* subsp. *sieberi*, *Bellida graminea*, *Waitzia acuminata* var. *acuminata* and *Gilruthia osbornei*, on red or red-brown clay loam with ironstone and sometimes quartz surface stones, on plains and simple slopes.	Y	-	-	Jibberding_420 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
S	Tall sparse shrubland to isolated clumps of shrubs of mixed species including *Acacia sibina*, *Acacia ramulosa* var. *ramulosa*, *Acacia tetragonophylla*, *Hakea recurva* subsp. *recurva* and *Acacia burkittii*, over mid shrubland to sparse shrubland of mixed species including *Aluta aspera* subsp. *hesperia*, *Eremophila forrestii* subsp. *forrestii*, *Malleostemon tuberculatus* and *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207), over low sparse shrubland to isolated clumps of shrubs of mixed species including *Pimelea spiculigera* var. *thesioides*, *Mirbelia microphylla*, *Hibbertia arcuata* and *Grevillea pityophylla*, over low isolated clumps of tussock grasses of *Amphipogon caricinus* var. *caricinus*, *Monachather paradoxus* and/or *Austrostipa elegantissima*, over low sparse forbland to isolated clumps of forbs of mixed species including *Chthonocephalus pseudevax*, *Bellida graminea*, *Goodenia rosea*, *Brachyscome ciliocarpa* and *Podolepis lessonii*, on red or brown clay loam, sandy clay loam or silty loam with ironstone or BIF surface stones, on flats, plains and slopes.	Y	-	11	Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419
T	Tall open to sparse shrubland of mixed species including *Acacia sibina*, *Melaleuca hamata*, *Acacia latior*, *Acacia acuminata* and *Hysterobaeckea setifera* subsp. *setifera*, over mid isolated shrubs of mixed species including, *Malleostemon tuberculatus*, *Philotheca glabra*, *Philotheca deserti* subsp. *deserti* and *Allocasuarina acutivalvis* subsp. *prinsepiana*, over low isolated clumps of shrubs of mixed species including *Grevillea granulosa* (P3), *Hibbertia stenophylla*, *Darwinia capitella* and *Malleostemon roseus*, over low isolated clumps of tussock grasses of *Amphipogon caricinus* var. *caricinus*, over low sparse sedgeland of *Ecdeiocolea monostachya*, over low sparse forbland of mixed species including *Cheilanthes sieberi* subsp. *sieberi*, *Bellida graminea*, *Trachymene cyanopetala*, *Borya sphaerocephala* and *Lawrencella davenportii*, on orange, brown or red sandy loam or sandy clay loam, occasionally with ironstone and quartz surface stones, on plains and flats.	-	-	-	Yalgoo_364 Yalgoo_419 Yalgoo_420
U	Low woodland of *Eucalyptus clelandiorum* or tall shrubland of *Melaleuca acutifolia*, over low sparse chenopod shrubland of mixed species dominated by *Maireana thesioides*, *Maireana carnosa*, *Sclerolaena diacantha* and *Maireana georgei*, on red-brown silty clay loam, occasionally with calcrete stones, in drainage depressions and on the edges of saline claypans.	-	-	19d	Yalgoo_41 Yalgoo_125

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
V	Tall open shrubland to shrubland of *Acacia tetragonophylla*, *Acacia quadrimarginea* and occasionally *Allocasuarina dielsiana*, *Acacia ramulosa* var. *ramulosa* and *Hakea recurva* subsp. *recurva*, over mid open shrubland of mixed species including *Dodonaea inaequifolia*, *Grevillea paradoxa*, *Senna glutinosa* subsp. *chatelainiana* and *Acacia kochii*, occasionally over low isolated shrubs of *Solanum cleistogamum* and *Ptilotus obovatus*, over low open forbland dominated by *Borya sphaerocephala*, on red or brown silty soil with ironstone and granite surface stones, on low to mid slopes.	-	-	-	Perenjori_693 Perenjori_1155
W	Low woodland of *Eucalyptus ebbanoensis* subsp. *ebbanoensis*, over tall shrubland to open shrubland of mixed species including *Senna charlesiana*, *Acacia ramulosa* var. *ramulosa*, *Grevillea obliquistigma* subsp. *obliquistigma* and *Acacia burkittii*, over low open shrubland of mixed species including *Acacia acanthoclada* subsp. *glaucescens*, *Cryptandra apetala* var. *apetala*, *Eremophila clarkei* and *Acacia ?nigripilosa* subsp. *nigripilosa*, on red-brown silty-sands with ironstone surface stones, on low to mid slopes.	-	-	-	Perenjori_693 Perenjori_1155
X	Occasional low isolated trees of *Eucalyptus arctata*, over tall shrubland dominated by *Senna charlesiana* and occasionally *Acacia stereophylla* var. *stereophylla*, *Grevillea obliquistigma* subsp. *obliquistigma* and *Melaleuca cordata*, over mid to low open to sparse shrubland of *Aluta aspera* subsp. *hesperia*, *Eremophila clarkei*, *Hakea multilineata*, *Hemigenia botryphylla* and *Ptilotus obovatus*, on red-brown silty loam with ironstone and granite surface stones, on low to mid slopes.	-	-	-	Perenjori_693
Y	Low woodland to open woodland of *Eucalyptus ebbanoensis* subsp. *ebbanoensis* and/or *Eucalyptus arctata*, over tall open shrubland of *Acacia ramulosa* var. *ramulosa*, *Acacia stereophylla* var. *stereophylla*, *Acacia acanthoclada* subsp. *glaucescens* and occasionally *Grevillea obliquistigma* subsp. *obliquistigma* and *Senna charlesiana*, over occasional mid sparse shrubland of *Senna glutinosa* subsp. *chatelainiana*, *Hakea recurva* subsp. *recurva*, *Ptilotus schwartzii* and *Chenopodium gaudichaudianum*, over low isolated clumps of tussock grasses of *Austrostipa elegantissima* and *Monachather paradoxus*, on red, brown or orange loam or silty-sands with ironstone surface stones, on plains and lower slopes.	-	-	-	Perenjori_352

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
Z	Low open woodland of *Eucalyptus kochii* subsp. *plenissima* and occasionally *Eucalyptus loxophleba* subsp. *supralaevis*, over tall open shrubland of *Acacia anthochaera*, *Acacia ramulosa* var. *ramulosa*, *Hakea recurva* subsp. *recurva* and *Bursaria occidentalis*, over low open chenopod shrubland of *Chenopodium gaudichaudianum*, *Maireana brevifolia*, *Maireana georgei* and *Maireana ?planifolia*, over low isolated clumps of tussock grasses of *Austrostipa elegantissima*, on red-brown sandy loam, on flats and plains.	-	-	-	Perenjori_352
AA	Occasional low woodland to open woodland of *Eucalyptus loxophleba* subsp. *supralaevis*, over tall closed shrubland to open shrubland of *Allocasuarina campestris* with *Acacia acuminata*, *Acacia tetragonophylla*, *Melaleuca nematophylla* and/or *Hakea scoparia*, over mid open to sparse shrubland of mixed species including *Baeckea* sp. Perenjori (J.W. Green 1516) (P2), *Ricinocarpos velutinus* and *Solanum ellipticum*, on rocky brown clay-silt with heavy quartz, on slopes.	-	-	-	Billeranga_692
AB†	Tall open shrubland to sparse shrubland of *Callitris arenaria*, *Hakea scoparia* subsp. *scoparia* and *Allocasuarina campestris*, over mid to low shrubland to open shrubland of mixed species including *Melaleuca tinkeri*, *Dodonaea scurra* (P1), *Cryptandra ?myriantha* and *Scholtzia* spp., over low open sedgeland of *Lepidosperma tenue* and *Ecdeiocolea monostachya*, on brown or yellow-brown sand with laterite gravel, on slopes.	-	-	-	Mingenew_352
HMVT A	Low open chenopod shrubland of mixed species dominated by *Maireana brevifolia* and *Tecticornia pergranulata* subsp. *pergranulata* and occasionally *Enchylaena tomentosa* var. *tomentosa*, over low forbland of **Mesembryanthemum nodiflorum*, on saline red-brown sandy loam on flats.	-	-	-	Occurs within Perenjori_352, but the species composition does not reflect that of the VSA; this HMVT was likely defined and mapped at too small a scale to be captured by the pre-European mapping

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
HMVT B	Low open woodland to isolated trees of *Eucalyptus arctata*, over tall shrubland of mixed species including *Acacia sibina*, *Grevillea obliquistigma* subsp. *obliquistigma*, *Melaleuca ?atroviridis* and *Acacia prainii*, over mid sparse shrubland of *Acacia dielsii* and *Grevillea extorris*, over low open sedgeland of *Ecdeiocolea monostachya*, on yellow sand on flats.	-	-	-	Perenjori_551
HMVT C	Tall open shrubland of mixed species including *Acacia anthochaera*, *Acacia acuminata*, *Acacia ?inceana* subsp. *conformis* and *Melaleuca eleuterostachya*, over low open chenopod shrubland of mixed species including *Enchylaena tomentosa* var. *tomentosa*, *Maireana brevifolia*, *Salsola australis* and *Rhagodia drummondii*, over low isolated clumps of tussock grasses of *Aristida ?contorta*, *Austrostipa elegantissima* and *Austrostipa nodosa*, on slightly saline red sand on flats.	-	-	-	Perenjori_352
HMVT D	Mid forest to low open woodland of *Eucalyptus camaldulensis* and/or *Eucalyptus loxophleba* subsp. *loxophleba*, over tall open to sparse shrubland of mixed species including *Hakea preissii*, *Acacia rostellifera* and/or *Acacia acuminata*, over occasional low sparse chenopod shrubland of mixed species including *Maireana brevifolia*, *Salsola australis*, *Enchylaena tomentosa* var. *tomentosa* and **Mesembryanthemum nodiflorum*, over low tussock grassland of mixed species including **Avena barbata*, **Ehrharta calycina*, **Cynodon dactylon* and **Bromus diandrus*, on red-brown sandy clay loam, on drainage lines and flats.	-	Y	-	Mingenew_354
HMVT E	Mid to low open woodland of *Eucalyptus loxophleba* subsp. *loxophleba*, over tall open shrubland of mixed species including *Acacia acuminata*, *Acacia tetragonophylla*, *Acacia aestivalis* and *Hakea recurva* subsp. *recurva*, over low isolated chenopod shrubs of *Maireana brevifolia*, *Chenopodium gaudichaudianum* and *Rhagodia drummondii*, over low open tussock grassland dominated by **Avena barbata* and **Bromus diandrus*, on red sandy loam or clay loam, on lower to upper slopes.	-	Y	-	Mingenew_354
HMVT F	Mid open woodland of *Eucalyptus loxophleba* subsp. *loxophleba*, over tall shrubland to open shrubland of *Acacia colletioides* and *Acacia acuminata*, over low open to sparse chenopod shrubland of mixed species including **Mesembryanthemum nodiflorum*, *Rhagodia drummondii*, *Maireana brevifolia*, *Atriplex semibaccata* and *Salsola australis*, over low open tussock grassland dominated by **Avena barbata*, **Bromus diandrus*, **Lolium ?rigidum* and **Hordeum ?glaucum*, on red loamy clay on lower slopes.	-	Y	-	Mingenew_354

VT	Description	Mine Area	Wheatbelt Area	Equivalent Woodman Environmental FCT	Equivalent Pre-European VSA
HMVT G	Mid isolated shrubs of *Acacia acuminata*, *Acacia tetragonophylla* and *Hakea recurva* subsp. *recurva*, over mid to low closed tussock grassland and forbland of agricultural weeds, on red-brown loam on gently undulating plains.	-	Y	-	Mingenew_354 Perenjori_631
CP	Occasional low open forbland of *Myriophyllum decussatum* on red clay in claypans. Bare clay that is completely devoid of vegetation when dry. It periodically fills with water, and in the subsequent weeks while water is still present (or when the clay is still waterlogged), *Myriophyllum decussatum* is present.	-	-	33	Yalgoo_363
PL	Planted trees and shrubs, predominately *Eucalyptus* spp., on plains in pasture and road verges.	-	Y	-	N/A
Water	Water in salt lakes and clay pans.	-	-	-	N/A
CL	Land cleared for roads, tracks, mining, infrastructure and agriculture. May contain occasional isolated native or introduced plants.	Y	Y	C	N/A

Source: Umwelt (2025).

'*' Indicates an introduced taxon.

[ǂ] VT AB is only located within a small portion of the potential indirect impact zone (adjacent to the Borefield Corridor). There is one P1 species (*Dodonaea scurra*) known occur within other occurrences of this VT, however the nearest known record within VT AB is1.6 km north of the Combined Proposal DE.

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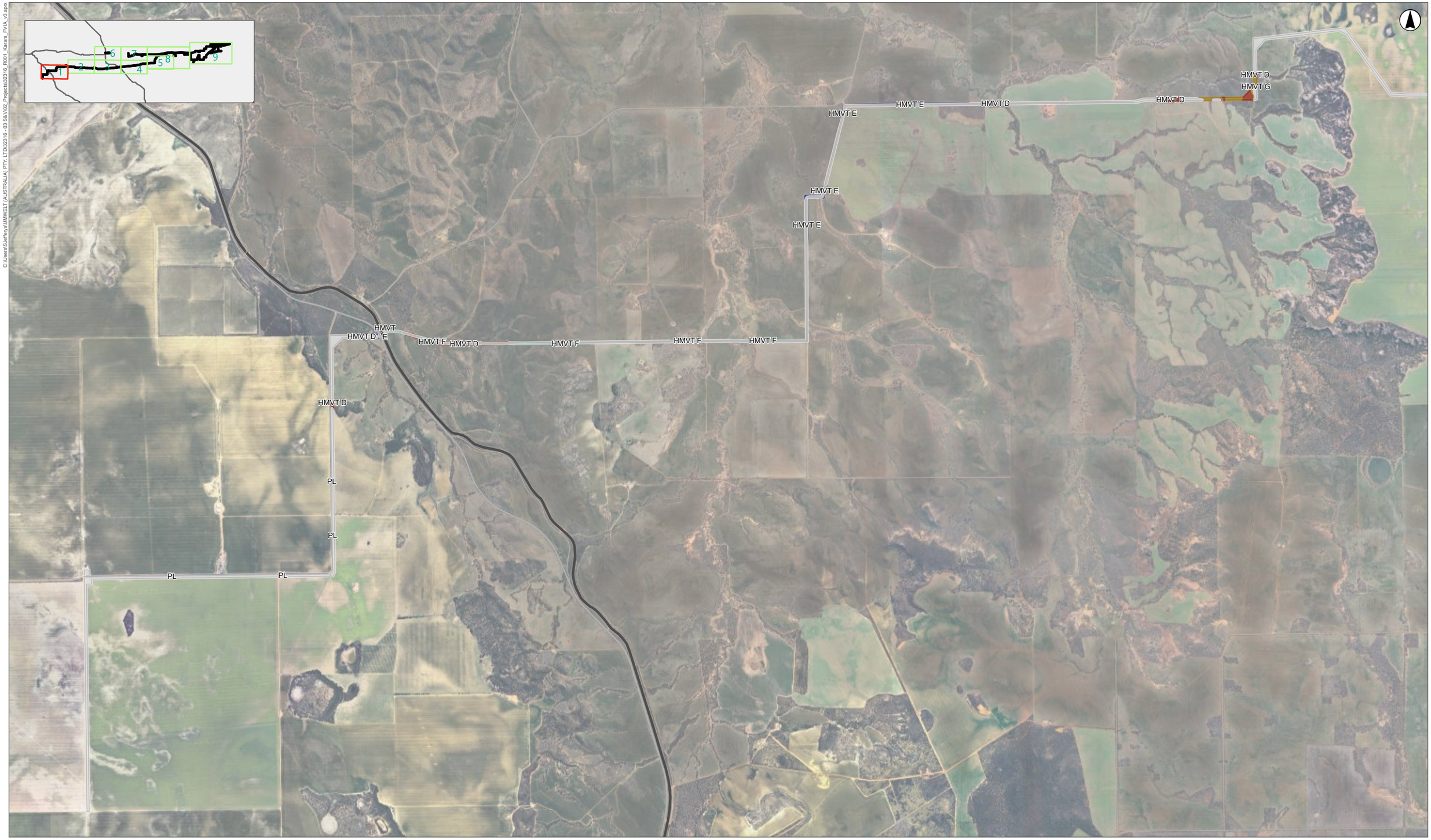

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Vegetation Type

- HMVT D
- HMVT E
- HMVT F
- HMVT G
- PL
- CL

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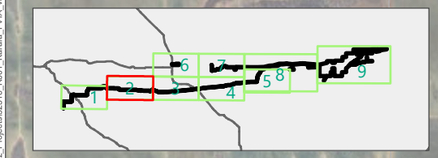
FIGURE 3.2

Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 1

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50



Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Watercourse
- Major Watercourse

Vegetation Type

- I
- L
- N
- AA
- HMVT G
- CL

FIGURE 3.2
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 2

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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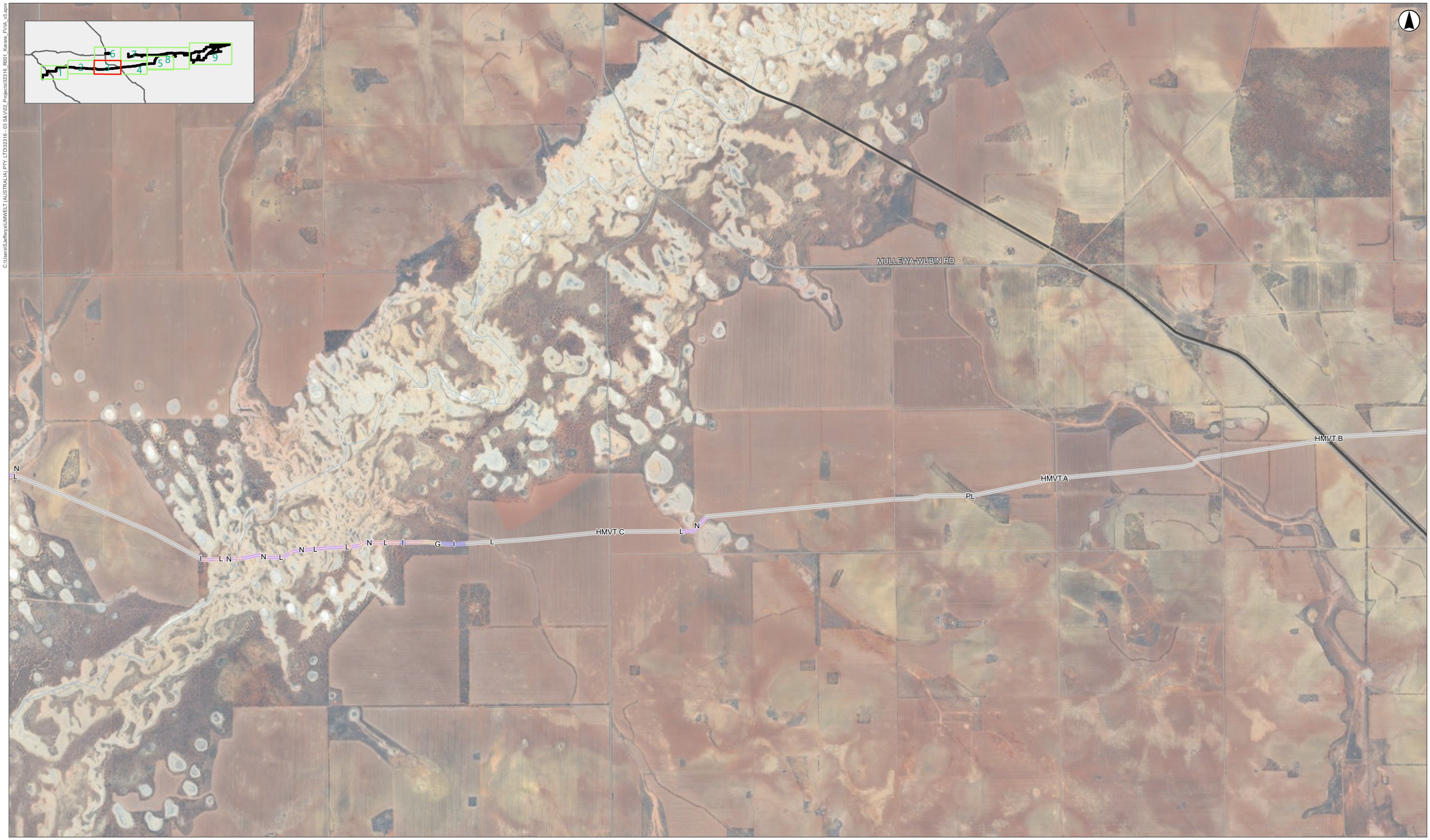

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway
- Major Watercourse

Vegetation Type

- G
- I
- L
- N
- HMVT A
- HMVT B
- HMVT C
- PL
- CL

FIGURE 3.2
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 3

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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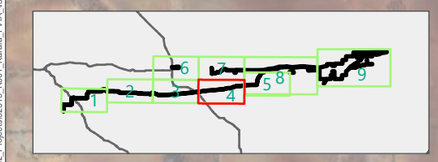

G

HMVT
G A

PL

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Vegetation Type

- G
- HMVT A
- PL
- CL

FIGURE 3.2
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 4

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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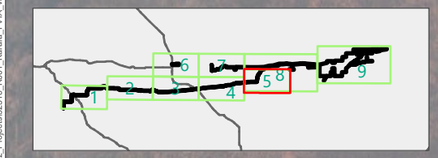

G O R

WEELHAMBY LAKE

O

E

E G

Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

Vegetation Type

- E
- G
- O
- R
- CL

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FIGURE 3.2

Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 5

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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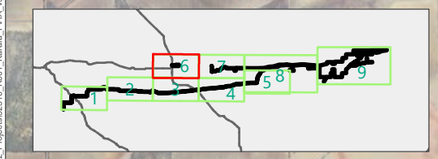

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway
- Major Watercourse

Vegetation Type

- G
- L
- Q
- CL

FIGURE 3.2
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 6

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

Vegetation Type

- A
- E
- G
- I
- N
- P
- R
- V
- W
- X
- Y
- Z
- CL

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FIGURE 3.2
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 7

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

Vegetation Type

A, D, E, F, G, I, L, M, N, O, P, Q, R, S, T, Water, CL

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FIGURE 3.2
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 8

0 1 2 km
Scale 1:80,000 at A4
GDA2020 MGA Zone 50

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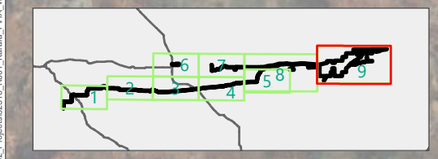

MUNGADA RD

Legend

Combined Proposal Development Envelope

Minor Road

Vegetation Type

A
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FIGURE 3.2

Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 9

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Scale 1:80,000 at A4

GDA2020 MGA Zone 50

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Vegetation Type

A Tall sparse shrubland to isolated shrubs of mixed species including *Acacia acuminata/Acacia burkittii, Acacia tetragonophylla, Melaleuca hamata* and/or *Acacia umbraculiformis* over mid sparse shrubland of mixed species including *Thryptomene costata* and *Malleostemon tuberculatus*, over low sparse shrubland of mixed species including *Mirbelia microphylla, Solanum lasiophyllum* and *Eremophila eriocalyx*, over low sparse forbland of mixed species including *Schoenia cassiniana, Borya sphaerocephala, Erodium cygnorum* and *Rhodanthe chlorocephala* subsp. *splendida*, on red-brown clay loam, sometimes with granite surface stones, on plains and gentle slopes

B Low open forbland of *Borya sphaerocephala* and other species including *Rhodanthe chlorocephala* subsp. *splendida, Calandrinia granulifera, Calotis hispidula* and *Chthonocephalus pseudevax*, in pockets of red clayey sand on and immediately adjacent to granite sheet outcropping

C Low open woodland of *Eucalyptus kochii* subsp. *plenissima* or *Eucalyptus loxophleba* subsp. *supralaevis*, over occasional tall isolated clumps of shrubs of *Acacia ramulosa* var. *ramulosa, Melaleuca eleuterostachya, Acacia assimilis* subsp. *assimilis, Acacia burkittii*, and/or *Acacia colletioides*, over low isolated clumps of shrubs of *Ptilotus obovatus* and *Solanum lasiophyllum*, over low open tussock grassland of *Monachather paradoxus*, over low isolated clumps of forbs of mixed species including *Erodium cygnorum, Crassula colorata* var. *colorata, Helipterum craspedioides, Cephalipterum drummondii* and *Chthonocephalus pseudevax*, on red clayey sand or clay loam, sometimes with ironstone or quartz surface stones, on flats and plains

D Occasional low woodland to open woodland of *Eucalyptus kochii, Callitris columellaris*, and/or *Eucalyptus loxophleba* subsp. *supralaevis*, over tall open shrubland of mixed species including *Acacia tetragonophylla, Acacia ramulosa* var. *ramulosa, Acacia acuminata, Acacia obtecta* and *Exocarpos aphyllus*, over mid sparse shrubland of mixed species including *Hakea recurva* subsp. *recurva, Senna artemisioides* subsp. *filifolia, Eremophila clarkei* and *Acacia assimilis* subsp. *assimilis*, over low sparse shrubland of mixed species including *Rhagodia drummondii, Ptilotus obovatus* and *Olearia humilis*, over low sparse tussock grassland of *Austrostipa elegantissima* and *Monachather paradoxus*, over low sparse forbland of mixed species including *Erodium cygnorum, Cephalipterum drummondii* and *Gilruthia osbornei*, on red or red-brown sandy clay loam, sometimes with occasional ironstone or quartz surface stones, on flats and plains

E Tall open to sparse shrubland of mixed species including *Acacia ramulosa* var. *ramulosa, Acacia tetragonophylla, Hakea recurva* subsp. *recurva, Acacia assimilis* subsp. *assimilis* and *Eremophila clarkei*, over low isolated clumps of shrubs of mixed species including *Maireana planifolia, Ptilotus obovatus, Solanum lasiophyllum* and *Sida* sp. dark green fruits (S. van Leeuwen 2260), over low isolated clumps of grasses of *Austrostipa elegantissima*, over low sparse forbland of mixed species including *Erodium cygnorum, Gilruthia osbornei, Cephalipterum drummondii, Calotis multicaulis* and *Panaetia lessonii*, on red clay loam, usually with ironstone, granite and/or quartz surface stones, on undulating plains and flats

F Tall sparse shrubland of *Acacia tetragonophylla, Acacia umbraculiformis, Acacia ramulosa* var. *ramulosa* and occasionally *Acacia burkittii* and *Thryptomene costata*, over mid isolated shrubs of mixed species including *Hakea recurva* subsp. *recurva* and *Acacia kochii*, over low sparse shrubland of *Solanum lasiophyllum* and *Ptilotus obovatus*, over low sparse forbland of mixed species including *Borya sphaerocephala, Rhodanthe chlorocephala, Myriocephalus gueriniae* and *Goodenia cycnopotamica*, on red or red-brown clay loam or silty loam, sometimes with small amounts of granite outcropping and granite surface stones, on simple slopes and plains

G Mid to low woodland to open woodland of *Eucalyptus loxophleba* subsp. *supralaevis* and occasionally *Eucalyptus kochii*, over tall sparse shrubland of mixed species including *Acacia tetragonophylla* and occasionally *Acacia ramulosa* var. *ramulosa, Exocarpos aphyllus, Acacia obtecta* and *Acacia burkittii*, over an occasional mid sparse shrubland of *Senna* sp. Austin (A. Strid 20210), *Scaevola spinescens* and/or *Dodonaea inaequifolia*, over low isolated clumps of shrubs of mixed species including *Senna artemisioides* subsp. *filifolia, Ptilotus obovatus* and *Pimelea microcephala* subsp. *microcephala*, over low isolated clumps of chenopod shrubs of mixed species including *Rhagodia drummondii, Sclerolaena fusiformis, Maireana georgei, Maireana carnosa* and *Enchylaena lanata*, over low isolated clumps of tussock grasses of *Austrostipa elegantissima*, over low isolated clumps of forbs of mixed species including **Mesembryanthemum nodiflorum, Cephalipterum drummondii, Erodium cygnorum* and *Gilruthia osbornei*, on red or red-brown clay loam or silty clay loam, usually with ironstone and/or granite and/or quartz surface stones, on flats and plains

H Occasional low open woodland to isolated trees of mixed species including *Eucalyptus loxophleba* subsp. *supralaevis, Eucalyptus salubris, Eucalyptus clelandiorum* or *Eucalyptus kochii* subsp. *amaryssia*, over tall open to sparse shrubland of mixed species including *Acacia obtecta, Acacia ramulosa* var. *ramulosa, Acacia latior* and *Melaleuca leiocarpa*, over mid isolated shrubs of mixed species including *Acacia tetragonophylla, Exocarpos aphyllus* and *Acacia exocarpoides*, over occasional low isolated clumps of shrubs of *Ptilotus obovatus, Senna charlesiana, Persoonia pentasticha* (P3) and *Olearia pimeleoides*, over low isolated clumps of chenopod shrubs of mixed species dominated by *Rhagodia drummondii* and *Sclerolaena fusiformis* and occasionally *Maireana georgei* and *Enchylaena lanata*, on red-brown clay loam, with occasional ironstone surface stones, on flats and plains

I Low open woodland of *Eucalyptus horistes* and *Eucalyptus loxophleba* subsp. *supralaevis*, over tall open shrubland of *Melaleuca stereophloia*, over mid sparse shrubland of mixed species including *Acacia acuaria* and *Scholtzia uniovulata*, over mid sparse tussock grassland of *Austrostipa elegantissima*, over low isolated forbs of mixed species including *Goodenia rosea, Rhodanthe chlorocephala* subsp. *splendida, Lawrencella davenportii, Podolepis aristata* subsp. *aristata* and *Waitzia acuminata* var. *acuminata*, on red sandy clay, on plains and low rises

J Occasional tall to mid isolated shrubs of *Acacia obtecta, Duma florulenta, Exocarpos aphyllus* and *Eremophila glabra*, over low sparse shrubland of *Ptilotus obovatus* and *Corchorus* sp., over mid open to sparse samphire shrubland of *Tecticornia disarticulata*, over low sparse chenopod shrubland of mixed species including *Maireana carnosa, Sclerolaena diacantha, Sclerolaena fusiformis, Atriplex semilunaris* and *Maireana brevifolia*, on brown or red-brown clay loam or silty clay loam, in saline claypans

K Occasional low woodland to open woodland of mixed species including *Eucalyptus clelandiorum, Eucalyptus loxophleba* subsp. *supralaevis* and/or *Eucalyptus salubris*, over tall sparse shrubland of mixed species including *Eremophila oppositifolia* subsp. *angustifolia, Acacia erinacea, Exocarpos aphyllus* and *Eremophila pantonii*, over low isolated clumps of shrubs of mixed species including *Senna stowardii, Scaevola spinescens, Ptilotus obovatus* and *Olearia pimeleoides*, over low isolated clumps of chenopod shrubs of *Sclerolaena fusiformis, Rhagodia drummondii, Maireana thesioides, Maireana georgei* and *Maireana marginata*, on red-brown silty clay loam or clay loam, sometimes with ironstone surface stones, on plains

L Tall sparse shrubland of *Melaleuca acutifolia* and occasionally *Melaleuca eleuterostachya, Acacia eremaea* and *Melaleuca stereophloia*, over low sparse chenopod shrubland of *Atriplex vesicaria, Rhagodia drummondii, Maireana eriosphaera, Enchylaena tomentosa* var. *tomentosa* and *Sclerolaena diacantha*, over low isolated clumps of tussock grasses of *Austrostipa elegantissima*, over low isolated clumps of forbs of mixed species including *Gunniopsis quadrifida, Rhodanthe chlorocephala* subsp. *splendida, Calandrinia granulifera, Gnephosis angianthoides* and **Mesembryanthemum nodiflorum*, on slightly saline brown sandy clay, on flats and lower slopes

M Occasional low isolated clumps of shrubs of *Lawrencia squamata* and *Frankenia pauciflora*, over low open to sparse samphire shrubland of mixed species including *Tecticornia disarticulata, Tecticornia loriae, Tecticornia* sp. 'Karara 4' and *Tecticornia peltata*, over low sparse chenopod shrubland of *Atriplex vesicaria, Maireana eriosphaera, Maireana glomerifolia* and *Maireana atkinsiana*, over isolated clumps of forbs of mixed species including *Senecio lacustrinus, Pogonolepis muelleriana, Stenopetalum salicola, Lawrencia squamata, Siemssenia capillaris* and *Cotula cotuloides*, on brown or orange sandy clay, in saline depressions

FIGURE 3.2

LEGEND: Overview of Vegetation Types of the Combined Proposal Development Envelope

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Vegetation Type

N — Low sparse samphire shrubland of mixed species, including *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. 'Karara 1' (PU), *Tecticornia* sp. 'Karara 2' (PU), and occasionally *Tecticornia peltata*, over low isolated clumps of forbs of mixed species including *Triglochin mucronata*, *Senecio lacustrinus*, *Cotula cotuloides*, **Parapholis incurva* and *Gunniopsis septifraga*, on grey-brown or brown sandy clay, in saline depressions

O — Occasional low isolated trees of *Allocasuarina acutivalvis* subsp. *prinsepiana*, over tall sparse shrubland of mixed species including *Acacia assimilis* subsp. *assimilis*, *Calycopeplus paucifolius*, *Melaleuca nematophylla*, and/or *Acacia ramulosa* var. *ramulosa*, over mid sparse shrubland of mixed species including *Eremophila clarkei*, *Philotheca brucei* subsp. *brucei*, *Philotheca sericea*, *Aluta aspera* subsp. *aspera* and *Eremophila latrobei* subsp. *latrobei*, over low isolated shrubs of *Xanthosia kochii*, *Sida* sp. dark green fruits (S. van Leeuwen 2260) and *Hibbertia arcuata*, over low isolated clumps of forbs of mixed species including *Waitzia acuminata* var. *acuminata*, *Podolepis lessonii* and *Lawrencella rosea*, on red-brown silty loam or silty clay loam with ironstone, BIF or granite stones, and sometimes with ironstone, BIF or granite outcropping, on slopes and crests

P — Occasional low isolated trees of *Allocasuarina acutivalvis* subsp. *prinsepiana*, over tall shrubland to open shrubland of mixed species including *Acacia assimilis* subsp. *assimilis*, *Melaleuca nematophylla*, *Acacia latior*, *Calycopeplus paucifolius* and *Acacia sibina*, over mid shrubland to open shrubland dominated by *Aluta aspera* subsp. *hesperia* and occasionally with *Philotheca sericea*, *Hibbertia arcuata* and/or *Grevillea paradoxa*, over occasional low open shrubland of mixed species including *Philotheca deserti* subsp. *deserti* and *Xanthosia kochii*, over low isolated clumps of tussock grasses of *Monachather paradoxus* and *Amphipogon caricinus* var. *caricinus*, over low sparse forbland of mixed species including *Erodium cygnorum*, *Bellida graminea*, *Trachymene ornata*, *Cheilanthes sieberi* subsp. *sieberi* and *Lawrencella rosea*, on red or red-brown clay loam or silty loam with ironstone or BIF surface stones, and occasionally with ironstone or BIF outcropping, on lower to upper slopes

Q — Occasional low open woodland of *Eucalyptus arctata* and/or *Eucalyptus kochii* subsp. *amaryssia*, over tall shrubland to open shrubland of mixed species dominated by *Acacia latior*, *Acacia sibina*, and occasionally *Melaleuca leiocarpa*, *Acacia longispinea* and *Melaleuca hamata*, over occasional mid isolated shrubs of mixed species including *Aluta aspera* subsp. *hesperia* and *Hakea recurva* subsp. *recurva*, over low isolated shrubs of mixed species including *Philotheca deserti* subsp. *deserti*, *Cryptandra imbricata*, *Prostanthera prostantheroides* and *Enekbatus stowardii*, over low sparse tussock grassland of *Monachather paradoxus*, *Amphipogon caricinus* var. *caricinus* and occasionally *Austrostipa elegantissima*, over low sparse forbland to isolated clumps of forbs of mixed species including *Bellida graminea*, *Erodium cygnorum*, *Dianella revoluta* var. *divaricata* and *Cheilanthes sieberi* subsp. *sieberi*, on brown or red clay loam, sandy clay loam or silty loam with ironstone surface stones, on lower slopes, plains and flats

R — Occasional low open woodland of *Allocasuarina acutivalvis* subsp. *prinsepiana* and/or *Eucalyptus kochii*, over tall shrubland to open shrubland of mixed species including *Acacia ramulosa* var. *ramulosa*, *Melaleuca hamata*, *Acacia latior*, *Acacia incognita* and *Acacia sibina*, over mid sparse shrubland to isolated clumps of shrubs of mixed species including *Eremophila clarkei*, *Acacia tetragonophylla*, *Eremophila eriocalyx*, *Aluta aspera* subsp. *hesperia* and *Eremophila latrobei* subsp. *latrobei*, over low sparse shrubland to isolated clumps of shrubs of mixed species including *Philotheca deserti* subsp. *deserti*, *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207), *Hibbertia arcuata*, and occasionally *Chamelaucium pauciflorum* subsp. Perenjori (B.J. Conn 2181) and *Olearia humilis*, over low sparse tussock grassland of *Amphipogon caricinus* var. *caricinus*, over low sparse forbland to isolated clumps of forbs of mixed species including *Erodium cygnorum*, *Cheilanthes sieberi* subsp. *sieberi*, *Bellida graminea*, *Waitzia acuminata* var. *acuminata* and *Gilruthia osbornei*, on red or red-brown clay loam with ironstone and sometimes quartz surface stones, on plains and simple slopes

S — Tall sparse shrubland to isolated clumps of shrubs of mixed species including *Acacia sibina*, *Acacia ramulosa* var. *ramulosa*, *Acacia tetragonophylla*, *Hakea recurva* subsp. *recurva* and *Acacia burkittii*, over mid shrubland to sparse shrubland of mixed species including *Aluta aspera* subsp. *hesperia*, *Eremophila forrestii* subsp. *forrestii*, *Malleostemon tuberculatus* and *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207), over low sparse shrubland to isolated clumps of shrubs of mixed species including *Pimelea spiculigera* var. *thesioides*, *Mirbelia microphylla*, *Hibbertia arcuata* and *Grevillea pityophylla*, over low isolated clumps of tussock grasses of *Amphipogon caricinus* var. *caricinus*, *Monachather paradoxus* and/or *Austrostipa elegantissima*, over low sparse forbland to isolated clumps of forbs of mixed species including *Chthonocephalus pseudevax*, *Bellida graminea*, *Goodenia rosea*, *Brachyscome ciliocarpa* and *Podolepis lessonii*, on red or brown clay loam, sandy clay loam or silty loam with ironstone or BIF surface stones, on flats, plains and slopes

T — Tall open to sparse shrubland of mixed species including *Acacia sibina*, *Melaleuca hamata*, *Acacia latior*, *Acacia acuminata* and *Hysterobaeckea setifera* subsp. *setifera*, over mid isolated shrubs of mixed species including, *Malleostemon tuberculatus*, *Philotheca glabra*, *Philotheca deserti* subsp. *deserti* and *Allocasuarina acutivalvis* subsp. *prinsepiana*, over low isolated clumps of shrubs of mixed species including *Grevillea granulosa* (P3), *Hibbertia stenophylla*, *Darwinia capitella* and *Malleostemon roseus*, over low isolated clumps of tussock grasses of *Amphipogon caricinus* var. *caricinus*, over low sparse sedgeland of *Ecdeiocolea monostachya*, over low sparse forbland of mixed species including *Cheilanthes sieberi* subsp. *sieberi*, *Bellida graminea*, *Trachymene cyanopetala*, *Borya sphaerocephala* and *Lawrencella davenportii*, on orange, brown or red sandy loam or sandy clay loam, occasionally with ironstone and quartz surface stones, on plains and flats

U — Low woodland of *Eucalyptus clelandiorum* or tall shrubland of *Melaleuca acutifolia*, over low sparse chenopod shrubland of mixed species dominated by *Maireana thesioides*, *Maireana carnosa*, *Sclerolaena diacantha* and *Maireana georgei*, on red-brown silty clay loam, occasionally with calcrete stones, in drainage depressions and on the edges of saline claypans

V — Tall open shrubland to shrubland of *Acacia tetragonophylla*, *Acacia quadrimarginea* and occasionally *Allocasuarina dielsiana*, *Acacia ramulosa* var. *ramulosa* and *Hakea recurva* subsp. *recurva*, over mid open shrubland of mixed species including *Dodonaea inaequifolia*, *Grevillea paradoxa*, *Senna glutinosa* subsp. *chatelainiana* and *Acacia kochii*, occasionally over low isolated shrubs of *Solanum cleistogamum* and *Ptilotus obovatus*, over low open forbland dominated by *Borya sphaerocephala*, on red or brown silty soil with ironstone and granite surface stones, on low to mid slopes

W — Low woodland of *Eucalyptus ebbanoensis* subsp. *ebbanoensis*, over tall shrubland to open shrubland of mixed species including *Senna charlesiana*, *Acacia ramulosa* var. *ramulosa*, *Grevillea obliquistigma* subsp. *obliquistigma* and *Acacia burkittii*, over low open shrubland of mixed species including *Acacia acanthoclada* subsp. *glaucescens*, *Cryptandra apetala* var. *apetala*, *Eremophila clarkei* and *Acacia ?nigripilosa* subsp. *nigripilosa*, on red-brown silty-sands with ironstone surface stones, on low to mid slopes

X — Occasional low isolated trees of *Eucalyptus arctata*, over tall shrubland dominated by *Senna charlesiana* and occasionally *Acacia stereophylla* var. *stereophylla*, *Grevillea obliquistigma* subsp. *obliquistigma* and *Melaleuca cordata*, over mid to low open to sparse shrubland of *Aluta aspera* subsp. *hesperia*, *Eremophila clarkei*, *Hakea multilineata*, *Hemigenia botryphylla* and *Ptilotus obovatus*, on red-brown silty loam with ironstone and granite surface stones, on low to mid slopes

Y — Low woodland to open woodland of *Eucalyptus ebbanoensis* subsp. *ebbanoensis* and/or *Eucalyptus arctata*, over tall open shrubland of *Acacia ramulosa* var. *ramulosa*, *Acacia stereophylla* var. *stereophylla*, *Acacia acanthoclada* subsp. *glaucescens* and occasionally *Grevillea obliquistigma* subsp. *obliquistigma* and *Senna charlesiana*, over occasional mid sparse shrubland of *Senna glutinosa* subsp. *chatelainiana*, *Hakea recurva* subsp. *recurva*, *Ptilotus schwartzi* and *Chenopodium gaudichaudianum*, over low isolated clumps of tussock grasses of *Austrostipa elegantissima* and *Monachather paradoxus*, on red, brown or orange loam or silty-sands with ironstone surface stones, on plains and lower slopes

FIGURE 3.2

LEGEND: Overview of Vegetation Types of the Combined Proposal Development Envelope

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Vegetation Type

Z	Low open woodland of *Eucalyptus kochii* subsp. *plenissima* and occasionally *Eucalyptus loxophleba* subsp. *supralaevis*, over tall open shrubland of *Acacia anthochaera*, *Acacia ramulosa* var. *ramulosa*, *Hakea recurva* subsp. *recurva* and *Bursaria occidentalis*, over low open chenopod shrubland of *Chenopodium gaudichaudianum*, *Maireana brevifolia*, *Maireana georgei* and *Maireana ?planifolia*, over low isolated clumps of tussock grasses of *Austrostipa elegantissima*, on red-brown sandy loam, on flats and plains
AA	Occasional low woodland to open woodland of *Eucalyptus loxophleba* subsp. *supralaevis*, over tall closed shrubland to open shrubland of *Allocasuarina campestris* with *Acacia acuminata*, *Acacia tetragonophylla*, *Melaleuca nematophylla* and/or *Hakea scoparia*, over mid open to sparse shrubland of mixed species including *Baeckea* sp. Perenjori (J.W. Green 1516) (P2), *Ricinocarpos velutinus* and *Solanum ellipticum*, on rocky brown clay-silt with heavy quartz, on slopes
HMVT A	Low open chenopod shrubland of mixed species dominated by *Maireana brevifolia* and *Tecticornia pergranulata* subsp. *pergranulata* and occasionally *Enchylaena tomentosa* var. *tomentosa*, over low forbland of **Mesembryanthemum nodiflorum*, on saline red-brown sandy loam on flats
HMVT B	Low open woodland to isolated trees of *Eucalyptus arctata*, over tall shrubland of mixed species including *Acacia sibina*, *Grevillea obliquistigma* subsp. *obliquistigma*, *Melaleuca ?atroviridis* and *Acacia prainii*, over mid sparse shrubland of *Acacia dielsii* and *Grevillea extorris*, over low open sedgeland of *Ecdeiocolea monostachya*, on yellow sand on flats
HMVT C	Tall open shrubland of mixed species including *Acacia anthochaera*, *Acacia acuminata*, *Acacia ?inceana* subsp. *conformis* and *Melaleuca eleuterostachya*, over low open chenopod shrubland of mixed species including *Enchylaena tomentosa* var. *tomentosa*, *Maireana brevifolia*, *Salsola australis* and *Rhagodia drummondii*, over low isolated clumps of tussock grasses of *Aristida ?contorta*, *Austrostipa elegantissima* and *Austrostipa nodosa*, on slightly saline red sand on flats
HMVT D	Mid forest to low open woodland of *Eucalyptus camaldulensis* and/or *Eucalyptus loxophleba* subsp. *loxophleba*, over tall open to sparse shrubland of mixed species including *Hakea preissii*, *Acacia rostellifera* and/or *Acacia acuminata*, over occasional low sparse chenopod shrubland of mixed species including *Maireana brevifolia*, *Salsola australis*, *Enchylaena tomentosa* var. *tomentosa* and **Mesembryanthemum nodiflorum*, over low tussock grassland of mixed species including **Avena barbata*, **Ehrharta calycina*, **Cynodon dactylon* and **Bromus diandrus*, on red-brown sandy clay loam, on drainage lines and flats
HMVT E	Mid to low open woodland of *Eucalyptus loxophleba* subsp. *loxophleba*, over tall open shrubland of mixed species including *Acacia acuminata*, *Acacia tetragonophylla*, *Acacia aestivalis* and *Hakea recurva* subsp. *recurva*, over low isolated chenopod shrubs of *Maireana brevifolia*, *Chenopodium gaudichaudianum* and *Rhagodia drummondii*, over low open tussock grassland dominated by **Avena barbata* and **Bromus diandrus*, on red sandy loam or clay loam, on lower to upper slopes
HMVT F	Mid open woodland of *Eucalyptus loxophleba* subsp. *loxophleba*, over tall shrubland to open shrubland of *Acacia colletioides* and *Acacia acuminata*, over low open to sparse chenopod shrubland of mixed species including **Mesembryanthemum nodiflorum*, *Rhagodia drummondii*, *Maireana brevifolia*, *Atriplex semibaccata* and *Salsola australis*, over low open tussock grassland dominated by **Avena barbata*, **Bromus diandrus*, **Lolium ?rigidum* and **Hordeum ?glaucum*, on red loamy clay on lower slopes
HMVT G	Mid isolated shrubs of *Acacia acuminata*, *Acacia tetragonophylla* and *Hakea recurva* subsp. *recurva*, over mid to low closed tussock grassland and forbland of agricultural weeds, on red-brown loam on gently undulating plains
CP	Occasional low open forbland of *Myriophyllum decussatum* on red clay in claypans. Bare clay that is completely devoid of vegetation when dry. It periodically fills with water, and in the subsequent weeks while water is still present (or when the clay is still waterlogged), *Myriophyllum decussatum* is present.
PL	Planted trees and shrubs, predominately *Eucalyptus* spp., on plains in pasture and road verges
Water	Water in salt lakes and clay pans
CL	Land cleared for roads, infrastructure and agriculture. May contain occasional isolated native or introduced plants.

FIGURE 3.2

LEGEND: Overview of Vegetation Types of the Combined Proposal Development Envelope

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3.3.3 Significant Vegetation

Four listed vegetation communities have been recorded within the Combined Proposal DE (discussed in **Section 3.3.3.1** and presented in **Figure 3.3**). In addition, 16 VTs were considered by Umwelt (2025) to be potentially significant for reasons other than formal listing, following an assessment of VTs against the definitions of 'significant vegetation' as per EPA guidance (2016a, 2016b). These VTs and the reasoning for being considered of potential significance are discussed in **Section 3.3.3.2**.

3.3.3.1 Listed Significant Vegetation

Four listed vegetation communities are present in the Combined Proposal DE (Umwelt 2025). These comprise:

- Three (3) Threatened Ecological Communities (TECs) listed under the EPBC Act and/or BC Act.
- One (1) Priority Ecological Community (PEC) classified by DBCA.

These four communities are summarised in **Table 3.7** and discussed in further detail below. No other listed TECs or PECs were considered by Umwelt (2025) to be present in the Combined Proposal DE.

Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation) (WA: P1)

The 'Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)' community is listed as a P1 PEC in WA but is not listed under the EPBC Act. A total of 770.4 ha of the Blue Hills PEC was mapped by Umwelt (2025) in the Karara Area of the Combined Proposal DE, and of this, 98.2 ha occurs within the KIOP MLE new disturbance footprint (the Mine Area). The PEC was predominantly in Excellent condition, with 2% in Very Good condition due to the presence of tracks, and drill lines and pads.

Eucalypt woodlands of the Western Australian Wheatbelt (WA: P3 / EPBC: CR)

The 'Eucalypt woodlands of the Western Australian Wheatbelt' community is listed as a P3 PEC in WA, and as a Critically Endangered TEC under Commonwealth legislation. The community predominately occurs across three IBRA subregions: Avon Wheatbelt subregion AVW01 Merredin; Avon Wheatbelt subregion AVW02 Katanning; and Mallee subregion MAL02 Western Mallee (DoE, 2015).

A total of 1.6 ha of the Eucalypt woodlands TEC was mapped by Umwelt (2025) in the Borefield Corridor part of the Combined Proposal DE. The mapped area also occurs within the KIOP MLE new disturbance footprint (the Wheatbelt Area). The condition of the TEC intersected by the Combined Proposal DE was Completely Degraded due to impact from weeds, historical clearing, and fragmentation. However, these occurrences form part of larger patches that extend outside the Combined Proposal DE and meet the condition and size thresholds of the Commonwealth Approved Conservation Advice (DoE, 2015) (Umwelt 2025).

Koolanooka System as originally described in Beard (1976) (WA: CR)

The 'Koolanooka System as originally described in Beard (1976)' community is listed as a Critically Endangered TEC in WA but is not listed under the EPBC Act. A total of 5.6 ha of the Koolanooka System TEC was mapped by Umwelt (2025) in the Yandanooka Pipeline part of the Combined Proposal DE. This TEC does not occur within the KIOP MLE new disturbance footprint, as that boundary does not intersect the Koolanooka System (DPIRD, 2022). The condition of the TEC ranged from Very Good to Degraded, primarily due to weed presence, but the Degraded areas were contiguous with vegetation that was in better condition (Umwelt 2025).

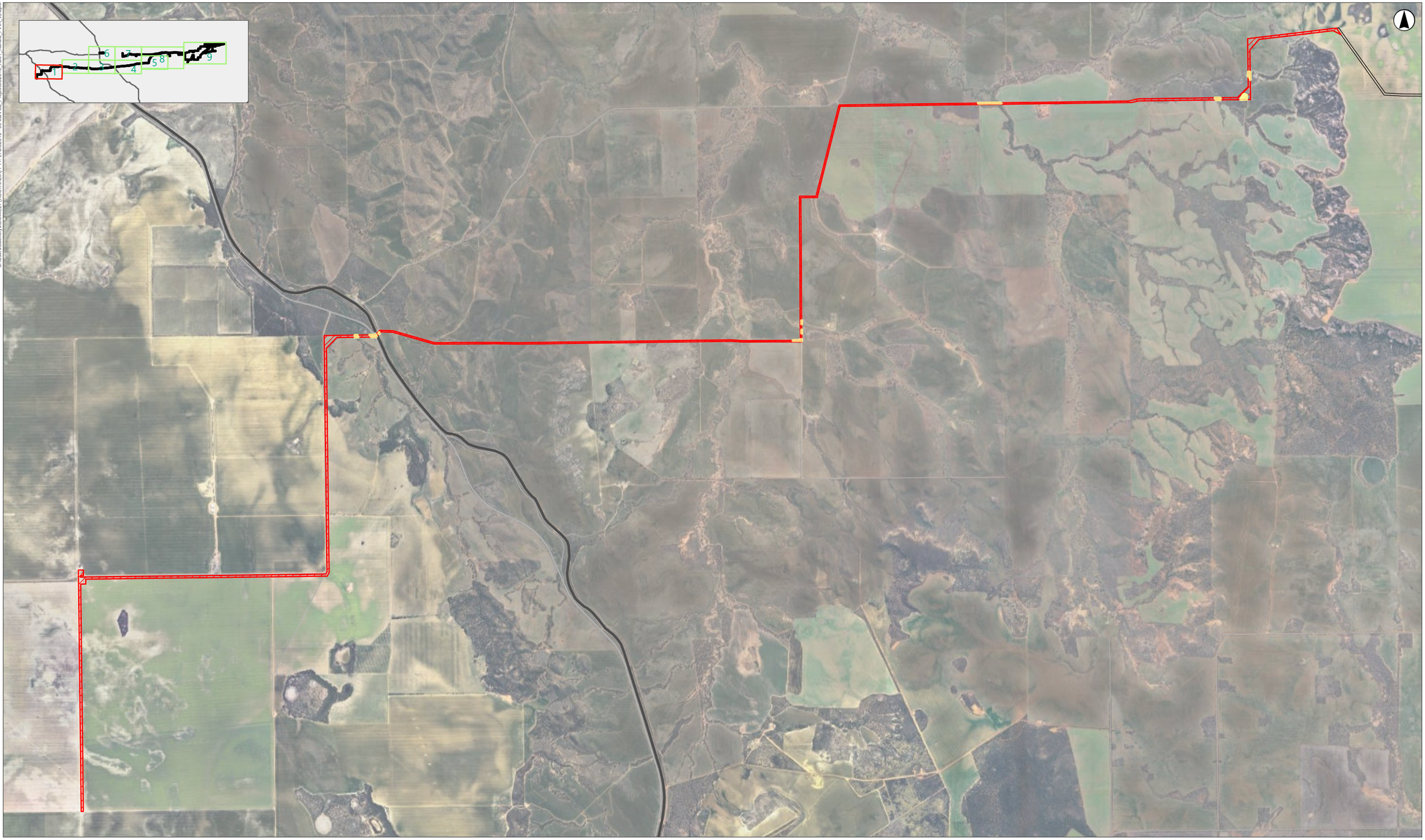
Plant assemblages of the Billeranga System as originally described in Beard (1976) (WA: CR)

The 'Plant assemblages of the Billeranga System as originally described in Beard (1976)' community is listed as a Critically Endangered TEC in WA but is not listed under the EPBC Act. A total of 0.2 ha of the Billeranga System TEC was mapped by Umwelt (2025) in the Borefield Corridor part of the Combined Proposal DE. This TEC does not occur within the KIOP MLE new disturbance footprint, as that boundary does not intersect the Billeranga System (DPIRD, 2022). The TEC was rated as being in Good condition due to weed presence and proximity to agriculture (Umwelt 2025).

Table 3.7 Summary of Listed Vegetation Communities of the Combined Proposal DE

Community	Status (WA)	Status (EPBC)	DBCA Description	Extent in DE (ha)	Condition in DE	Location in DE	Mine Area	Wheatbelt Area
Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)	PEC (P1)	-	Includes vegetation assemblages associated with the BIF in the Blue Hills Range, including Mt Karara and Windaning Hill (Mungada Ridge) (part of the Central Tallering Land System), as described in Markey and Dillon (2008)	770.4	Excellent (98%) Very Good (2%)	Karara Area	Y	-
Eucalypt woodlands of the Western Australian Wheatbelt	PEC (P3)	TEC (CR)	This community occurs in the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions. It also includes outlying patches in the eastern parts of JAF01 Northern Jarrah Forests and JAF02 Jarrah Forests adjacent to the Avon Wheatbelt, that are off the Darling Range, and receive less than 600 mm mean annual rainfall. The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10 %. The key dominant or co-dominant species of the tree canopy are species of *Eucalyptus* trees that typically have a single trunk. Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this DBCA PEC.	1.6	Completely Degraded (100%)	Far western end of Borefield Corridor only	-	Y
Koolanooka System as originally described in Beard (1976)	TEC (CR)	-	This community is known from the Koolanooka Hills, its footslopes and the Perenjori Hills. It comprises *Eucalyptus ebbanoensis* subsp. *ebbanoensis* mallee and *Acacia* sp. scrub with scattered *Allocasuarina huegeliana* (rock sheoak) over red loam and ironstone on the upper slopes and summits, *Allocasuarina campestris* scrub over red loam on hill slopes, shrubs and emergent mallees on shallow red loam over massive ironstone on steep rocky slopes, *Eucalyptus loxophleba* (York gum) woodland over scrub on the footslopes, and mixed *Acacia* sp. scrub on granite. The community was originally described in Beard's (1976) The vegetation of the Perenjori area, Western Australia: Map and explanatory memoir (1:250,000 vegetation series, Vegmap Publications, Perth, Western Australia).	5.6	Very Good (46%) Good (21%) Degraded (33%)	Western end of Yandanooka Pipeline only	-	-
Plant assemblages of the Billeranga System as originally described in Beard (1976)	TEC (CR)	-	The community occurs in the Billeranga Hills in the north-eastern Wheatbelt of WA. It generally comprises: *Melaleuca nematophylla* (wiry honeymyrtle) - *Allocasuarina campestris* thicket on clay sands over laterite on slopes and ridges; open mallee over mixed scrub on yellow sand over gravel on western slopes; *Eucalyptus loxophleba* (York gum) woodland over sandy clay loam or rocky clay on lower slopes and creeklines; and mixed scrub or scrub dominated by *Dodonaea inaequifolia* over red brown loamy soils on the slopes and ridges. The community was originally described by Beard (1976).	0.2	Good (100%)	Central part of Borefield Corridor only	-	-

Source: Umwelt (2025).



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Legend

- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Significant Vegetation

- Eucalypt woodlands of the Western Australian Wheatbelt (WA – P3, EPBC – CR)

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 1

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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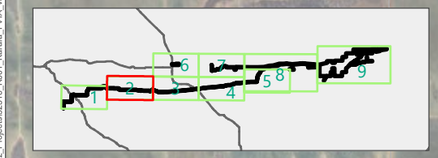

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Major Watercourse

Significant Vegetation

- Plant assemblages of the Billeranga System as originally described in Beard (1976) (WA – CR)

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 2

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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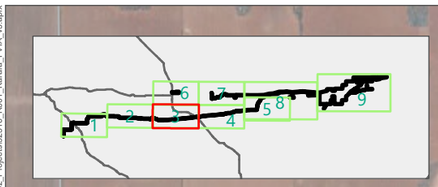

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway
- Major Watercourse

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 3

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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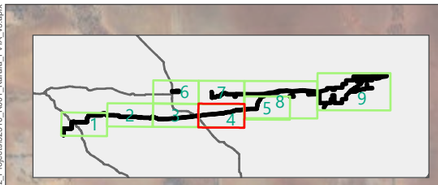

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 4

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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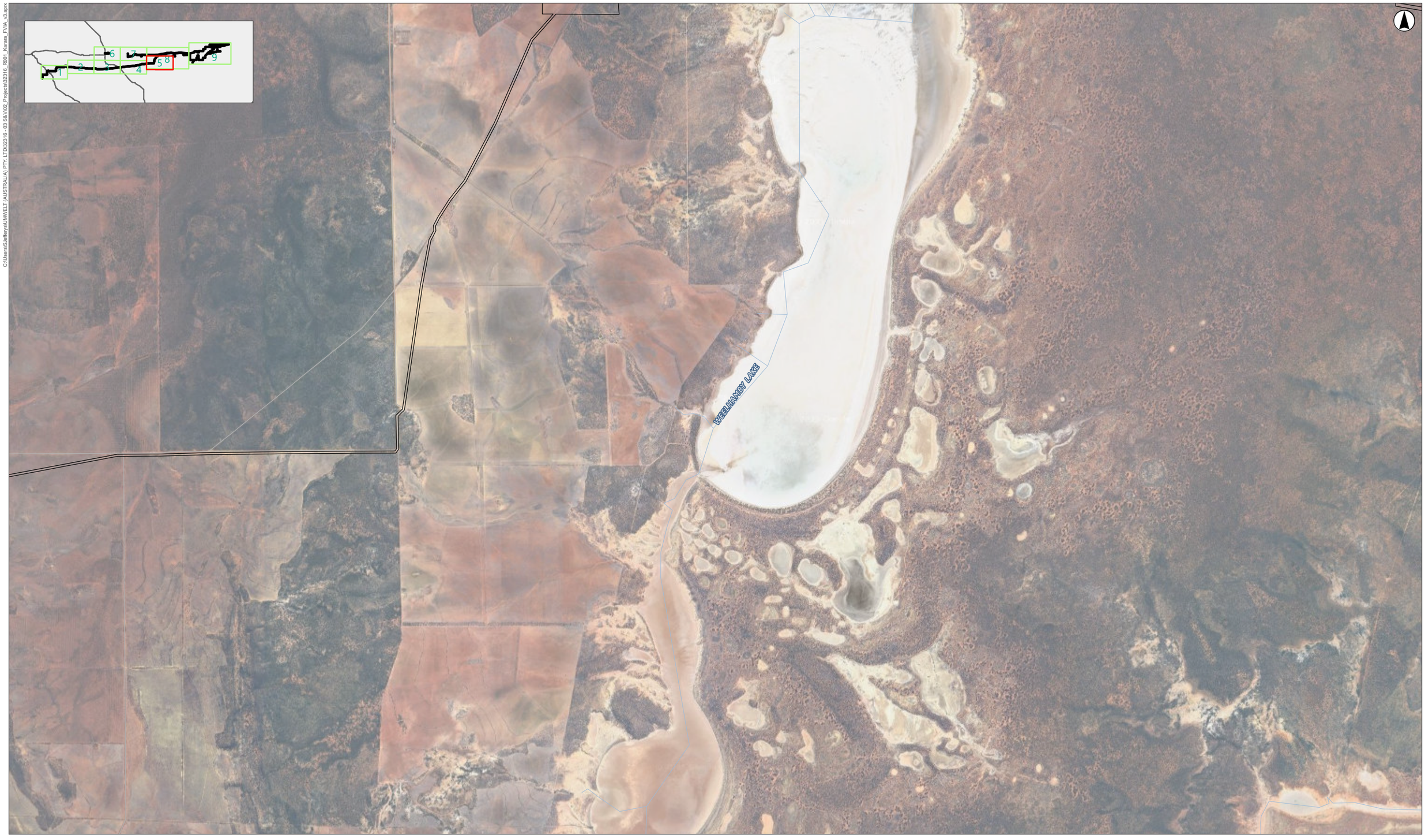

Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 5

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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MORAWA

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway
- Major Watercourse

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 6

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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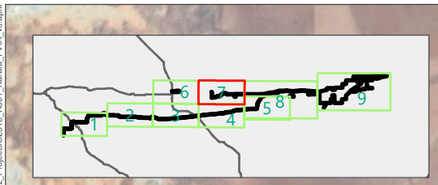

Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

Significant Vegetation

- Koolanooka System as originally described in Beard (1976) (WA – CR)

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 7

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 8

0 1 2 km
Scale 1:80,000 at A4
GDA2020 MGA Zone 50

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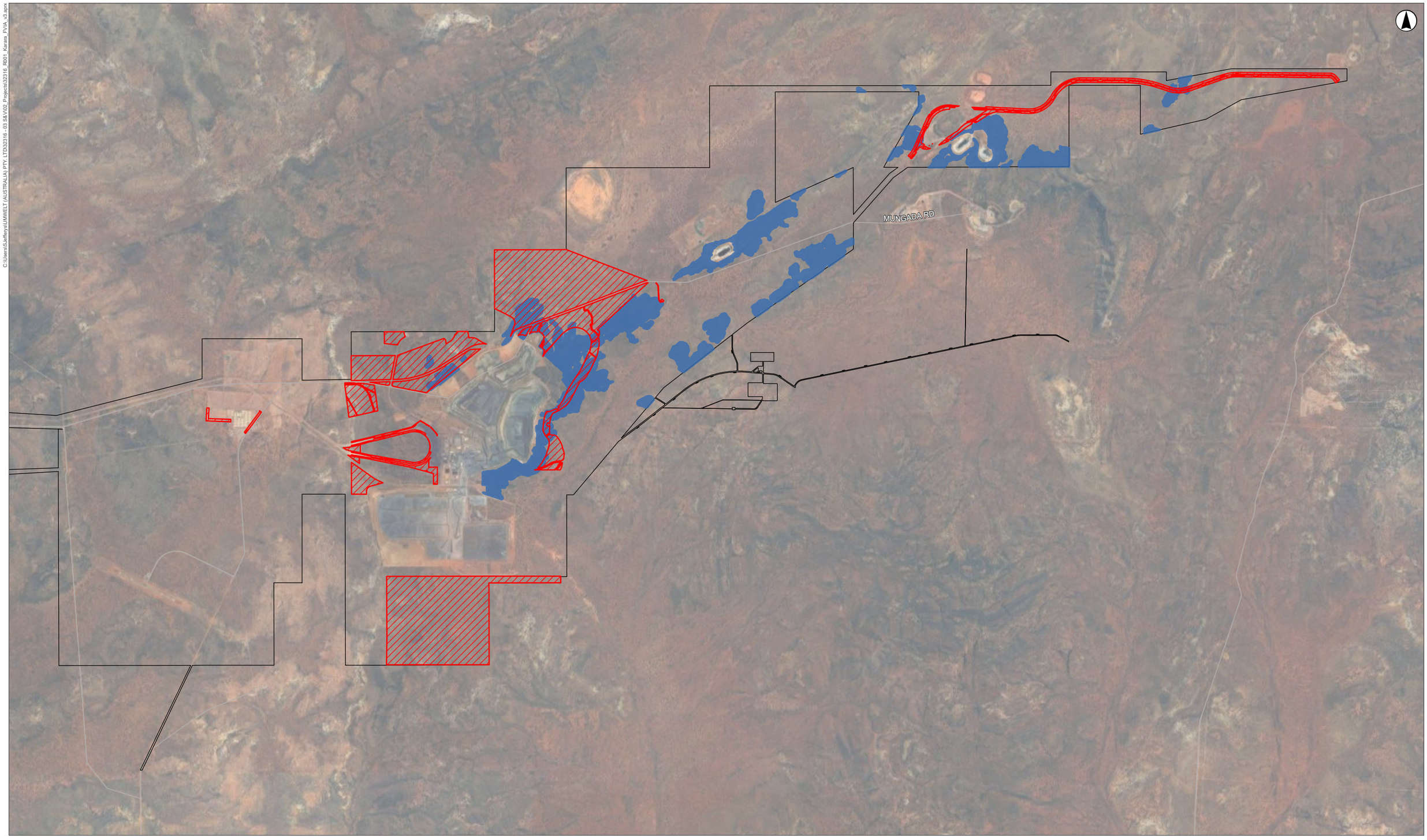

Legend

- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Minor Road

Significant Vegetation

- Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation) (WA – P1)

FIGURE 3.3
Listed Significant Vegetation Recorded in the Combined Proposal Development Envelope – Sheet 9

0 1 2 km
Scale 1:80,000 at A4
GDA2020 MGA Zone 50

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3.3.3.2 Vegetation Significant for Other Reasons

Of the 38 VTs of the Combined Proposal DE, 16 were considered by Umwelt (2025) to be potentially significant as per EPA guidance (2016a, 2016b) definitions of 'significant vegetation' (**Table 3.8**). The reasoning for these 16 VTs potentially representing significant vegetation included:

- Occurring across a restricted distribution or habitat.
- Playing a role as a refuge or refugium.
- Providing an important ecological function.
- Other reasons:
  - (1) Having a degree of historical impact from threatening processes.
  - (2) Providing preferred habitat for significant flora taxa with restricted distributions.

Table 3.8 Significance of VTs per EPA Definitions of Significant Vegetation Other Than Formal Listing

VT	Restricted Distribution or Habitat	Plays a Role as a Refuge or Refugium	Provides Important Ecological Function	Other Reasons	Overall Outcome
A	-	-	-	-	
B	Yes	Yes	Yes	Yes (2)	Significant for reasons other than formal listing
C	-	-	-	-	
D	-	-	-	-	
E	-	-	-	-	
F	-	-	-	-	
G	-	-	-	-	
H	-	-	-	-	
I	-	-	-	-	
J	Yes	Yes	Yes	-	Significant for reasons other than formal listing
K	-	-	-	-	
L	-	-	-	-	
M	Yes	Possibly	Yes	Yes (1)	Significant for reasons other than formal listing
N	Yes	Possibly	Yes	Yes (1)	Significant for reasons other than formal listing
O	Yes	Yes	Yes	-	Significant for reasons other than formal listing
P	Yes	-	Yes	-	Significant for reasons other than formal listing
Q	-	-	-	Yes (2)	Significant for reasons other than formal listing
R	-	-	-	-	
S	-	-	-	-	
T	-	-	-	-	
U	Yes	Yes	Yes	-	Significant for reasons other than formal listing

VT	Restricted Distribution or Habitat	Plays a Role as a Refuge or Refugium	Provides Important Ecological Function	Other Reasons	Overall Outcome
V	Yes	Yes	Yes	-	Significant for reasons other than formal listing
W	Yes	-	Yes	-	Significant for reasons other than formal listing
X	Yes	Yes	Yes	-	Significant for reasons other than formal listing
Y	Yes	Yes	-	-	Significant for reasons other than formal listing
Z	Yes	Yes	-	-	Significant for reasons other than formal listing
AA	Yes	Yes	-	-	Significant for reasons other than formal listing
HMVT A	Yes	-	Unlikely	-	
HMVT B	Yes	-	-	-	
HMVT C	Yes	-	-	-	
HMVT D	Yes	Yes	-	-	Significant for reasons other than formal listing
HMVT E	Yes	-	-	-	
HMVT F	Yes	-	-	-	
HMVT G	Yes	-	-	-	
CP	Yes	Unlikely	Yes	-	Significant for reasons other than formal listing

Source: Umwelt (2025).

3.3.4 Surface and Groundwater Dependent Vegetation

3.3.4.1 Surface Water Dependent Vegetation

Sixteen VTs were identified by Umwelt (2025) as being at least partially or totally dependent on ephemeral surface water flows for survival, due to a combination of representing riparian vegetation, or having a degree of dependence on sheet water flow originating from higher ground. These VTs were C, D, G, H, J, K, L, M, N, U, Y, Z, HMTV A, HMVT D, HMVT E, and CP (Umwelt 2025).

3.3.4.2 Groundwater Dependent Vegetation

Three VTs were identified by Umwelt (2025) as being potentially groundwater dependent. Two of these (VTs M and N), form part of the Yarra Yarra salt lake system which has been determined to be a net discharge point for groundwater (Boggs, 2007). The third VT, HMVT D, contains the obligate phreatophyte *Eucalyptus camaldulensis*, and therefore represents potential groundwater dependent vegetation (GDV) (Umwelt 2025).

3.3.5 Vegetation Condition

The condition of the vegetation of the Combined Proposal DE was mapped by Umwelt (2025) per the vegetation condition scale for the South West and Interzone Botanical Provinces as described in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b). Areas mapped as 'Cleared Land' and 'Water' were not allocated vegetation condition categories, as they do not constitute vegetation in the context of the condition scale.

A total of 94.7% (**Table 3.9**) of vegetation was considered to be in Excellent condition; these areas had no or little evidence of impact to vegetation composition and structure as a result of human or animal activities, or there were only low levels of introduced (weed) taxa. Historical disturbance was present in many areas from mining and exploration activities (for example, drill lines) and historical grazing (evidence of use of the area as a pastoral station), and there was historical and current evidence of kangaroo, rabbit, goat and cattle activity throughout (Umwelt 2025).

The vegetation of the Karara Area was overwhelmingly mapped as Excellent condition, as well as the eastern part of the Yandanooka Pipeline. There was a general trend of declining vegetation condition east of Weelhamby Lake (and the boundary between the Avon Wheatbelt and Yalgoo IBRA regions), likely associated with a change in the dominant land use to agriculture, and a corresponding increase in weed presence. The vegetation in this part of the Yandanooka Pipeline was generally Very Good to Good, while that of the Borefield Corridor was Good to Degraded, due to proximity to agriculture, high weed loads, and fragmentation. This is typical of vegetation within that area, which has experienced historically high levels of clearing and weed invasion, primarily for agriculture.

The vegetation north, east and west of camp was mapped as Degraded to Completely Degraded, due to significant alterations to vegetation structure as a result of historical clearing. These areas had regrown and were compositionally similar to adjacent uncleared vegetation, but very dissimilar structurally.

Table 3.9 Vegetation Condition of the Combined Proposal DE

Condition	Extent in DE (ha)	Proportion (%)
Excellent	10,229.9	94.7
Very Good	226.9	2.1
Good	75.0	0.7
Poor	0	0
Degraded	199.3	1.9
Completely Degraded	69.9	0.6
Not Applicable*	2,755.9	

Source: Umwelt (2025).

* Comprises areas mapped as 'Cleared Land' and 'Water'.

3.4 Introduced Flora Taxa

The Umwelt 2025 assessment and previous flora and vegetation assessments have recorded a total of 64 introduced flora taxa within the Combined Proposal DE (Umwelt 2025). These taxa are listed in **Table 3.10**, along with comments regarding the significance of each taxon, including ecological impact and invasiveness ratings under DBCA's *Ecological Impact and Invasiveness Ratings from the Department of Parks and Wildlife* for the Midwest Region (DBCA, 2014).

None of the 64 introduced flora taxa are listed as weeds of national significance, but two taxa are listed as declared pests (section 22(2)) under the WA *Biosecurity and Agriculture Management Act 2007* (Paterson's Curse (*Echium plantagineum*) and Goosegrass (*Galium aparine*)). A weed management plan has been developed to document the management of significant environmental weeds for the Project. This is included as a mitigation strategy in **Section 6.0**.

Table 3.10 Introduced Flora Taxa Recorded in the Combined Proposal DE

Taxon	Common Name	National or State Significance	Ecological Impact*	Invasiveness*
Aira caryophyllea	Silvery Hairgrass	-	High	Rapid
Arctotheca calendula	Cape Weed, African Marigold	-	High	Rapid
Avena ?sativa	Common Oat	-	Low	Slow
Avena barbata	Bearded Oat	-	High	Rapid
Avena fatua	Wild Oat	-	High	Rapid
Brassica tournefortii	Mediterranean Turnip	-	High	Rapid
Briza maxima	Blowfly Grass	-	Unknown	Rapid
Bromus diandrus	Great Brome	-	High	Rapid
Bromus rubens	Red Brome	-	Unknown	Rapid
Carrichtera annua	Ward's Weed	-	Not assessed	Not assessed
Carthamus lanatus	Saffron Thistle	-	Unknown	Rapid
Centaurea melitensis	Maltese Cockspur	-	High	Rapid
Citrullus amarus	Pie Melon, Paddy melon	-	Low	Rapid
Cleretum papulosum subsp. *papulosum*	-	-	Unknown	Rapid
Cucumis myriocarpus	Prickly Paddy Melon, Paddy melon	-	Unknown	Rapid
Cuscuta epithymum	Lesser Dodder, Greater Dodder	-	Unknown	Rapid
Cuscuta planiflora	Red Dodder	-	Unknown	Rapid
Cynodon dactylon	Couch	-	High	Rapid
Echium plantagineum	Paterson's Curse	Declared Pest	High	Rapid
Ehrharta calycina	Perennial Veldt Grass	-	High	Rapid
Ehrharta longiflora	Annual Veldt Grass	-	Unknown	Rapid
Erodium cicutarium	Common Storksbill	-	Low	Rapid
Ficinia marginata	Coarse Clubrush	-	Unknown	Rapid
Galium aparine	Goosegrass	Declared Pest	Unknown	Rapid
Gazania linearis	Gazania	-	High	Rapid
Gorteria personata	Gorteria	-	Unknown	Rapid
Hordeum ?glaucum	Northern Barley Grass	-	Unknown	Rapid
Hordeum leporinum	Barley Grass	-	Unknown	Rapid
Hypochaeris glabra	Flatweed, Smooth Catsear	-	Low	Rapid
Juncus bufonius	Toadrush	-	Low	Rapid
Lamarckia aurea	Goldentop	-	Unknown	Rapid
Leontodon rhagadioloides	Cretan Weed	-	High	Rapid

Taxon	Common Name	National or State Significance	Ecological Impact*	Invasiveness*
Limonium lobatum	Winged Sea Lavender, Statice	-	High	Rapid
Lolium perenne	Perennial Ryegrass	-	Unknown	Rapid
Lolium rigidum	Annual Ryegrass, Wimmera Ryegrass	-	Unknown	Rapid
Lupinus angustifolius	Narrowleaf Lupin	-	Medium	Moderate
Lupinus cosentinii	Sandplain Lupin	-	Medium	Moderate
Lysimachia arvensis	Scarlet Pimpernel, Blue Pimpernel	-	Low	Rapid
Medicago minima	Small Burr Medic	-	Low	Moderate
Medicago polymorpha	Burr Medic	-	Unknown	Rapid
Medicago ?truncatula	Barrel Medic	-	Low	Moderate
Mesembryanthemum nodiflorum	Slender Iceplant	-	High	Moderate
Monoculus monstrosus	Stinking Roger	-	Unknown	Rapid
Parapholis incurva	Coast Barbgrass	-	Medium	Rapid
Parentucellia latifolia	Red Bartsia, Common Bartsia	-	Medium	Rapid
Pentameris airoides subsp. *airoides*	False Hairgrass	-	Unknown	Rapid
Petrorhagia dubia	Hairy Pink	-	Low	Rapid
Phalaris ?minor	Lesser Canary Grass	-	Low	Slow
Plantago coronopus subsp. *commutata*	Buckshorn Plaintain	-	Unknown	Rapid
Polypogon monspeliensis	Annual Barbgrass, Annual Beardgrass	-	Medium	Moderate
Raphanus raphanistrum	Wild Radish	-	High	Rapid
Rostraria pumila	Rough Cat's Tail, Tiny Bristle-grass	-	Unknown	Unknown
Rumex hypogaeus	Double Gee	-	Low	Rapid
Rumex vesicarius	Rosy Dock, Ruby Dock	-	High	Rapid
Silene nocturna	Mediterranean Catchfly	-	Low	Rapid
Sisymbrium erysimoides	Smooth Mustard	-	Unknown	Unknown
Sisymbrium orientale	Indian Hedge Mustard	-	Unknown	Unknown
Sisymbrium runcinatum	African Turnip Weed	-	Unknown	Unknown
Sonchus oleraceus	Common Sowthistle	-	Unknown	Rapid
Spergula pentandra	Five Ather Spurrey	-	Low	Rapid
Spergularia rubra	Red Sand Spurrey, Sand Spurry	-	Low	Rapid
Trifolium glomeratum	Ball Clover, Cluster Clover	-	High	Moderate
Ursinia anthemoides subsp. *anthemoides*	Ursinia	-	High	Rapid
Vulpia myuros forma *myuros*	Rat's Tail Fescue	-	Unknown	Rapid

Source: Umwelt (2025).

4.0 Potential Impacts

The following sections list activities from the KIOP MLE Proposal that could potentially impact flora and vegetation values, including directly, indirectly, and cumulatively.

4.1 Direct Impacts

The potential direct impacts to flora and vegetation from Proposal activities comprise loss of native flora (including significant flora taxa) and loss of vegetation (including significant vegetation communities) as a result of clearing of native vegetation. Direct impacts have been assessed based on the KIOP MLE new disturbance footprint, as shown in **Figure 1.2**.

The KIOP MLE new disturbance footprint is 1,522 ha and contains approximately 1,441 ha of vegetation (excluding CCAC areas). This includes 1,429 ha within the Mine Area and 12 ha within the Wheatbelt Area.

4.2 Indirect Impacts

The KIOP MLE Proposal activities and threats that may lead to indirect impacts to native flora or degradation of vegetation include:

- Smothering of plants from dust emissions, causing potential decline in health or death of individual plants, and reduction in the overall condition of vegetation.
- Accidental clearing outside of approved areas or driving outside planned disturbance areas, resulting in reduced vegetation condition in proximity to cleared areas, unnecessary or unapproved clearing of flora and vegetation.
- Water and / or sediment runoff (e.g. erosion after significant rainfall from WRDs, and spillage of saline water / tailings / hydrocarbons), causing potential smothering of individual plants and vegetation, resulting in decline in health or death.
- Fragmentation of local populations of flora and vegetation, leading to a decline in health and quality of populations / patches of vegetation, or loss of genetic diversity through isolation of segments of a population, resulting in reduced genetic fitness of remaining populations.
- Dust suppression with saline water on roads and waste stockpiles, potentially resulting in saline water runoff into uncleared areas and associated decline in health or death of individual plants, and reduction in the overall condition of vegetation.
- Introduction of weeds, leading to increased competition for available resources with individual plants, and reduction in the overall condition of vegetation.
- Spread of *Phytophthora cinnamomi* (dieback) or an increase in the occurrence of dieback in native vegetation (relevant to the Wheatbelt Area only).

Hydrological modelling for the Combined Proposal has been undertaken by Stantec (2024), which concluded that it would be unlikely that the predicted hydrological changes to the Karara Area would significantly impact surface water or groundwater dependent vegetation. For this reason, hydrological factors such as changes to surface water hydrology and groundwater levels were excluded from the indirect impact assessment.

KML have a Flora and Vegetation Environmental Management Plan (EMP) (Document Number: CORP-EN-PLN-1011 Rev 1) for KIOP and MIOP that has been prepared to address, in a coordinated manner, the regional and site-specific flora and vegetation management requirements resulting from mining, processing, stockpiling, handling and transporting of iron ore product. The EMP includes discussion of the risk of impacts from ground disturbance, altered hydrology, groundwater drawdown, dust deposition, dust suppression water overspray, fire, weeds, feral animals and rehabilitation. The EMP also details management measures to be implemented to minimise the potential impacts to flora and vegetation as a result of these threats, and performance indicators to assess performance against the environmental objectives.

Flora and vegetation monitoring at KIOP and MIOP is conducted by an external consultant annually in September. Monitoring includes an assessment against threats and impacts including weed coverage, dust, saline water, feral grazing, erosion, drought stress and fire. The results of this monitoring are reported in MS 805, MS 806 and MS 968 Annual Compliance Assessment Report s.6.4, and Department of Mines, Petroleum and Exploration Annual Environmental Report s.4.2. Flora and vegetation monitoring results to date show that overall vegetation health at KIOP and MIOP has not declined. Monitoring of vegetation health also demonstrates that the Blue Hills PEC has not been adversely impacted by current KIOP operations.

A potential indirect impact zone was spatially defined as described in **Section 1.2.2** and presented in **Figure 1.4.** This boundary has been prepared to account for any potential indirect impacts as a result of the KIOP MLE Proposal. Further information on the potential indirect impacts is presented in the following sections.

4.2.1 Edge Effects

There is a potential for the dust generated during the implementation of the KIOP MLE Proposal to be deposited on flora and vegetation in proximity to the impacted areas. Dust can impede photosynthesis and other physiological processes of plants, including blocking the stomata, which can impact the overall health of vegetation.

Some research has been undertaken to investigate the impact of dust on native vegetation in the Pilbara and southwest of WA (Butler 2009; Matsuki et al. 2016), as well as at mine sites in nearby regions. There is some evidence to suggest that dust from mining operations can impact flora taxa and / or vegetation; however, the long-term impact remains unclear. Turner (2013) reported that heavy dust loading resulted in reduced stomatal conductance in two *Acacia* taxa; similarly, field observations indicated that heavy dust loads resulted in some plant stress, including leaf shedding, or plant senescence. It was determined that the interaction between the leaf surface and the dust was more critical to plant stress levels than the actual amount of dust; however, metal-rich dust with low pH may have been the casual factor (Turner, 2013).

In other studies, while temporary impacts in terms of reduced photosynthesis have been recorded, long-term effects, such as increased plant mortality, have not been established. Monitoring by Woodman Environmental (2017) at the Atlas Iron Pty Ltd Pardoo iron ore mine focused on assessing the potential impacts of dust generated by mining operations, including road use, on two significant ephemeral flora taxa, *Eragrostis crateriformis* (P3) and *Rothia indica* subsp. *australis* (P1). In contrast to Turner, Woodman Environmental reported that dust levels that affected these taxa were not associated with significant stress or mortality.

If appropriate dust suppression procedures are implemented during clearing and machinery movement, it is unlikely that dust deposition will significantly impact surrounding vegetation and flora taxa. However, dust suppression using saline water may result in run-off of saline water into adjacent vegetation or overspray of water directly onto vegetation, resulting in a decline in plant and vegetation health.

4.2.2 Accidental Disturbance

There is a risk of unplanned, unnecessary, or unauthorised native vegetation clearing. This may include clearing outside of the approved KIOP MLE new disturbance footprint or clearing of areas within the KIOP MLE new disturbance footprint that are not required to be cleared. This risk is highest during construction and native vegetation clearing activities and could be exacerbated by having multiple contractors simultaneously and/or unclear roles and responsibilities.

Implementation of an internal land disturbance procedure will minimise the risk of accidental native vegetation clearing (**Section 5.1**).

4.2.3 Fragmentation

Native vegetation clearing has the potential to result in patches of isolated ecological communities which have reduced dispersal and resilience to other threatening processes. The main drivers of indirect fragmentation effects include reduced patch (habitat) area, increased edge effects (introduction of weeds and other degradation), altered patch shape, increased patch isolation and altered matrix structure. Smaller patches, including smaller populations of significant flora taxa, can result in reduction of reproductive success of individual taxa, and reduction of overall species composition. The length of time for which a patch has been isolated is also important, with species richness decreasing with increased time since fragmentation (Didham 2010).

With respect to individual taxa, several traits may assist in predicting their sensitivity to fragmentation (Didham 2010):

- Population size: smaller populations are more prone to extinction.
- Population variability: greater temporal variability in population size reduces the probability of population persistence.
- Competitive ability and sensitivity to disturbance: competitively dominant taxa in undisturbed habitats may reduce at the expense of disturbance-opportunists.
- Degree of habitat specialisation: specialist taxa are more susceptible than generalist taxa.
- Rarity: rare, patchily distributed taxa are more susceptible than common taxa.
- Biogeographical location: tropical and Mediterranean biomes are more sensitive to fragmentation than temperate biomes.

- Gene flow that is too low to sufficiently buffer the negative effects of inbreeding and genetic drift in fragmented populations may result in decreased population fitness and increased risk of extinction following further habitat fragmentation (Lienert 2004; Luquet et al. 2012). Furthermore, taxa with genetic diversity that is already low may be at greater risk from habitat fragmentation than those with greater genetic diversity.

Some localised fragmentation of flora taxa and VTs may occur as a result of vegetation clearing for the KIOP MLE Proposal. However, the effect of fragmentation may decrease over time as rehabilitation and return of vegetation and habitat progresses.

4.2.4 Saline Water and Spillage Impacts

Runoff or spray of saline water from dust suppression activities has the potential to result in the loss or reduced health of flora and vegetation. This indirect impact particularly applies to significant flora taxa and VTs adjacent to unsealed haul roads or other high traffic disturbance areas within the Mine Area.

Failure of a tailings storage cell would result in release of tailings fines and could lead to smothering of native vegetation.

4.2.5 Weeds

Introduced flora taxa (weeds) can compete with native flora for space, water and nutrients and can adversely impact the structure and composition of vegetation communities. Movement of vehicles and machinery, ground disturbance vegetation clearing, soil handling and storage could introduce, transport, and promote establishment of weeds in the KIOP MLE Proposal area.

None of the introduced flora taxa recorded by the Umwelt 2025 assessment or previous flora and vegetation assessments are listed as Weeds of National Significance, however two declared pests listed under the BAM Act have been recorded in the Combined Proposal DE (see **Section 3.4**). Weeds in the Mine Area of the KIOP MLE new disturbance footprint were generally recorded in previously disturbed areas and as isolated individuals or at low foliage covers. This suggests that weeds are not currently degrading the structure and composition of the native vegetation and are symptomatic of disturbance.

However, understorey weeds were dominant in the Wheatbelt Area of the KIOP MLE new disturbance footprint, which was not unexpected given the highly fragmented nature of the vegetation in this area and the proximity to agriculture (see **Section 3.3.5**).

Weed and seed checks and implementation of a weed management plan will minimise the risk of weed introduction and establishment due to KIOP MLE Proposal activities. This will be particularly important in the Mine Area given the vegetation in the Combined Proposal DE is predominately in Excellent condition (**Section 3.3.5**).

4.2.6 Dieback

Phytophthora cinnamomi (dieback) is a pathogen (fungal disease) that poses a major threat to native flora in WA, in particular in the temperate southwest of the State. *Phytophthora* is a type of water mould (Oomycota) that infests plant roots and causes them to rot. The loss of functional root systems prevents plants from taking up water and nutrients, causing them to die. The ecological consequences of infection include a dramatic modification of the structure and composition of native plant communities, a significant reduction in primary productivity, and habitat loss and degradation (Shearer et al., 2007).

Dieback can spread quickly into uninfested areas downslope of infected areas, facilitated by the movement of the pathogen in subsurface water flows. Human activity can also spread dieback through moving infected soil and plant material. Dieback also spreads slowly through root-to-root contact (Shearer et al., 2007).

The disease caused by dieback is most prevalent in wetter areas where the soil and rainfall conditions are conducive to its spread. Dieback occurs in the southwest of WA in an area called the "vulnerable zone", the boundary of which represents the 400 mm long-term average isohyet (DBCA, 2025). The conditions in this zone allow *Phytophthora* to persist, establish and cause dieback in natural ecosystems. Not all parts of the zone are equally vulnerable, and dieback is particularly widespread in the areas of ≥800mm annual rainfall (DBCA, 2025).

Approximately 40% (or more than 2,000 species) of native plants in WA are considered potentially susceptible to the disease caused by dieback. The plant groups most affected are the banksia family (*Proteaceae*), heath family (*Ericaceae*) and pea family (*Fabaceae*) (Groves et al., 2020; Shearer et al., 2004). According to the *threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi* (DoEE, 2018), the Eucalypt Woodlands of the Wheatbelt TEC is one of the EPBC listed TECs that may be impacted by *Phytophthora* dieback, and all of the previously listed susceptible plant families have species present in the TEC. However, several of the key TEC eucalypt species are considered resistant to dieback disease, including *Eucalyptus accedens*, *E. astringens*, *E. falcata*, *E. gardneri*, *E. occidentalis*, *E. rudis*, *E. salmonophloia*, *E. spathulata* and *E. wandoo* (DoE, 2015).

The Wheatbelt Area occurs within the vulnerable zone (albeit near its eastern boundary) and the nearest meteorological station, Yandanooka, receives an average of 181 mm of annual rainfall. However, the Mine Area is outside the vulnerable zone and receives 120 mm annual average rainfall (as recorded at KML's weather station at Karara site) (Umwelt, 2025). Given the Mine Area occurs outside the vulnerable zone and has annual precipitation well below 400 mm, it is unlikely that dieback is present.

Potential dieback impacts are most likely associated with clearing and soil movement activities during construction phase of the KIOP MLE Proposal. The construction activities that may result in dieback impacts include:

- Movement of vehicles with adhering soil/plant material from infested areas to uninfested areas (during construction and operation).
- Movement and stockpiling of soil during construction.
- New dieback infestations from importation of fill.

Implementation of dieback hygiene and a dieback management plan can prevent the spread of the disease caused by *Phytophthora*. Dieback hygiene includes ensuring that anything that may carry soil, such as machines, vehicles, footwear or equipment, are completely free of mud, clods or slurry of soil, and plant material prior to entering natural areas. If it is unknown whether or not an area is infested, the precautionary approach of cleaning on entry (to prevent introducing dieback to potentially uninfested areas) and cleaning on exit (to prevent bringing infested soil out of potentially infested areas and potentially introducing it elsewhere) should be implemented (DBCA, 2025).

4.3 Cumulative Impacts

Cumulative impacts to flora and vegetation could occur as a combination of impacts from the KIOP MLE Proposal as well as historical clearing, including from other historical proposals in the region (as far as they can be assessed). Cumulative impacts within RAA 1 (defined in **Section 6.3.1**) will likely be a result of a combination of impacts from KIOP, MIOP, HIOP, SMC, Warriedar Golden Range and Mt Mulgine projects in the area. Cumulative impacts within RAA 2 (defined in **Section 6.3.2**) will be predominately a result of the extensive historical clearing for agricultural activities (principally cereal cropping or grazing) in the Wheatbelt region (DoE 2015).

5.0 Mitigation

This section describes the mitigation measures that have been applied for the proposed expansion to minimise the impact of the Combined Proposal on significant flora and vegetation.

5.1 Land Clearing

KML will manage potential impacts to flora and vegetation in accordance with existing KML management system documents, including:

- Environmental Plan – Flora and Vegetation Management Plan (Document Number: CORP-EN-PLN-1011).
- Environmental Procedure – Approvals Request and Ground Disturbance (Document Number: CORP-EN-PRO-1004).
- Environmental Procedure – Flora, Weeds and Plant Pathogens (Document Number: CORP-EN-PRO-1009).
- Environmental Procedure – Seed Collection, Cleaning and Storage (CORP-EN-PRO-1037).

Key management measures to be implemented include:

- A Ground Disturbance Permit is required to be obtained from the KML Environment Department before commencing any activities that will change or disturb the ground surface or vegetation.
- Each application for a Ground Disturbance Permit will be assessed by the Environment Department who will assess the application against aspects such as heritage, flora, fauna and legislative approvals / requirements.
- The Ground Disturbance Permit may be granted subject to conditions, which will be tracked to completion.
- Areas required to be cleared will be surveyed and clearly demarcated, and clearing activities will be supervised to prevent over-clearing.
- Ground Disturbance activities will be subject to assessments and inspections, both pre and post clearing.

5.2 Rehabilitation

KML undertakes progressive rehabilitation at KIOP (and nearby MIOP and HIOP) with the aim of achieving stable, non-eroding and non-polluting final landforms that allow for the re-establishment of native vegetation as close as possible to its pre-disturbance condition. Rehabilitation objectives for vegetation include:

- Achieving 70% species composition at rehabilitated sites relative to the corresponding analogue site.
- Achieving baseline weeds levels or 10% coverage, whichever is less.

- Rehabilitation is conducted in accordance with the following KML environmental procedures / plans / schedules:
    - Land Rehabilitation (Document Number: CORP-EN-PRO-1002)
    - Rehabilitation Performance Monitoring (Document Number: CORP-EN-PRO-1040)
    - Rehabilitation Schedule (Document Number: CORP-EN-SCH-1006)
    - Mine Closure Plan (Document Number: CORP-EN-PLN-1038).

Progressive rehabilitation has been conducted at KIOP on parts of the WRD, and rehabilitation trials are being conducted on the dry stack TSF. Direct seeding and planting of tube stock has been undertaken to help achieve KML's rehabilitation goal of establishing self-sustaining vegetation communities that are reflective of the surrounding environment. Detailed rehabilitation monitoring results were provided to DWER in the 2020 Performance Review Report (Document Number: CORP-EN-REP-1144) and annual compliance and audit report for MS805, MS806 and MS968. KML has an ongoing minor non-compliance in not meeting the requirements in condition 11 of MS 806 that requires flora and vegetation to be reestablished with not less than 70% species composition, although an average of 70% species composition was achieved for MIOP as a whole for the area.

With respect to significant flora taxa, seven taxa have been recorded within rehabilitation at KIOP as presented in **Table 5.1**.

Table 5.1 Significant Flora Taxa Recorded in Rehabilitation at KIOP and MIOP

Taxon	Status (WA)	Status (EPBC)	Total Individuals (#)	Year Recorded	Rehabilitation Site(s)
Acacia karinae	P3	-	1	2024	KARWD01
			1	2024	TPD03
			1	2024	TPD04
			Total: 3		
Acacia woodmaniorum	EN	EN	1	2017	TSF01
Drummondita fulva	P3	-	8	2024	TPD08
			2	2024	TPD09
			Total: 10		
Grevillea globosa	P3	-	2	2013, 2014	TSF02
Micromyrtus acuta	P3	-	1	2024	TPD09
Micromyrtus trudgenii	P3	-	3	2015	TSF08
Rhodanthe collina	P3	-	1	2024	BHNWD05
			28	2024	TPD08
			1	2024	TPD09
			Total: 30		

6.0 Impact Assessment Methods

The assessment of impacts to significant flora and vegetation was determined through spatial analysis in a GIS environment by quantification of the KIOP MLE new disturbance footprint (direct/indirect impacts) or proposed Combined Proposal DF (cumulative impacts) on the known extent and range of environmental factors in the Combined Proposal DE and surrounding area. The KIOP MLE Proposal is expected to directly impact no more than 1,522 ha (which comprises 1,441 ha of vegetation).

6.1 Direct Impacts

6.1.1 Significant Flora Taxa

The number of individuals (perennial taxa) or locations (annual and ephemeral taxa) of each significant flora taxon that may be directly impacted by the KIOP MLE Proposal was used to quantify direct impacts to significant flora taxa. Spatial layers of the areas defined in **Section 1.2.1** were overlain on records of significant flora taxa from the Umwelt 2025 assessment in a GIS environment to determine the potential degree of direct impact to individuals / locations by the KIOP MLE new disturbance footprint. Any records of significant flora taxa within CCAC areas (defined in **Section 1.2** and presented in **Figure 6.1**) were removed during the assessment to ensure impacts were determined relative to extant (or presumed extant) flora records. The remaining records were used to calculate the direct impact of the portion of the KIOP MLE new disturbance footprint that is not a CCAC area.

The assessment of potential impact to *Calandrinia kalanniensis* (P2), which does not have known records within the Combined Proposal DE but has the potential to occur within the KIOP MLE new disturbance footprint (**Section 3.2.3**), was undertaken using impact to preferred habitat VTs.

6.1.2 Vegetation, Significant Vegetation and Vegetation Condition

Spatial layers of the areas defined in **Section 1.2.1** were overlain on the VT mapping from the Umwelt 2025 assessment in a GIS environment to determine the potential extent of direct impact to VTs, significant flora preferred habitat, significant vegetation communities and vegetation condition categories. Similarly to the significant flora direct impact assessment (**Section 6.1.1**), direct impact to vegetation was calculated as the remaining extents of the portions of the KIOP MLE new disturbance footprint that are not CCAC areas (as defined in **Section 1.2**).

6.2 Indirect Impacts

A spatial layer representing a buffer of 50 m on the Mine Area (excluding several minor isolated portions) and 10 m around all other proposed infrastructure was generated to assess the potential indirect impact of the KIOP MLE Proposal (**Section 1.2.2**). This indirect impact zone was used in a GIS spatial environment to quantify potential indirect impacts (i.e. edge effects) of the KIOP MLE Proposal on nearby significant flora, vegetation and significant vegetation.

The indirect impact assessment is based on a worst-case scenario, assuming total clearing of the Combined Proposal DF and total loss / deterioration of flora and vegetation within the indirect impact

zone. However, actual total loss of vegetation within this zone is considered unlikely based on observations of vegetation condition bordering the existing operations at KIOP.

A qualitative discussion of other potential indirect impacts to flora and vegetation surrounding the Combined Proposal DF was also provided where a quantitative assessment could not be undertaken.

6.3 Cumulative Impacts

The cumulative impact assessments considered areas that would be potentially directly impacted by the Combined Proposal DF, in addition to impacts (both existing and previously approved) from CCAC land (where data was available). The CCAC includes the existing mining operations at KIOP (MS 805) and MIOP (MS 806). To capture the total previous and potential disturbance within RAA 1 and RAA 2 (defined in **Section 6.3.1** and **Section 6.3.2**, respectively), all historic ecological records within CCAC areas (and for RAA 1, other existing impact areas as listed in **Section 6.3.1.1**) were incorporated into the cumulative impact assessment.

6.3.1 Regional Assessment Area 1

The impact of historical clearing on significant vegetation at Karara has been previously documented by Maia Environmental Consultancy (Maia, 2017) for the Mungada East Expansion Project. Maia calculated historical impacts within an area called the 'Blue Hills Impact Assessment Area', which encompasses the Mine Area part of the KIOP MLE new disturbance footprint, as well as KIOP, MIOP, HIOP, and SMC Mungada DSO.

The Blue Hills Impact Assessment Area was used here – as RAA 1 – for the Mine Area portion of the Combined Proposal DF, due to the similarity of impacted environmental values between Mungada East and the Combined Proposal. Note that the boundary of RAA 1 (as presented in **Figure 6.1** was manually digitised in a GIS environment as the spatial data for this boundary was not available. RAA 1 is approximately 71,453 ha in size.

6.3.1.1 Flora and Vegetation

The cumulative direct impact assessment for significant flora taxa considered all known records within RAA 1 of the 41 significant flora taxa of the Combined Proposal DE that would be directly or indirectly impacted by the KIOP MLE Proposal (**Section 7.1.1**). The data utilised for this assessment was compiled from a number of sources as presented in **Section 2.2**. Data was reviewed in a GIS environment prior to undertaking the assessment to remove potential duplicates.

Woodman Environmental's (2012) 'Regional Flora and Vegetation survey of the Karara to Minjar Block' assessment categorised vegetation communities into FCTs across an area encompassing KIOP and the BIF ridges adjacent to KIOP (**Figure 6.1**). This mapping was used to assess cumulative impacts to vegetation within RAA 1. Impacts to VTs of the Combined Proposal DE were then inferred from impacts to FCTs (based on the FCTs that were identified by Umwelt (2025) as being potentially equivalent to each VT (**Section 3.3.2**)).

Note that the Woodman Environmental (2012) FCTs do not quite extend across the entire RAA 1 (**Figure 6.1**Error! Reference source not found.), however this is considered a minor limitation of the assessment as the alternative dataset available for the area, pre-European VSAs (DPIRD 2019), have been defined and mapped at a much broader scale than the Woodman Environmental (2012) FCTs and therefore may not adequately capture the diversity of vegetation within RAA 1.

Historical clearing that was included in the cumulative direct impact assessment for RAA 1 comprised:

- CCAC areas as listed in in **Section 1.2**.
- Approved disturbance footprints for HIOP (MS 968) and neighbouring SMC operations (Mungada East, MS 1071 and Koolanooka/Blue Hills DSO Project, MS 811).
- Land mapped as cleared by Woodman Environmental (2012), provided the area was still visibly cleared based on current Esri (2025) satellite imagery.
- Large (visible at approximately 1:100,000 scale) areas of disturbance from the Warriedar Golden Range and Mt Mulgine Projects, manually mapped by Umwelt using current satellite imagery (Esri, 2025).

The DPIRD (2025) native vegetation extent spatial dataset was not used when mapping historically cleared areas within RAA 1 (as was done for RAA 2; described in **Section 6.3.2**) because this dataset mapped the entire RAA 1 area as native remnant vegetation except for some parts of the existing KIOP. Therefore, the approach described above for determining historically cleared areas within RAA 1 is considered more accurate.

All CCAC areas in RAA 1 are presented in **Figure 4.1**.

6.3.1.2 Listed Significant Vegetation

The cumulative direct impact assessment of significant vegetation communities was based on the original community extents stated in the Maia (2017) report. Umwelt considers that the Maia assessment is the most recent large-scale assessment of the Blue Hills PEC in the region. While the Warriedar Resources Golden Range Project has been approved since then, it does not occur within the known distribution of the Blue Hills PEC. Therefore, this data was deemed adequate for use in a cumulative assessment context. However, it is possible that some small areas of the PEC have been cleared since preparation of the Maia (2017) assessment, but this is not considered a significant limitation of this cumulative impact assessment.

Specifically, the cumulative impact assessment for RAA 1 used the below values from Maia (2017):

- Original regional extent, as per 'Total area mapped ha Pre' in Table 3.6 and 3.7 of Maia (2017).
- Historical regional impact, as per 'Total existing impact in Blue Hills Impact Assessment Area before proposal impact' in Table 3.7 of Maia (2017).

  This includes the area of the PEC previously impacted by all tenement holders in the Blue Hills Impact Assessment Area as well as in areas not covered by a tenement.

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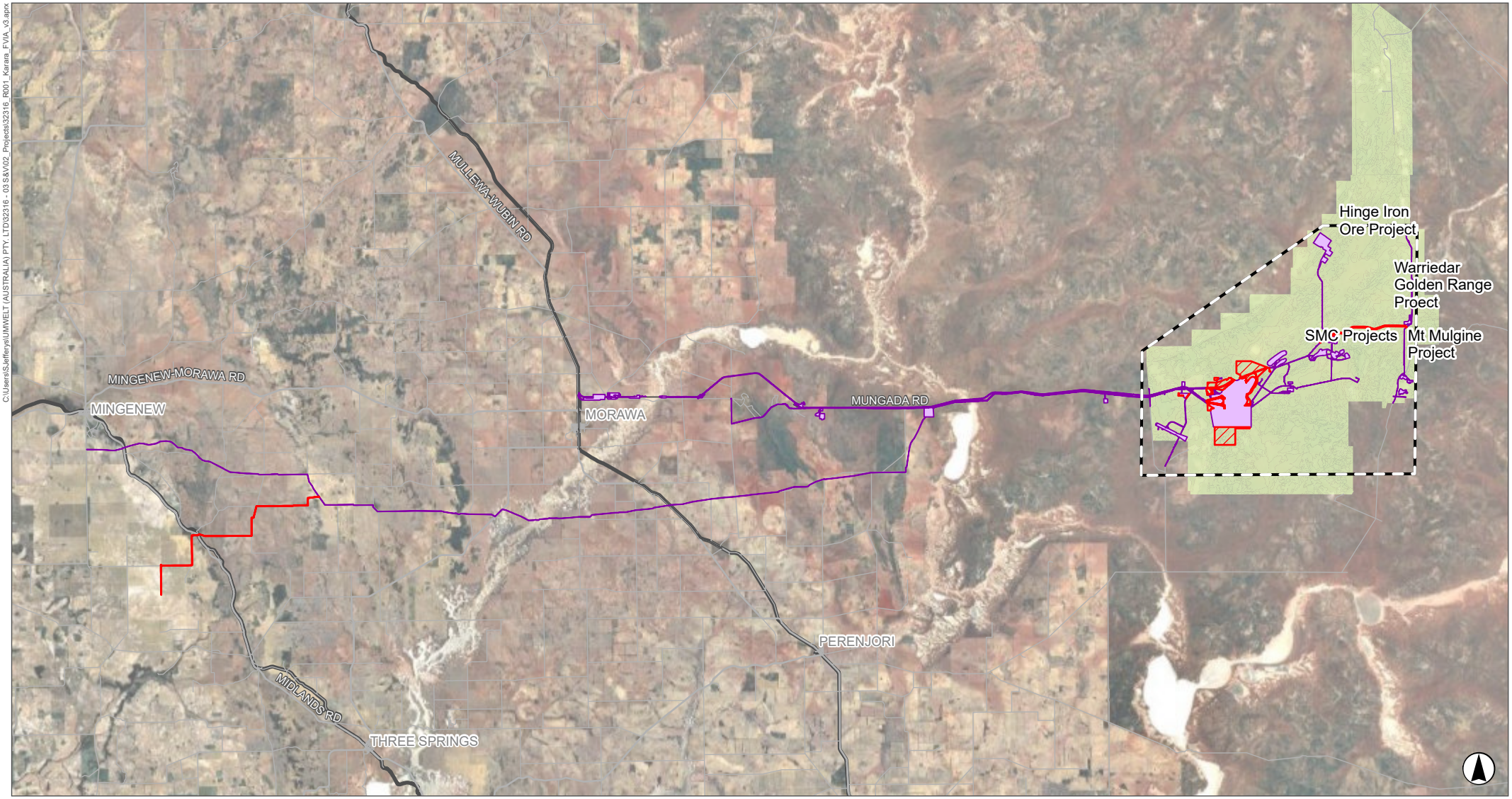

Legend

- Regional Assessment Area 1
- Currently Cleared or Approved to be Cleared (CCAC) Areas
- KIOP MLE New Disturbance Footprint
- Woodman Environmental (2012) Study Area
- Main Road
- Minor Road
- Railway

FIGURE 6.1
Regional Assessment Area 1

umwelt

Scale: 1:600,000 at A4, GDA2020 MGA Zone 50

0 12 24 km

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Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Woodman Environmental (2012)

6.3.2 Regional Assessment Area 2

RAA 2 was defined to assess cumulative direct impacts in the Wheatbelt Area of the Combined Proposal DF. RAA 2 represents the combined boundary of the two IBRA subregions that intersect the Wheatbelt Area (Merredin and Lesueur Sandplain) (DCCEEW 2022). The boundary of these two subregions was chosen to define RAA 2 as the Merredin IBRA subregion is highly relevant to the Eucalypt Woodlands of the Wheatbelt TEC (discussed further below), which was mapped by Umwelt (2025) in the Wheatbelt Area of the KIOP MLE new disturbance footprint.

As no significant flora taxa are known from or are 'likely'/'possible' to occur within the Wheatbelt Area or its associated indirect impact zone (Umwelt, 2025), a cumulative impact assessment for this environmental value was not conducted for RAA 2.

Cumulative impacts to vegetation were quantified using DPIRD (2019) pre-European vegetation mapping within RAA 2, which provided likely pre-disturbance extents for native vegetation in RAA 2. This mapping categorised vegetation communities into VSAs, which have been likened to potentially equivalent VTs by Umwelt (2025). Native vegetation extent mapping from DPIRD (2025) (last updated June 2023), along with CCAC areas, were then overlain on pre-European VSAs in a GIS environment to estimate the total disturbance to VSAs within RAA 2.

To assess cumulative impact to the Eucalypt Woodlands of the Wheatbelt TEC within the Merredin IBRA subregion of RAA 2, the methods described in the Commonwealth Approved Conservation Advice for the TEC (DoE 2015) were replicated and updated to reflect reductions in native vegetation extent within the Merredin IBRA subregion of RAA 2 since publication of that document in 2015. This involved calculating the total pre-European and current extents of the 45 Vegetation Associations (VAs) (as mapped by Beard et al. (2013)) that correspond to the TEC, as described in the Approved Conservation Advice. These 45 VAs are listed in **Appendix A**. The current VA extents were subsequently calculated using the DPIRD (2025) native vegetation extent spatial dataset using the method described previously; therefore, the 'current' extent of the TEC has been estimated based on the mapped native vegetation extent at June 2023. CCAC areas were also considered when calculating the cumulative impact, as described above for VTs.

7.0 Assessment of Residual Impacts

The KIOP MLE Proposal would result in direct loss of a maximum 1,441 ha of vegetation due to proposed land disturbance. Direct impacts have been assessed based on the KIOP MLE new disturbance footprint. Indirect impacts have been assessed as described in **Section 6.2**. According to this approach, approximately 171 ha of vegetation may be indirectly impacted by the KIOP MLE Proposal.

The assessment of impacts focuses on potential residual impacts from the KIOP MLE Proposal on the below, following mitigation as described in **Section 5.0**:

- Direct and indirect impacts on:
  - Significant flora taxa (**Section 7.1.1**).
  - Vegetation types (**Section 7.1.3**).
  - Significant vegetation (**Section 7.1.3**).
  - Vegetation condition (**Section 7.1.4**).
- Cumulative impacts on:
  - Significant flora taxa (**Section 7.2.1**).
  - Vegetation types (**Section 7.2.1.2**).
  - Significant vegetation (**Section 7.2.1.3**).

The results of the assessment of residual impacts from the KIOP MLE Proposal have been assessed qualitatively in **Section 8.0** to determine their potential significance.

7.1 Direct and Indirect Impacts

7.1.1 Significant Flora Taxa

The potential local impact to significant flora taxa is presented quantitatively as below:

- Direct and indirect local impact to extant [2] individuals of perennial taxa (i.e. those with a life span extending over more than two growing seasons (WA Herbarium, 1998-)) (**Table 7.1**).
- Direct and indirect local impact to extant locations of annual taxa (i.e. those that complete the full cycle of germination to fruiting within a single year and then die) as well as ephemeral taxa (short-lived taxa that fit neither previous definition, including geophytic taxa that have an underground storage organ, e.g. a tuber, bulb or rhizome, and an annually renewed aerial shoot (WA Herbarium, 1998-) (**Table 7.2**).

[2] Extant in this context refers to significant flora records that are located outside CACC areas.

Fourteen (14) of the 41 significant flora taxa of the Combined Proposal DE have records within the KIOP MLE new disturbance footprint and indirect impact zone, comprising:

- Three (3) Priority 1 taxa
- Ten (10) Priority 3 taxa
- One (1) potentially undescribed taxon.
- There are no records of EPBC or BC Act listed flora taxa within the KIOP MLE new disturbance footprint.

The direct and indirect local impacts to the 14 significant flora taxa will occur in the Mine Area only; no significant flora taxa are predicted to be directly or indirectly impacted in the Wheatbelt Area of the KIOP MLE new disturbance footprint. All 14 taxa are predicted to experience local indirect impacts based on the spatially defined indirect impact zone (**Section 1.2.2**), which extends outside the Combined Proposal DE in some places. Indirect impacts include dust emissions and weeds. Indirect impacts are not likely to involve direct clearing of vegetation (unless in the case of accidental clearing outside approved areas) but could result in local degradation of the health of flora and vegetation.

The KIOP MLE Proposal would result in local direct and indirect impact to 100% of records of five significant flora taxa:

- *Allocasuarina tessellata* (P3) (perennial).
- *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3) (annual).
- *Grevillea scabrida* (P3) (perennial).
- *Gunniopsis divisa* (P3) (annual).
- *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1) (perennial).

Two additional taxa have predicted direct and indirect impacts greater than 90%:

- *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1) (ephemeral): 96%.
- *Rhodanthe collina* (P3) (annual).

However, all the above taxa have records outside the Combined Proposal DE in RAA 1 (**Section7.2.1.1**).

Table 7.1 Direct and Indirect Local Impact to Individuals of Perennial Significant Flora Taxa

Taxon	Status (WA)	Status (EPBC)	Individuals in DE Including Those in CCAC (#)	Individuals in DE Excluding Those in CCAC (#)	Individuals in KIOP MLE New Disturbance Footprint Excl. CCAC (#)	Individuals in KIOP MLE New Disturbance Footprint Excl. CCAC (%)	Individuals in Indirect Impact Zone (#)	Total Individuals Impacted (#)	Total Individuals Impacted (%)^
Acacia karinae	P3	-	9,078	3,792	2,985	78.72	148	**3,133**	**81.23**
Acacia woodmaniorum	EN	EN	41	-	-	-	-	**-**	**-**
Allocasuarina tessellata	P3	-	726	720	696	96.67	24	**720**	**100.00**
Baeckea sp. Perenjori (J.W. Green 1516)	P2	-	29	-	-	-	-	**-**	**-**
Drummondita fulva	P3	-	516	478	131	27.41	-	**131**	**27.41**
Eucalyptus synandra	VU	VU	46	46	-	-	-	**-**	**-**
Grevillea globosa	P3	-	704	579	375	64.77	50	**425**	**67.68**
Grevillea granulosa	P3	-	11	10	-	-	-	**-**	**-**
Grevillea scabrida	P3	-	981	980	949	96.84	31	**980**	**100.00**
Grevillea subtiliflora	P3	-	1	1	-	-	-	**-**	**-**
Hemigenia sp. aff. *botryphylla*	PU	-	2	2	-	-	-	**-**	**-**
Hibbertia cockertoniana	P3	-	1	1	-	-	-	**-**	**-**
Lepidosperma sp. Blue Hills (A. Markey & S. Dillon 3468)	P1	-	44,550	6,338	2,914	45.98	223	**3,137**	**49.50**
Melaleuca barlowii	P3	-	9	4	-	-	-	**-**	**-**
Micromyrtus acuta	P3	-	4,751	1,923	-	-	-	**-**	**-**
Micromyrtus trudgenii	P3	-	1,292	621	28	4.51	-	**28**	**4.51**
Persoonia pentasticha	P3	-	532	437	377	86.27	15	**392**	**87.31**
Petrophile pauciflora	P3	-	22	2	-	-	-	**-**	**-**
Pityrodia viscida	P4	-	1	-	-	-	-	**-**	**-**
Prostanthera sp. Karara (D. Coultas & K. Greenacre Opp 8)	P1	-	9	9	9	100.00	10	**19**	**100.00**
Seringia exastia	-	CR	10	-	-	-	-	**-**	**-**
Stenanthemum poicilum	P3	-	25	22	-	-	-	**-**	**-**
Tecticornia fimbriata	P3	-	2	-	-	-	-	**-**	**-**
Tecticornia sp. 'Karara 1'	PU	-	4	-	-	-	-	**-**	**-**
Tecticornia sp. 'Karara 2'	PU	-	5	-	-	-	-	**-**	**-**

^ Total individuals impacted by the KIOP MLE new disturbance footprint and indirect impact zone as a proportion of the total number of extant individuals known from the Combined Proposal DE and indirect impact zone (i.e. excluding those that occur in CCAC).

Table 7.2 Direct and Indirect Local Impact to Locations of Annual and Ephemeral Significant Flora Taxa

Taxon	Status (WA)	Status (EPBC)	Locations in DE Including Those in CCAC (#)	Locations in DE Excluding Those in CCAC (#)	Locations in KIOP MLE New Disturbance Footprint Excl. CCAC (#)	Locations in KIOP MLE New Disturbance Footprint Excl. CCAC (%)	Locations in Indirect Impact Zone (#)	Total Locations Impacted (#)	Total Locations Impacted (%)^
Caesia sp. Koolanooka Hills (R. Meissner & Y. Caruso 78)	P1	-	234	227	216	95.15	8	**224**	**96.14**
Calotis sp. Perrinvale Station (R.J. Cranfield 7096)	P3	-	40	38	37	97.37	1	**38**	**100.00**
Crassula sp. nov.	PU	-	4	4	2	50.00	-	**2**	**50.00**
Epitriche demissus	P2	-	4	-	-	-	-	**-**	**-**
Fitzwillia axilliflora	P2	-	1	-	-	-	-	**-**	**-**
Gnephosis setifera	P1	-	2	1	-	-	-	**-**	**-**
Gunniopsis divisa	P3	-	23	20	20	100.00	4	**24**	**100.00**
Menkea draboides	P3	-	2	2	-	-	-	**-**	**-**
Millotia dimorpha	P1	-	55	1	-	-	-	**-**	**-**
Nicotiana salina	P1	-	1	-	-	-	-	**-**	**-**
Podotheca uniseta	P3	-	1	-	-	-	-	**-**	**-**
Rhodanthe collina	P3	-	497	437	389	89.02	7	**396**	**90.21**
Roebuckiella halophila	P3	-	13	10	-	-	-	**-**	**-**
Stylidium scintillans	VU	-	17	15	-	-	-	**-**	**-**
Swainsona picta	P1	-	2	2	-	-	-	**-**	**-**
Tricoryne soullierae	P3	-	1	1	-	-	-	**-**	**-**

^ Total locations impacted by the KIOP MLE new disturbance footprint and indirect impact zone as a proportion of the total number of extant locations known from the Combined Proposal DE and indirect impact zone (i.e. excluding those that occur in CCAC).

7.1.2 Vegetation

The potential local direct and indirect impact to vegetation types is presented quantitatively in **Table 7.3**.

Excluding CCAC areas, the KIOP MLE Proposal will result in local direct impact to 1,441 ha of vegetation across 19 VTs. Of these VTs, 13 provide preferred habitat for at least one of the 41 significant flora taxa known from the Combined Proposal DE, and 11 are significant for reasons other than formal listing (**Section 3.3.3.2**).

A total of 20 VTs are also predicted to experience local indirect impacts based on the indirect impact zone (**Section 1.2.2**). This comprises the 19 VTs that will be directly impacted, as well as VT AB. The extent of potential indirect impacts represents a total of 171 ha of VTs that may experience impacts such as dust deposition and weeds, of which 61 ha is outside the Combined Proposal DE. Indirect impacts are not likely to involve direct clearing of vegetation (unless in the case of accidental clearing outside approved areas) but could result in local degradation of the health of flora and vegetation.

The KIOP MLE Proposal will result in local direct and indirect impact to:

- VTs: 1,612 ha total impact (1,441 ha directly and 171 ha indirectly) to 19 VTs, or 17% of the total vegetation within the Combined Proposal DE and indirect impact zone (excluding CCAC areas).
- The total impact includes 4.3 ha direct and indirect impact to VT PL, which represents planted (non-locally endemic) mature *Eucalyptus* species in the Wheatbelt Area of the KIOP MLE new disturbance footprint.
- This total direct and indirect impact also includes impact to 100% of the total mapped extent of six VTs, as all mapped areas of these VTs are within the KIOP MLE new disturbance footprint and/or indirect impact zone (Wheatbelt Area). Of these six VTs, four have greater than 50% of their total extents represented within the indirect impact zone (VTs AB, HMVT D, HMVT E and HMVT F), and therefore it is unlikely that there will actually be 100% local loss of these VTs as a result of the KIOP MLE Proposal. With the exception of VT AB, these VTs are 'highly modified vegetation types' and are in Completely Degraded condition (as per the vegetation condition scale for the South West and Interzone Botanical Provinces from EPA (2016b)) (Umwelt 2025). VT AB occurs only within the indirect impact zone, and consequently it is unlikely that the KIOP MLE Proposal will actually result in 100% local loss of this VT.
- **Significant flora preferred habitat:** 1,587 ha total impact (1,429 ha directly and 158 ha indirectly) to preferred habitat for any of the 41 significant flora taxa of the Combined Proposal DE, or 18% of total preferred habitat vegetation within the Combined Proposal DE and indirect impact zone (excluding CCAC areas). This impact is within the Mine Area only, as the VTs of the Wheatbelt Area do not provide preferred habitat for any of the 41 significant flora taxa of the Combined Proposal DE (Umwelt 2025).

- **Unlisted significant vegetation:** 385 ha impact (331 ha directly and 54 ha indirectly) to VTs that are significant for reasons other than formal listing, or 13% of total extent of these VTs within the Combined Proposal DE and indirect impact zone (excluding CCAC areas). These VTs are:
    - **HMVT D** (Wheatbelt Area): 100% impact, as all mapped areas occur within the KIOP MLE new disturbance footprint and indirect impact zone. However, the VT extends outside these areas and the Combined Proposal DE (Umwelt 2025). This VT is significant for reasons other than formal listing as it may contribute to maintenance of refugia within a highly cleared landscape (Umwelt 2025) (**Section 3.3.3.2**). This VT corresponds to pre-European VSA Mingenew_354 (**Section 3.3.2**), which in 2018 had 11.4% of its pre-European extent remaining in the Merredin IBRA subregion, of which 1.0% occurred within protected areas (**Section 3.3.1**).
    - **VT O** (Mine Area): 25% impact. This VT is significant due to occurring on a restricted landform (slopes and crests of banded iron formation (BIF) hills), and consequently the VT plays a role as a refugium and provides habitat for a diverse and unique plant community with high plant endemism (Umwelt 2025).
    - **VT Q** (Mine Area): 12% impact. This VT is significant due to providing preferred habitat for *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1). According to DBCA records, this taxon has a restricted range of 15 km (WA Herbarium, 1998-). However, Woodman Environmental (2009j, 2010a, 2012) recorded the taxon a further 20 km north of DBCA records. It is not clear why these records are not represented in DBCA databases. Therefore, the taxon may have a slightly larger range than currently indicated by DBCA.
    - **VT P** (Mine Area): 12% impact. This VT is significant due to occurring on a restricted landform (slopes and ridges of BIF hills), and consequently the VT provides habitat for a diverse and unique plant community with high plant endemism (Umwelt 2025).
    - **VT B** (Mine Area): 8% impact. This VT is significant due to occurring on a restricted landform (granite outcrops), and consequently the VT plays a role as a refugium and provides specialised niche habitats for flora and fauna. VT B also provides preferred habitat for *Swainsona picta* (P1), which is known from a range of only 10 km and two locations (as per DBCA's WA Herbarium specimen database (WA Herbarium, 1998-)), none of which are within conservation tenure (Umwelt 2025).

Table 7.3 Direct and Indirect Local Impact to Vegetation Types

VT	Preferred Habitat for Significant Flora Taxon	Significant other than Formal Listing	Extent in DE Including CCAC (ha)	Extent in DE Excluding CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (%)	Extent in Indirect Impact Zone Excl. CACC (ha)	Total Extent in Indirect Impact Zone Excl. CACC (%)*	Total Extent Impacted Excl. CACC (ha)	Total Extent Impacted Excl. CACC (%)^
A	• *Acacia karinae* • *Allocasuarina tessellata* • *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) • *Calandrinia kalanniensis* • *Grevillea scabrida* • *Hemigenia* sp. aff. *botryphylla* • *Menkea draboides* • *Rhodanthe collina*	-	291.72	246.51	82.01	33.27	5.23	2.08	**87.24**	**35.28**
B	• *Calandrinia kalanniensis* • *Crassula* sp. nov. • *Swainsona picta*	Yes	112.29	110.61	3.82	3.45	5.44	4.68	**9.26**	**8.37**
C	-	-	327.19	321.27	0.78	0.24	0.03	0.01	**0.80**	**0.25**
D	• *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) • *Grevillea scabrida* • *Persoonia pentasticha* • *Seringia exastia*	-	2,443.70	2,212.88	389.56	17.60	26.99	1.20	**416.55**	**18.75**
E	• *Baeckea* sp. Perenjori (J.W. Green 1516) • *Menkea draboides* • *Roebuckiella halophila* • *Stenanthemum poicilum*	-	670.66	621.19	28.49	4.59	4.78	0.76	**33.27**	**5.36**
F	• *Calandrinia kalanniensis* • *Grevillea subtiliflora*	-	366.78	340.46	13.17	3.87	4.41	1.28	**17.58**	**5.16**
G	• *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) • *Gunniopsis divisa* • *Persoonia pentasticha* • *Roebuckiella halophila*	-	1,575.23	1,307.83	236.15	18.06	25.10	1.88	**261.24**	**19.80**
H	• *Persoonia pentasticha*	-	139.83	128.59	70.19	54.58	2.88	2.19	**73.07**	**56.29**
I	• *Tricoryne soullierae*	-	10.39	8.38	-	-	-	-	**-**	**-**
J	-	Yes	99.30	99.30	-	-	-	-	**-**	**-**
K	• *Grevillea scabrida* • *Gunniopsis divisa* • *Persoonia pentasticha* • *Rhodanthe collina*	-	313.59	219.08	38.27	17.47	8.21	3.61	**46.48**	**20.78**

VT	Preferred Habitat for Significant Flora Taxon	Significant other than Formal Listing	Extent in DE Including CCAC (ha)	Extent in DE Excluding CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (%)	Extent in Indirect Impact Zone Excl. CACC (ha)	Total Extent in Indirect Impact Zone Excl. CACC (%)*	Total Extent Impacted Excl. CACC (ha)	Total Extent Impacted Excl. CACC (%)^
L	• *Nicotiana salina* • *Podotheca uniseta* • *Tecticornia fimbriata*	-	50.92	30.57	-	-	-	-	**-**	**-**
M	• *Gnephosis setifera*	Yes	18.20	17.11	-	-	-	-	**-**	**-**
N	• *Epitriche demissus* • *Fitzwillia axilliflora* • *Gnephosis setifera* • *Tecticornia fimbriata* • *Tecticornia* sp. 'Karara 1' • *Tecticornia* sp. 'Karara 2'	Yes	10.74	1.87	-	-	-	-	**-**	**-**
O	• *Acacia karinae* • *Calandrinia kalanniensis* • *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) • *Drummondita fulva* • *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) • *Micromyrtus acuta* • *Micromyrtus trudgenii* • *Millotia dimorpha* • *Petrophile pauciflora* • *Rhodanthe collina* • *Stylidium scintillans*	Yes	546.25	401.24	90.03	22.44	12.14	2.94	**102.17**	**25.46**
P	• *Acacia karinae* • *Drummondita fulva* • *Grevillea globosa* • *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) • *Melaleuca barlowii*	Yes	619.78	554.21	58.25	10.51	8.07	1.44	**66.32**	**11.96**
Q	• *Grevillea globosa* • *Hibbertia cockertoniana* • *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8)	Yes	1,688.21	1,632.78	175.33	10.74	24.04	1.45	**199.38**	**12.09**
R	• *Drummondita fulva* • *Eucalyptus synandra* • *Grevillea globosa* • *Roebuckiella halophila*	-	785.40	652.13	133.34	20.45	17.01	2.54	**150.34**	**23.03**

VT	Preferred Habitat for Significant Flora Taxon	Significant other than Formal Listing	Extent in DE Including CCAC (ha)	Extent in DE Excluding CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (%)	Extent in Indirect Impact Zone Excl. CACC (ha)	Total Extent in Indirect Impact Zone Excl. CACC (%)*	Total Extent Impacted Excl. CACC (ha)	Total Extent Impacted Excl. CACC (%)^
S	• *Acacia karinae* • *Allocasuarina tessellata* • *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) • *Menkea draboides*	-	452.66	432.96	109.95	25.40	13.77	3.08	**123.72**	**28.33**
T	• *Grevillea granulosa* • *Melaleuca barlowii* • *Tricoryne soullierae*	-	187.33	174.83	-	-	-	-	**-**	**-**
U	-	Yes	64.25	64.25	-	-	-	-	**-**	**-**
V	-	Yes	0.44	-	-	-	-	-	**-**	**-**
W	-	Yes	0.56	-	-	-	-	-	**-**	**-**
X	-	Yes	0.21	-	-	-	-	-	**-**	**-**
Y	-	Yes	1.82	-	-	-	-	-	**-**	**-**
Z	-	Yes	0.65	-	-	-	-	-	**-**	**-**
AA	• *Baeckea* sp. Perenjori (J.W. Green 1516)	Yes	0.22	-	-	-	-	-	**-**	**-**
AB	-	-	-	-	-	-	0.06	100.00	**0.06**	**100.00**
HMVT A	-	-	0.15	-	-	-	-	-	**-**	**-**
HMVT B	• *Pityrodia viscida*	-	0.20	-	-	-	-	-	**-**	**-**
HMVT C	-	-	0.05	-	-	-	-	-	**-**	**-**
HMVT D	-	Yes	4.72	3.89	3.89	100.00	4.10	51.31	**7.99**	**100.00**
HMVT E	-	-	1.75	1.42	1.42	100.00	3.00	67.79	**4.42**	**100.00**
HMVT F	-	-	2.00	1.51	1.51	100.00	3.79	71.50	**5.29**	**100.00**
HMVT G	-	-	3.29	1.54	1.54	100.00	1.09	41.42	**2.63**	**100.00**
CP	-	Yes	6.70	6.70	-	-	-	-	**-**	**-**
PL	-	-	3.88	3.61	3.61	100.00	0.70	16.15	**4.31**	**100.00**
Water	-	-	1.55	1.53	-	-	-	-	**-**	**-**
CL	-	-	2,754.36	-	-	-	-	-	**-**	**-**
Total			**13,557.00**	**9,598.27**	**1,441.31**		**170.81**		**1,612.13**	

* Total VT extent in the indirect impact zone is the indirect impact zone extent as a proportion of the entire extent of the VT across both the DE (excluding vegetation within CCAC areas) and the indirect impact zone.

^ Total extent impacted by the KIOP MLE new disturbance footprint and indirect impact zone as a proportion of the total extent within both the Combined Proposal DE and indirect impact zone excluding areas that occur in CCAC.

7.1.3 Listed Significant Vegetation

The potential local direct and indirect impact to listed significant vegetation (i.e. TECs and PECs) is presented quantitatively in **Table 7.3**.

The KIOP MLE Proposal will result in local direct and indirect impact to two communities:

- **Blue Hills PEC:** 118 ha impact (98 ha directly and 20 ha indirectly), or 20% of the total community extent within the Combined Proposal DE and indirect impact zone (excluding CCAC areas). This community occurs within the Mine Area of the Combined Proposal DE only. The direct and indirect impact area encompasses PEC vegetation in Excellent condition.
- **Eucalypt Woodlands of the Wheatbelt TEC:** 3.7 ha impact (1.4 ha directly and 2.3 ha indirectly), equating to 100% of the total community extent within the Combined Proposal DE and indirect impact zone (excluding CCAC areas), as all mapped areas occur within the KIOP MLE new disturbance footprint and indirect impact zone. The vegetation that will be directly impacted is in Completely Degraded condition, while the vegetation that may be indirectly impacted is in Good to Degraded condition. A total of 63% of the impacted area occurs within the indirect impact zone, and consequently it is unlikely that the KIOP MLE Proposal will result in 100% loss of this vegetation. This community occurs within the Wheatbelt Area of the Combined Proposal DE only.

Table 7.4 Direct and Indirect Local Impact to Listed Significant Vegetation

Community	Status (WA)	Status (EPBC)	Extent in DE Including CCAC (ha)	Extent in DE Excluding CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (%)	Extent in Indirect Impact Zone (ha)	Total Community Extent in Indirect Impact Zone (%)*	Total Extent Impacted (ha)	Total Extent Impacted (%)^
Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)	PEC (P1)	-	770.40	598.51	98.15	16.40	19.54	3.16	**117.70**	**19.67**
Eucalypt woodlands of the Western Australian Wheatbelt	PEC (P3)	TEC (CR)	1.57	1.36	1.36	100.00	2.32	63.08	**3.68**	**100.00**
Koolanooka System as originally described in Beard (1976)	TEC (CR)	-	5.65	1.95	-	-	-	-	**-**	**-**
Plant assemblages of the Billeranga System as originally described in Beard (1976)	TEC (CR)	-	0.22	-	-	-	-	-	**-**	**-**

* Total community extent in the indirect impact zone is the indirect impact zone extent as a proportion of the entire extent of the community across both the DE (excluding vegetation within CCAC areas) and the indirect impact zone.

^ Total extent impacted by the KIOP MLE new disturbance footprint and indirect impact zone as a proportion of the total extent within both the Combined Proposal DE and indirect impact zone excluding areas that occur in CCAC.

7.1.4 Vegetation Condition

The impacts to vegetation condition were assessed only for direct impacts within the Combined Proposal DE, as it is difficult to predict changes in vegetation condition caused by indirect impacts. The potential local direct impact to vegetation condition is presented quantitatively in **Table 7.5**.

The condition of the vegetation in the Combined Proposal DE was mostly rated as Excellent. Similarly, within the Mine Area of the KIOP MLE new disturbance footprint, the vegetation was predominately in Excellent condition, whereas the entirety of the Wheatbelt Area was mapped as Completely Degraded (**Section 3.3.5**). The largest expanses of Excellent condition vegetation in the Mine Area of the KIOP MLE new disturbance footprint are the proposed locations of the TSF and WRD.

The KIOP MLE Proposal is predicted to directly impact 15% of the Excellent rated vegetation of the Combined Proposal DE (Mine Area), and 34% of the Completely Degraded vegetation (Wheatbelt Area) (**Table 7.5**). Vegetation outside the KIOP MLE new disturbance footprint will remain outside of direct impacts. At least 85% of vegetation rated as Excellent and 99% of vegetation rated as Very Good will remain in the Combined Proposal DE.

Table 7.5 Direct Local Impact to Vegetation Condition

Condition Category	Extent in DE Including in CCAC (ha)	Extent in DE Excluding in CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (%)
Excellent	10,229.93	9,182.36	1,420.89	**15.47**
Very Good	226.90	153.57	2.18	**1.42**
Good	75.04	52.22	-	**-**
Poor	-	-	-	**-**
Degraded	199.30	160.87	2.24	**1.39**
Completely Degraded	69.92	47.72	16.01	**33.56**
Not Applicable*	2,755.92	108.12	56.14	**51.92**
Total	**13,557.00**	**9,704.86**	**1,497.45**	

* Includes areas mapped as 'Cleared Land' and 'Water'.

7.2 Cumulative Impacts

The cumulative direct impact assessments to significant flora taxa and vegetation considered existing impacts within the region. As discussed in **Section 1.2.3**, the history, context and scale of existing impacts differ greatly between the Mine Area and Wheatbelt Area of the KIOP MLE new disturbance footprint. For the Mine Area, existing impacts within RAA 1 are predominately from other mining projects in the region as described in **Section 1.4** and **6.3.1**. For the Wheatbelt Area, existing impacts within RAA 2 are overwhelmingly from clearing for agriculture. These two areas have therefore been assessed separately, in **Section 7.2.1** and **Section 7.2.2** respectively, using sources as described in **Section 2.2**.

7.2.1 Regional Assessment Area 1

7.2.1.1 Significant Flora Taxa

The cumulative direct impact assessment for flora considered all known records within RAA 1 of the 14 significant flora taxa that will be impacted by the KIOP MLE Proposal as identified in **Section 7.1.1**. The cumulative direct impact of the Combined Proposal to significant flora taxa within RAA 1 was evaluated by determining the number of significant flora records within the KIOP MLE new disturbance footprint, all CCAC areas, and the Combined Proposal DF (noting there is some overlap in these boundaries). The quantitative results are presented in **Table 7.6** (perennial taxa) and **Table 7.7** (annual and ephemeral taxa).

According to available data, the cumulative direct impact within RAA 1 to three significant flora taxa is predicted to be greater than 75%:

- ***Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1):** 95% cumulative impact to known locations within RAA 1, predominately as a result of the KIOP MLE Proposal which will directly impact 92% of all known locations within RAA 1.
- ***Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3):** 78% cumulative impact to known locations within RAA 1, predominately as a result of the KIOP MLE Proposal which will directly impact 73% of all known locations within RAA 1.
- ***Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1):** 72% cumulative impact to known locations within RAA 1. While the KIOP MLE Proposal is predicted to impact only 5% of all known individuals within RAA 1, 66% of all known individuals have already been cleared or occur in areas that have already been approved to be cleared (i.e. CCAC).

A further two taxa have predicted cumulative impacts between 50% and 75%:

- ***Rhodanthe collina* (P3):** 66% cumulative impact to known locations within RAA 1, predominately as a result of the KIOP MLE Proposal which will directly impact 56% of all known locations within RAA 1.
- ***Grevillea globosa* (P3):** 52% cumulative impact to known locations within RAA 1. This is a combination of a predicted 39% impact as a result of the KIOP MLE Proposal, and an additional 13% of all known individuals occurring in CCAC areas.

Table 7.6 Cumulative Impact to Individuals of Perennial Significant Flora Taxa Within RAA 1 that will be Impacted by the KIOP MLE Proposal

Taxon	Status (WA)	Status (EPBC)	Individuals in RAA 1 (#)	Individuals in KIOP MLE New Disturbance Footprint in RAA 1 (#)	Individuals in KIOP MLE New Disturbance Footprint in RAA 1 (%)	Individuals in All CCAC Areas in RAA 1 (#)	Individuals in All CCAC Areas in RAA 1 (%)	Individuals in Combined Proposal DF in RAA 1 (#)*	Individuals in Combined Proposal DF in RAA 1 (%)	Total Cumulative Impact in RAA 1 (#)^	Total Cumulative Impact in RAA 1 (%)
Acacia karinae	P3	-	33,481	2,985	8.92	5,789	17.29	8,271	24.70	**8,774**	**26.21**
Allocasuarina tessellata	P3	-	7,336	696	9.49	7	0.10	703	9.58	**703**	**9.58**
Drummondita fulva	P3	-	2,825	131	4.64	88	3.12	169	5.98	**219**	**7.75**
Grevillea globosa	P3	-	967	375	38.78	125	12.93	500	51.71	**500**	**51.71**
Grevillea scabrida	P3	-	4,491	949	21.13	6	0.13	950	21.15	**955**	**21.26**
Lepidosperma sp. Blue Hills (A. Markey & S. Dillon 3468)	P1	-	58,182	2,914	5.01	38,687	66.49	41,294	70.97	**41,601**	**71.50**
Micromyrtus trudgenii	P3	-	11,145	28	0.25	1,045	9.38	699	6.27	**1,073**	**9.63**
Persoonia pentasticha	P3	-	1,082	377	34.84	128	11.83	471	43.53	**505**	**46.67**
Prostanthera sp. Karara (D. Coultas & K. Greenacre Opp 8)	P1	-	306	9	2.94	-	-	9	2.94	**9**	**2.94**

* The total number of individuals in the Combined Proposal DF is not necessarily equal to the sum of individuals in the KIOP MLE new disturbance footprint and in CCAC areas within RAA 1, as these two boundaries overlap in some areas.

^ Total cumulative direct impact as the sum of individuals within the KIOP MLE new disturbance footprint and in CCAC areas within RAA 1.

Table 7.7 Cumulative Impact to Locations of Annual and Ephemeral Significant Flora Taxa Within RAA 1 that will be Impacted by the KIOP MLE Proposal

Taxon	Status (WA)	Status (EPBC)	Locations in RAA 1 (#)	Locations in KIOP MLE New Disturbance Footprint in RAA 1 (#)	Locations in KIOP MLE New Disturbance Footprint in RAA 1 (%)	Locations in All CCAC Areas in RAA 1 (#)	Locations in All CCAC Areas in RAA 1 (%)	Locations in Combined Proposal DF in RAA 1 (#) *	Locations in Combined Proposal DF in RAA 1 (%)	Total Cumulative Impact in RAA 1 (#)^	Total Cumulative Impact in RAA 1 (%)
Caesia sp. Koolanooka Hills (R. Meissner & Y. Caruso 78)	P1	-	235	216	91.91	7	2.98	223	94.89	**223**	**94.89**
Calotis sp. Perrinvale Station (R.J. Cranfield 7096)	P3	-	51	37	72.55	3	5.88	39	76.47	**40**	**78.43**
Crassula sp. nov.	PU	-	5	2	40.00	-	-	2	40.00	**2**	**40.00**
Gunniopsis divisa	P3	-	95	21	22.11	1	1.05	21	22.11	**22**	**23.16**
Rhodanthe collina	P3	-	693	389	56.13	65	9.38	449	64.79	**454**	**65.51**

* The total number of locations in the Combined Proposal DF is not necessarily equal to the sum of locations in the KIOP MLE new disturbance footprint and in CCAC areas within RAA 1, as these two boundaries overlap in some areas.

^ Total cumulative direct impact as the sum of locations within the KIOP MLE new disturbance footprint and in CCAC areas within RAA 1.

7.2.1.2 Vegetation

The cumulative direct impact assessment for vegetation within RAA 1 considered impact to the original mapped extents of Woodman Environmental (2012) FCTs within RAA 1 (**Section 6.3.1.1**). These FCTs have potentially equivalent VTs as described in **Section 3.3.2** and below. The cumulative direct impact of the Combined Proposal to such FCTs was evaluated by determining the extent of each FCT within the KIOP MLE new disturbance footprint, all CCAC areas, and the Combined Proposal DF (noting there is some overlap in these boundaries). The quantitative results are presented in **Table 7.8**.

No FCTs are predicted to have greater than 36% cumulative impact within RAA 1. Of the 19 FCTs that will be directly impacted by the KIOP MLE Proposal, those with the highest predicted cumulative impact are:

- **FCT 1:**
    - 35% cumulative impact to mapped extent of FCT within RAA 1. While the KIOP MLE Proposal is predicted to impact only 3.6% of the FCT extent within RAA 1, 31.5% of the mapped extent within RAA 1 has already been cleared or has been mapped in areas that have already been approved to be cleared (i.e. CCAC).
    - FCT 1 is potentially equivalent to VT O of the Combined Proposal DE.
- **FCT 27**:
    - 27% cumulative impact to mapped extent of FCT within RAA 1. This is a combination of a predicted 11% impact as a result of the KIOP MLE Proposal, and an additional 16% of the mapped extent within RAA 1 occurring in CCAC areas.
    - FCT 27 is potentially equivalent to VTs D and H of the Combined Proposal DE.
- **FCT 6**:
    - 23% cumulative impact to mapped extent of FCT within RAA 1. While the KIOP MLE Proposal is predicted to impact only 3% of the FCT extent within RAA 1, 20% of the mapped extent within RAA 1 occurs in CCAC areas.
    - FCT 6 is potentially equivalent to VT P of the Combined Proposal DE.

Table 7.8 Cumulative Direct Impact to Woodman Environmental (2012) FCTs Within RAA 1

FCT	Equivalent VT(s)	Original Regional Extent in RAA 1 (ha)	KIOP MLE Proposal Direct Impact in RAA 1 (ha)	KIOP MLE Proposal Direct Impact in RAA 1 (%)	FCT Extent in All CCAC Areas in RAA 1 (ha)	FCT Extent in All CCAC Areas in RAA 1 (%)	FCT Extent in Combined Proposal DF in RAA 1 (ha)	FCT Extent in Combined Proposal DF in RAA 1 (%)	Total Cumulative Impact to FCT in RAA 1 (ha)	Total Cumulative Impact to FCT in RAA 1 (%)
1	O	695.72	25.08	3.60	219.30	31.52	228.78	32.88	244.34	**35.12**
2	O	1,621.89	11.11	0.68	71.09	4.38	34.17	2.11	82.20	**5.07**
3	O	156.47	-	-	-	-	-	-	-	**-**
4	O	190.27	14.34	7.54	0.63	0.33	14.97	7.87	14.97	**7.87**
5	-	108.77	-	-	-	-	-	-	-	**-**
6	P	1,195.43	35.94	3.01	235.11	19.67	269.81	22.57	271.04	**22.67**
7	Q	8,057.06	279.20	3.47	671.97	8.34	883.85	10.97	947.59	**11.76**
8	P	311.75	2.48	0.80	0.86	0.28	2.48	0.80	3.35	**1.07**
9	Q	3,141.72	4.87	0.16	91.92	2.93	6.07	0.19	96.79	**3.08**
10	P	2,257.72	64.32	2.85	239.98	10.63	245.34	10.87	304.16	**13.47**
11	S	1,233.11	94.89	7.70	23.41	1.90	110.28	8.94	116.03	**9.41**
12	O	160.51	3.13	1.95	10.34	6.44	11.37	7.08	13.47	**8.39**
13	Q	1,462.62	37.73	2.58	70.78	4.84	38.82	2.65	108.51	**7.42**
14	-	125.83	-	-	-	-	-	-	-	**-**
15	G	671.92	-	-	34.44	5.13	34.44	5.13	34.44	**5.13**
16	B	12.08	-	-	-	-	-	-	-	**-**
17	-	969.06	-	-	4.86	0.50	-	-	4.86	**0.50**
18	-	625.47	-	-	33.88	5.42	-	-	33.88	**5.42**
19a	G, K	12,965.29	161.27	1.24	562.02	4.33	537.51	4.15	720.34	**5.56**
19b	J	102.89	-	-	-	-	-	-	-	**-**
19c	-	54.50	-	-	-	-	-	-	-	**-**
19d	U	159.52	-	-	-	-	-	-	-	**-**
20	-	781.69	-	-	-	-	-	-	-	**-**
21a	K	610.29	-	-	-	-	-	-	-	**-**
21b	C	4.37	-	-	1.50	34.42	1.50	34.42	1.50	**34.42**
21c	-	36.17	-	-	-	-	-	-	-	**-**
22	-	729.59	-	-	-	-	-	-	-	**-**
23	E, F	3,006.21	7.85	0.26	54.38	1.81	55.74	1.85	62.22	**2.07**
24	C, H	624.80	5.68	0.91	83.46	13.36	82.03	13.13	89.12	**14.26**
25	D, H	213.04	-	-	21.13	9.92	19.86	9.32	21.13	**9.92**
26	D, H	4,693.14	132.30	2.82	207.33	4.42	284.97	6.07	339.60	**7.24**
27	D, H	4,207.75	458.86	10.91	684.52	16.27	1,101.75	26.18	1,137.03	**27.02**
28	E	878.96	4.49	0.51	16.76	1.91	4.55	0.52	21.25	**2.42**
29	A	599.46	-	-	6.86	1.15	2.93	0.49	6.87	**1.15**
30	-	157.76	-	-	-	-	-	-	-	**-**
31	A	1,814.39	36.53	2.01	-	-	36.53	2.01	36.53	**2.01**
32	A, F	3,520.47	65.72	1.87	157.15	4.46	213.42	6.06	222.58	**6.32**
33	CP	13.40	-	-	-	-	-	-	-	**-**
C	CL	88.75	0.08	-	-	-	19.55	-	-	**-**
Total		**58,259.86**	**1,445.88**		**3,503.68**		**4,240.72**		**5,020.30**	

7.2.1.3 Listed Significant Vegetation

The Blue Hills PEC is the only listed significant vegetation community within RAA 1 that will be directly or indirectly impacted by the Combined Proposal (**Section 7.1.3**). The cumulative direct impact to this PEC was evaluated by incorporating the direct impact from the KIOP MLE new disturbance footprint, into the values for the PEC's original regional extent and historic impact as previously reported by Maia (2017) (**Section 6.3.1.2**). The results of this assessment are presented in **Table 7.9**.

The total cumulative impact to the Blue Hills PEC within RAA 1 is predicted to be 14%. However, as discussed in **Section 6.3.1.2**, the actual historical regional impact to the PEC is likely to be greater than that determined by Maia (2017) as it is possible that some clearing of the PEC has occurred since preparation of that assessment (although any clearing that may have occurred is likely to be small in comparison to the scale of RAA 1). Therefore, the impact of the Combined Proposal to the PEC is potentially significant.

Table 7.9 Cumulative Direct Impact to Listed Significant Vegetation Within RAA 1 that will be Impacted by the KIOP MLE Proposal

Community	Status (WA)	Status (EPBC)	Original Regional Extent in RAA 1 (ha)*	Historical Impact in RAA 1(ha)^	KIOP MLE Proposal Direct Impact (ha)	Total Cumulative Impact in RAA 1(ha)	Cumulative Impact in RAA 1 (%)
Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)	PEC (P1)	-	7,098	939	98	**1,037**	**14.61**

* As per 'Total area mapped ha Pre' in Table 3.6 and 3.7 of Maia (2017).

^ As per 'Total existing impact in Blue Hills Impact Assessment Area before proposal impact' in Table 3.7 of Maia (2017).

7.2.2 Regional Assessment Area 2

7.2.2.1 Significant Flora Taxa

There were no direct or indirect local impacts predicted to significant flora taxa in the Wheatbelt Area of the Combined Proposal DE (**Section 7.1.1**). Therefore, no cumulative impact assessment has been undertaken for significant flora taxa in RAA 2.

7.2.2.2 Vegetation

The cumulative direct impact assessment for vegetation within RAA 2 was assessed by calculating impacts to DPIRD (2019) pre-European VSAs (**Section 6.3.2**), which were likened to VTs by Umwelt (2025) (**Section 3.3.2**). All four HMVTs within RAA 2 that will be impacted by the Combined Proposal are represented by Mingenew_354 VSA, and therefore the predicted impacts to that VSA were used for the assessment. Note that no equivalent pre-European VSA was identified by Umwelt (2025) for VT PL, as it represents planted (non-locally endemic) mature *Eucalyptus* species, and therefore is incompatible with the pre-European dataset (which maps the original native vegetation presumed to have existed prior to European settlement (DPIRD 2019)).

As per **Section 3.3.2**, HMVT G is represented by both the Mingenew_354 and Perenjori_631 VSAs, as the VT was mapped in two main occurrences approximately 20 km apart: one occurrence within the Mingenew system and the other in the Perenjori system. However, only Mingenew_354 has relevance to the Combined Proposal, as the Perenjori_631 VSA occurs 20 km east of the KIOP MLE new disturbance footprint. Therefore, Perenjori_631 has not been included in this cumulative impact assessment.

The cumulative direct impact to the Mingenew_354 VSA within RAA 2 was evaluated by calculating the historical impact to the VSA using the native vegetation extent spatial dataset from DPIRD (2025) (last updated June 2023), combined with the direct impact from the Combined Proposal. The quantitative results are presented in **Table 7.10**.

While the direct impact of the Combined Proposal on the Mingenew_354 VSA is predicted to represent an increase of only 0.01% impact in RAA 2, the VSA has already experienced significant historical impact via clearing. The total cumulative impact to the VSA in RAA 2 is predicted to be 89%.

Table 7.10 Cumulative Direct Impact to Pre-European VSAs Within RAA 2

VT	Equivalent VSA	Original Pre-European Extent in RAA 2 (ha)	Remaining Extent of VSA in RAA 2 (ha)*	Historical Impact to VSA in RAA 2 (ha)	Combined Proposal Direct Impact in RAA 2 (ha)	Total Cumulative Impact to VSA in RAA 2 (ha)^	Total Cumulative Impact to VSA in RAA 2 (%)
HMVT D	Mingenew_354	91,115.03	10,341.03	80,774.00	4.72	**80,784.72**	**88.66**
HMVT E					1.75		
HMVT F					2.00		
HMVT G					2.25		
PL	N/A	-	-	-	3.61	**-**	**-**
CL	N/A	-	-	-	-	**-**	**-**
Total					**14.33**		

* Extent of the VSAs remaining within RAA 2, calculated by clipping the DPIRD pre-European vegetation spatial dataset to the DPIRD native vegetation extent spatial dataset (DPIRD, 2025). The spatial layers in this latter dataset were last updated – and therefore presumed current to – 19 June 2023.

7.2.2.3 Listed Significant Vegetation

The Eucalypt Woodlands of the Wheatbelt TEC is the only listed significant vegetation community within RAA 2 that will be directly or indirectly impacted by the Combined Proposal (**Section 7.1.3**). The cumulative direct impact to this TEC within the Merredin IBRA subregion in RAA 2 was evaluated by calculating the historical impact to the VAs that comprise the TEC (**Section 6.3.2**) using the native vegetation extent spatial dataset from DPIRD (2025) (last updated June 2023), combined with the direct impact from the Combined Proposal. The quantitative results are presented in **Table 7.11**.

While the direct impact of the Combined Proposal on the Eucalypt Woodlands of the Wheatbelt TEC is predicted to represent an increase of only 0.0001% impact in the Merredin IBRA subregion in RAA 2, the TEC has already experienced significant historical impact via clearing. The total cumulative impact is predicted to be 85%.

Using the same method as for RAA 2, the original and current extents of the TEC were estimated for its entire extent of occurrence (i.e. the Katanning, Merredin and Western Mallee). These were estimated to be 6,128,258 ha and 903,173 ha, representing a cumulative decline of 85.3%, which is similar to the decline of 84.6% estimated for the Merredin IBRA subregion in RAA 2.

Table 7.11 Cumulative Direct Impact to Listed Significant Vegetation Within the Merredin IBRA Subregion in RAA 2

Community	Status (WA)	Status (EPBC)	Original Regional Extent in RAA 2 (ha)*	Remaining Regional Extent in RAA 2 (ha)^	Historical Impact in RAA 2(ha)	KIOP MLE New Proposal Direct Impact (ha)	Total Cumulative Impact in RAA 2 (ha)	Total Cumulative Impact in RAA 2 (%)
Eucalypt woodlands of the Western Australian Wheatbelt	PEC (P3)	TEC (CR)	2,753,351.06	424,230.38	2,329,120.68	1.36	**2,329,122.04**	**84.59**

* Total pre-European extent of the 45 associated VAs of the TEC within the Merredin and Lesueur Sandplain IBRA subregions (i.e. RAA 2), calculated using the DPIRD pre-European vegetation spatial dataset (DPIRD 2019).

^ Extent of the 45 associated VAs of the TEC remaining within RAA 2, calculated by clipping the DPIRD pre-European vegetation spatial dataset to the DPIRD native vegetation extent spatial dataset (DPIRD, 2025). The spatial layers in this latter dataset were last updated – and therefore presumed current to – 19 June 2023.

8.0 Significance of Residual Impacts

The *WA Environmental Offsets Guidelines* (GoWA, 2014) provides a residual impact significance model that outlines how significance of residual impacts can be determined, and when an offset is likely to be required, or may be required, in relation to EPA environmental factors. The model defines four levels of significance for residual impacts:

- Unacceptable impacts: those impacts which are environmentally unacceptable or where no offset can be applied to reduce the impact. Offsets are not appropriate in all circumstances, as some environmental values cannot be offset.
- Significant impacts requiring an offset: any significant residual impact of this nature will require an offset. These generally relate to any impacts to species, ecosystems, or reserve areas protected by statute or where the cumulative impact is already determined to be at a critical level.
- Potentially significant impact which may require an offset: the residual impact may be significant depending on the context and extent of the impact. These relate to impacts that are likely to result in a species or ecosystem requiring protection under statute or increasing the cumulative impact to a critical level. Whether these impacts require an offset will be determined by the decision-maker based on information provided by the proponent or applicant and expert judgement.
- Impacts which are not significant: impacts which do not trigger the above categories are not expected to have a significant impact on the environment and therefore do not require an offset.

The residual impact significance model from GoWA (2014) was used to assist in categorising the residual impacts of the Combined Proposal and identify whether offsets may be required. The model was applied to significant flora taxa, vegetation types, and listed significant vegetation communities. The results of the assessment are presented in the following sections.

8.1 Significant Flora Taxa

An assessment against the residual impact significance model was undertaken for:

- all 14 significant flora taxa that will be directly or indirectly impacted by the KIOP MLE Proposal (**Section 7.1.1**).
- *Calandrinia kalanniensis* (P2) which has the potential to be present in the KIOP MLE new disturbance footprint (**Section 3.2.3**) and consequently is at risk of impact by the KIOP MLE Proposal.
- the four (4) EPBC Act/BC Act listed flora taxa that do not occur in the KIOP MLE new disturbance footprint, but are known from the Combined Proposal DE (**Section 3.2.1**).

The results are discussed in the following sections and summarised in **Table 8.1**.

Table 8.1 Summary of Results of Assessment of Significance of Residual Impacts to Significant Flora Taxa Against GoWA (2014) Clearing Principal (c)

Taxon	Status (WA)	Status (EPBC)	Unacceptable Impact	Significant Impact	Potentially Significant Impact	Impact Not Likely to be Significant
Acacia karinae	P3	-	-	-	-	✓
Acacia woodmaniorum	EN	EN	-	-	-	✓
Allocasuarina tessellata	P3	-	-	-	-	✓
Caesia sp. Koolanooka Hills (R. Meissner & Y. Caruso 78)	P1	-	-	-	-	✓
Calandrinia kalanniensis	P2	-	-	-	-	✓
Calotis sp. Perrinvale Station (R.J. Cranfield 7096)	P3	-	-	-	-	✓
Crassula sp. nov.	PU	-	-	-	-	✓
Drummondita fulva	P3	-	-	-	-	✓
Eucalyptus synandra	VU	VU	-	-	-	✓
Grevillea globosa	P3	-	-	-	-	✓
Grevillea scabrida	P3	-	-	-	-	✓
Gunniopsis divisa	P3	-	-	-	-	✓
Lepidosperma sp. Blue Hills (A. Markey & S. Dillon 3468)	P1	-	-	-	✓	-
Micromyrtus trudgenii	P3	-	-	-	-	✓
Persoonia pentasticha	P3	-	-	-	-	✓
Prostanthera sp. Karara (D. Coultas & K. Greenacre Opp 8)	P1	-	-	-	-	✓
Rhodanthe collina	P3	-	-	-	-	✓
Seringia exastia	-	CR	-	-	-	✓
Stylidium scintillans	VU	-	-	-	-	✓
Count			**0**	**0**	**1**	**14**

8.1.1 Unacceptable Impacts

The assessment against the residual impact significance model found that the residual impact to any significant flora taxon would not be environmentally unacceptable and/or could be able to be offset given the KIOP MLE Proposal is not predicted to completely remove (or result in significant deterioration to the health of) all occurrences of any flora taxon or their habitat.

8.1.2 Significant Impacts

The assessment against the residual impact significance model did not find that any residual impacts to significant flora taxa are significant and require an offset, given the KIOP MLE Proposal is not predicted to directly or indirectly impact any taxa that are listed under the BC and/or EPBC Acts (**Section 7.1.1**). Specific discussion on the four EPBC Act/BC Act listed taxa of the Combined Proposal DE is presented in **Section 8.1.4**.

In addition to the above, no other significant flora taxa within the KIOP MLE Proposal area are considered to have cumulative impacts that are already at a critical level.

8.1.3 Potentially Significant Impacts

The assessment against the residual impact significance model found that residual impacts to one significant flora taxon are potentially significant and may require an offset:

***Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1):**

- Direct local impact to only 5% of known locations within RAA 1, but taxon has a predicted cumulative impact of 72% (**Section 7.2.1.1**). Taxon has a relatively restricted range of 80 km and known records occur in protected tenure (Mungada Ridge National Park and Karara Conservation Park); however, there are unlikely to be substantial areas of suitable habitat within its known distribution given it occurs on restricted landforms (slopes of BIF landforms and granite outcrops) (Umwelt 2025).
- VT O represents preferred habitat for this taxon in the Combined Proposal DE (**Section 3.2.1**), and there is a predicted 25% direct and indirect impact to this VT as a result of the KIOP MLE Proposal (**Section 7.2.1.2**).
- Research and trials into the possibility of establishing or translocating the taxon in rehabilitation may reduce the residual impacts to this taxon.

8.1.4 Impacts that are Unlikely to be Significant

The residual impacts to the remaining 18 significant flora taxa are unlikely to be significant, as discussed in the following sections.

8.1.4.1 Threatened Flora Taxa

The KIOP MLE Proposal is not predicted to substantially impact, either directly or indirectly, any areas necessary to maintain ecological processes and functions for any taxa that are listed under the EPBC Act or BC Act:

***Acacia woodmaniorum* (WA: EN; EPBC: EN)**

- Habitat for this taxon is not considered to be present in the Combined Proposal DE (Umwelt 2025) (**Section 3.2.1**).

***Eucalyptus synandra* (WA: VU; EPBC: VU)**

- Preferred habitat for this taxon in the Combined Proposal DE (VT R) will be directly and indirectly impacted by the KIOP MLE Proposal (**Section 7.1.2**), however the impact to this vegetation is unlikely to be 'substantial'. The pre-European VSAs that represent this VT in the KIOP MLE Proposal area (Yalgoo_358, Yalgoo_363 and Yalgoo_420; **Section 3.3.2**) all have at least 98.5% of their pre-European extents remaining in the Tallering IBRA subregion (**Section 3.3.1**). Therefore, significant suitable habitat will remain for this taxon in the region.

***Seringia exastia* (EPBC: CR; not listed in WA)**

- Preferred habitat for this taxon in the Combined Proposal DE (VT D) will be directly and indirectly impacted by the KIOP MLE Proposal (**Section 7.1.2**), however the impact to this vegetation is unlikely to be 'substantial'. This taxon is known to be common and widespread across its large range, which extends across the arid zone of WA, including within numerous national parks and nature reserves. It also extends well into the NT, and the northwest of SA (**Section 3.2.1**). Therefore, significant suitable habitat will remain for this taxon.

***Stylidium scintillans* (WA: VU; not EPBC listed)**

- VT O represents the preferred habitat for this taxon in the Combined Proposal DE, which will be directly and indirectly impacted by the KIOP MLE Proposal (**Section 7.1.2**). However, this VT occurs on both BIF and granite geologies (**Section 3.3.2**). The impact to VT O by the KIOP MLE Proposal is almost entirely to the occurrences with underlying BIF geologies rather than granitic, and therefore there will not be 'substantial' impact to suitable habitat for this taxon.

8.1.4.2 Priority Flora Taxa

The remaining 14 significant flora taxa are unlikely to have significant residual impacts as a result of the KIOP MLE Proposal:

***Acacia karinae* (P3)**

- Direct local impact to 9% of known individuals within RAA 1 and predicted cumulative impact of 26% (**Section 7.2.1.1**). However, this taxon is not restricted to RAA 1 and has a known range of 80 km with records in protected tenure (Mungada Ridge National Park) (Umwelt 2025). Furthermore, the taxon is somewhat locally common, and the high predicted impact may be a consequence of targeted survey effort for the taxon being focussed on potential disturbance areas rather than all suitable habitat in the area.
- Woodman Environmental (2012) FCTs 1, 2, 3, 4, 6, 8, 10, 11, 12, 29, 31 and 32, which are equivalent to the taxon's preferred habitat VTs (A, O, P and S), will have 12,442 ha (90%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.
- Taxon has successfully established within rehabilitation at KIOP (**Section 5.2**), demonstrating positive evidence that some impact from the Combined Proposal could be mitigated.

***Allocasuarina tessellata* (P3)**

- Direct local impact to 9% of known individuals within RAA 1 and predicted cumulative impact of 10% (**Section 7.2.1.1**). The taxon is not restricted to RAA 1 and has a known range of 85 km (Umwelt 2025). The impact is not anticipated to result in the taxon requiring protection under statute or increasing the predicted cumulative impact of a critical level.

***Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)**

- Direct local impact to 92% of known locations within RAA 1 and predicted cumulative impact of 95% (**Section 7.2.1.1**). However, this is likely a reflection of the taxon being data-deficient in RAA 1.
- This taxon was recorded at Karara for the first time in 2020 by Umwelt (2021), representing a range extension of 39 km to the east at the time, and increasing the total known range to approximately 84 km. However, additional records have since been made further east of KIOP and also a disjunct record 230 km to the south (WA Herbarium, 1998-), significantly increasing its known extent of occurrence. Between Umwelt (2025) and DBCA (2023b) data, there are four records in protected tenure (timber reserve O 2 10 and Karara Conservation Park).
- Given the taxon is cryptic and challenging to differentiate from the common *Caesia micrantha*, and is only observable when above-ground parts are visible (August to October), it is possible that it has been overlooked by previous surveys. Therefore, it may be underrepresented in datasets (Combined Proposal DE, RAA 1 and wider datasets). Furthermore, high intensity survey at KIOP was undertaken for the first time by the Umwelt 2025 assessment within the KIOP MLE new disturbance footprint only, and consequently it is likely overrepresented in the KIOP MLE Proposal area dataset.
- Removal of individuals in the KIOP MLE Proposal area is unlikely to result in fragmentation of the taxon given populations will remain to the west and east (**Figure 3.1**).
- Woodman Environmental (2012) FCTs 11, 29, 31 and 32, which are equivalent to the taxon's preferred habitat VTs (A and S), will have 6,785 ha (95%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.
- It is likely that the high predicted impact to this taxon is a reflection of data deficiency as opposed to actual rarity of the taxon.

***Calandrinia kalanniensis* (P2)**

- Taxon has not been recorded in the Combined Proposal DE or KIOP MLE new disturbance footprint but known locations are in proximity to the DE (4.7 km) and habitat possibly occurs in the Combined Proposal DE and KIOP MLE Proposal area (brown, red gritty sandy clay over granite; shallow rock hollows on large granite rocks) (Umwelt 2025). Therefore, impact to the taxon has been assessed in terms of loss of suitable habitat as a result of the KIOP MLE Proposal.
- Suitable habitat in the Combined Proposal DE and KIOP MLE new disturbance footprint is likely represented by VTs A, B, F and O. The combined direct and indirect local impact to these VTs is 216 ha, or 20% of the mapped extent in the Combined Proposal DE (**Section 7.1.2**). Within RAA 1, these VTs are equivalent to Woodman Environmental (2012) FCTs 1, 2, 3, 4, 12, 16, 23, 29, 31 and 32 which will have 11,094 ha (94%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.

- Furthermore, the taxon is known from a wide range of 315 km (WA Herbarium, 1998-). Given it is only observable when above-ground parts are visible (October to January), it is possible that it has been overlooked by previous surveys. Therefore, it may be underrepresented in datasets (Combined Proposal DE, RAA 1 and wider datasets).

***Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3)**

- Direct local impact to 73% of known locations within RAA 1 and predicted cumulative impact of 78% (**Section 7.2.1.1**). However, the taxon is known from a wide range of 490 km with records in protected tenure (Mungada Ridge National Park) (Umwelt 2025). The high predicted impact may be a consequence of targeted survey effort for the taxon being focussed on potential disturbance areas rather than all suitable habitat in the area.
- Woodman Environmental (2012) FCTs 15, 19a, 25, 26 and 27, which are equivalent to the taxon's preferred habitat VTs (D and G), will have 20,499 ha (91%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.
- Furthermore, the taxon is an annual and is only observable during August to October. Consequently, it may not be captured by surveys outside this period and thus may be underrepresented in datasets.
- Given this taxon is an annual and therefore likely maintains a seed store in topsoil, it is possible that using appropriately managed topsoil from the area of direct impact may return this taxon in rehabilitation.

***Crassula* sp. nov. (PU)**

- Direct local and cumulative regional impact to 40% of known locations within RAA 1 as a result of the Combined Proposal (**Section 7.2.1.1**). However, this entity is data deficient and the results of the Umwelt 2025 assessment raise uncertainty as to the taxonomic status of the entity and whether it truly represents an undescribed taxon. All collections made by Umwelt in 2024 of a *Crassula* species that resembled *Crassula* sp. nov., from the same general area and same habitat as where *Crassula* sp. nov. was collected (granitic areas and near/on granite outcrops), were all attributed to the common *Crassula extrorsa*. It was not clear why there were no collections made of the potentially undescribed *Crassula* entity in 2023 or 2024, particularly given the exceptional season and above-average winter rainfall received in 2024. It is possible that the entity is in fact *Crassula extrorsa*, with the original collection being either aberrant or under-developed (Umwelt 2025).
- Three known locations will not be impacted by the Combined Proposal (**Section 7.2.1.1**), and 87% of the original extents of Woodman Environmental (2012) FCTs 1, 2, 3, 4 and 12, which are equivalent to the taxon's preferred habitat VTs (B and O), will remain in RAA 1 when considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, 'substantial' impact to preferred habitat for the taxon in the area.
- Further sampling is required in order to resolve the taxonomic status of this entity. This could be done at the remaining locations outside the Combined Proposal, and/or similar habitat in the area.

***Drummondita fulva* (P3)**

- Direct local impact to 5% of known individuals within RAA 1 and predicted cumulative impact of 8% (**Section 7.2.1.1**). The taxon is not restricted to RAA 1 and has a known range of 60 km with records in protected tenure (Mungada Ridge National Park) (Umwelt 2025). The impact is not anticipated to result in the taxon requiring protection under statute or increasing the predicted cumulative impact of a critical level.
- Taxon has successfully established within rehabilitation at KIOP (**Section 5.2**), demonstrating positive evidence that some impact from the Combined Proposal could be mitigated.

***Grevillea globosa* (P3)**

- Direct local impact to 39% of known individuals within RAA 1 and predicted cumulative impact of 52% (**Section 7.2.1.1**). However, the taxon is not restricted to RAA 1 and has a known range of 145 km with records in protected tenure (Barnong National Park, Mungada Ridge National Park, and Dalgaranga National Park) (Umwelt 2025). While the local impact and impact within RAA 1 is moderately high, across its range, the impact of the Combined Proposal is not anticipated to result in the taxon requiring protection under statute or increasing the predicted cumulative impact of a critical level.
- Woodman Environmental (2012) FCTs 6, 7, 8, 9, 10 and 13, which are equivalent to the taxon's preferred habitat VTs (P, Q and R), will have 14,695 ha (89%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.
- Taxon has successfully established within rehabilitation at KIOP (**Section 5.2**), demonstrating positive evidence that some impact from the Combined Proposal could be mitigated.

***Grevillea scabrida* (P3)**

- Direct local impact to 21.1% of known individuals within RAA 1 and predicted cumulative impact of 21.3% (**Section 7.2.1.1**). However, taxon is not restricted to RAA 1 and has a known range of 85 km with records in protected tenure (Karara Conservation Park) (Umwelt 2025).
- Woodman Environmental (2012) FCTs 19a, 21a, 25, 26, 27, 29, 31 and 32, which are equivalent to the taxon's preferred habitat VTs (A, D and K), will have 26,140 ha (91%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.
- The high predicted impact may be a consequence of targeted survey effort for the taxon being focussed on potential disturbance areas rather than all suitable habitat in the area.

***Gunniopsis divisa* (P3)**

- Direct local impact to 22% of known individuals within RAA 1 and predicted cumulative impact of 23% (**Section 7.2.1.1**). However, taxon is not restricted to RAA 1 and has a large known range of 410 km with records in protected tenure (Mungada Ridge National Park and Karara Conservation Park) (Umwelt 2025).

- Woodman Environmental (2012) FCTs 15, 19a and 21a, which are equivalent to the taxon's preferred habitat VTs (G and K), will have 13,493 ha (95%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.
- The high predicted impact may be a consequence of targeted survey effort for the taxon being focussed on potential disturbance areas rather than all suitable habitat in the area.
- Given this taxon is an annual and therefore likely maintains a seed store in topsoil, it is possible that using appropriately managed topsoil from the area of direct impact may return this taxon in rehabilitation.

***Micromyrtus trudgenii* (P3)**

- Direct local impact to 0.25% of known individuals within RAA 1 and predicted cumulative impact of 10% (**Section 7.2.1.1**). The taxon is not restricted to RAA 1 and has a known range of 55 km with records in protected tenure (Mungada Ridge National Park and Karara Conservation Park) (Umwelt 2025). The impact is not anticipated to result in the taxon requiring protection under statute or increasing the predicted cumulative impact of a critical level.
- Taxon has successfully established within rehabilitation at KIOP (**Section 5.2**), demonstrating positive evidence that some impact from the Combined Proposal could be mitigated.

***Persoonia pentasticha* (P3)**

- Direct local impact to 35% of known individuals within RAA 1 and predicted cumulative impact of 47% (**Section 7.2.1.1**). However, taxon is not restricted to RAA 1 and has a large known range of 250 km with records in protected tenure (Mungada Ridge National Park, Karara Conservation Park, Timber Reserve O 2 10, West Perenjori Nature Reserve, Barnong Conservation Park and East Yuna Nature Reserve) (Umwelt 2025).
- Woodman Environmental (2012) FCTs 15, 19a, 21a, 24, 25, 26 and 27, which are equivalent to the taxon's preferred habitat VTs (D, G, H and K), will have 21,645 ha (90%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.
- The high predicted impact may be a consequence of targeted survey effort for the taxon being focussed on potential disturbance areas rather than all suitable habitat in the area.

***Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)**

- Direct local and cumulative regional impact to 3% of known individuals within RAA 1 as a result of the KIOP MLE Proposal/Combined Proposal (**Section 7.2.1.1**). According to DBCA records, taxon has a restricted range of 15 km which occurs entirely within RAA 1 (WA Herbarium, 1998-). However, Woodman Environmental (2009j, 2010a, 2012) have recorded the taxon a further 14 km north of RAA 1. It is not clear why these records are not represented in DBCA databases. Therefore, the taxon may have a slightly larger range than currently indicated by DBCA.
- There are records of the taxon in protected tenure (Karara Conservation Park).

- While there will be a 12% combined direct and indirect impact to the taxon's preferred habitat (VT Q) at the local scale (**Section 6.1.2**), Woodman Environmental (2012) FCTs 7, 9 and 13, which are equivalent to the taxon's preferred habitat VT (Q), will have 11,509 ha (91%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**).
- The impact is unlikely to result in the taxon requiring protection under statute or increasing the predicted cumulative impact of a critical level.

***Rhodanthe collina* (P3)**

- Direct local impact to 56% of known locations within RAA 1 and predicted cumulative impact of 66% (**Section 7.2.1.1**). However, taxon known from a wide range of 150 km with records in protected tenure (Mungada Ridge National Park, Karara Conservation Park, Thundelarra Conservation Park, and Mingenew Nature Reserve) (Umwelt 2025). The high predicted impact may be a consequence of targeted survey effort for the taxon being focussed on potential disturbance areas rather than all suitable habitat in the area.
- Woodman Environmental (2012) FCTs 1, 2, 3, 4, 12, 19a, 21a, 29, 31 and 32, which are equivalent to the taxon's preferred habitat VTs (A, K and O), will have 20,993 ha (91%) of their original extents remaining in RAA 1 following implementation of the Combined Proposal and considering cumulative impacts (**Section 7.2.1.2**). Therefore, there has not been, nor will be, substantial impact to preferred habitat for the taxon in the area.
- Furthermore, taxon is an annual and is only observable during August to October. Consequently, it may not be captured by surveys outside this period and thus may be underrepresented in datasets.
- Taxon has successfully established within rehabilitation at KIOP (**Section 5.2**), demonstrating positive evidence that some impact from the Combined Proposal could be mitigated.

8.2 Vegetation

An assessment against the residual impact significance model was undertaken for all 19 remnant VTs (i.e. excluding VT PL) that will be directly or indirectly impacted by the KIOP MLE Proposal. The results are discussed in the following sections and summarised in **Table 8.2**.

Table 8.2 Summary of Results of Assessment of Significance of Residual Impacts to Vegetation Types Against GoWA (2014) Clearing Principal (e)

VT	Significant other than Formal Listing	Unacceptable Impact	Significant Impact	Potentially Significant Impact	Impact Not Likely to be Significant
A	-	-	-	-	✓
B	Yes	-	-	-	✓
C	-	-	-	-	✓
D	-	-	-	-	✓
E	-	-	-	-	✓
F	-	-	-	-	✓
G	-	-	-	-	✓
H	-	-	-	-	✓
K	-	-	-	-	✓
O	Yes	-	-	✓	-
P	Yes	-	-	-	✓
Q	Yes	-	-	-	✓
R	-	-	-	-	✓
S	-	-	-	-	✓
AB	-	-	-	-	✓
HMVT D	Yes	-	-	✓	-
HMVT E	-	-	-	✓	-
HMVT F	-	-	-	✓	-
HMVT G	-	-	-	✓	-
Count		**0**	**0**	**5**	**14**

8.2.1 Unacceptable Impacts

The assessment against the residual impact significance model found that the residual impact to any VT would not be environmentally unacceptable and/or could be able to be offset. The KIOP MLE Proposal is not predicted to completely remove (or result in significant deterioration to the health of) all occurrences of any vegetation community as all VTs occur outside the KIOP MLE new disturbance footprint to some extent.

8.2.2 Significant Impacts

The assessment against the residual impact significance model did not find that any residual impacts to VTs are considered significant and require an offset. While the KIOP MLE Proposal will impact four VTs that represent pre-European VSA Mingenew_354, which has experienced cumulative impacts of 89% (**Section 7.2.2.2**), these VTs (HMVT D, HMVT E, HMVT F and HMVT G) are in Completely Degraded condition and predominantly occurred as very small, isolated strips or patches of vegetation surrounded by cleared land or agriculture (**Figure 3.2**). The residual impacts to these VTs have instead been identified as being potentially significant and may require an offset, as discussed in the next section.

None of the other VTs that will be impacted by the KIOP MLE Proposal are predicted to have <30% of their original extents remaining in the relevant regional assessment area (**Sections 7.2.1.2** and **Section 7.2.2.2**).

8.2.3 Potentially Significant Impacts

The assessment against the residual impact significance model determined that the direct, indirect and cumulative residual impacts to five VTs are potentially significant and may require an offset:

VT O:

- There will be 25% direct and indirect local impact to the mapped extent of the VT within the Combined Proposal DE and indirect impact zone (**Section 7.1.2**). The predicted cumulative impacts to the individual Woodman Environmental (2012) FCTs that represent this VT in RAA 1 (FCTs 1, 2, 3, 4, 12) ranges from 0% (FCT 3) to 35% (FCT 1), with a combined cumulative impact of 25% (**Section 7.2.1.1**).
- This VT occurs on slopes and crests of BIF hills and ridges, as well as on rocky granite, which are restricted landforms in the Combined Proposal DE and the wider landscape (Umwelt 2025).
- VT O provides preferred habitat for 10 significant flora taxa of the Combined Proposal DE (**Section 3.2**), including *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1) which was identified in **Section 8.1.3** as having a potentially significant residual impact.
- VT O also forms a major component of the 'Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)' P1 PEC, which was identified as having a potentially significant residual impact (**Section 8.3.1**).

HMVT D, HMVT E, HMVT F and HMVT G:

- These four VTs represent pre-European VSA Mingenew_354, which has been heavily historically cleared and has 11% of its pre-European extent remaining within the Merredin IBRA subregion (**Section 7.2.2.2**).
- As discussed in **Section 8.2.2**, these VTs predominantly occurred as very small, isolated strips or patches of vegetation surrounded by cleared land or agriculture. Only HMVT D had occurrences with contiguous vegetation that extended outside the Combined Proposal DE that were in better condition and across reasonable areas (greater than approx. 50 ha) (Umwelt 2025).
- Impact to these VTs could be offset by restoration of other degraded areas of similar vegetation in the local or regional area, such as through planting, weed control, and fencing.

8.2.4 Impacts that are Unlikely to be Significant

The residual impacts to the remaining 14 VTs are unlikely to be significant. These VTs have been discussed separately for those in the Mine Area and Wheatbelt Area, with reference to predicted impacts to Woodman Environmental (2012) FCTs and DPIRD (2019) pre-European VSAs.

8.2.4.1 Mine Area

Within RAA 1 there is a predicted 27% and 22% cumulative impact to Woodman Environmental (2012) FCTs 27 (which is equivalent to VTs D and S) and 6 (equivalent to VT P), respectively (**Section 7.2.1.2**). However, these FCTs comprise *Acacia* shrubland with emergent *Eucalyptus* spp. on flats to gently inclined areas (Woodman Environmental, 2012), which is not a restricted vegetation community in the wider region. Based on review of mapped extents and descriptions of these FCTs against DPIRD (2019) pre-European VSAs, they are likely equivalent to VSAs YALGOO_355, YALGOO_363, YALGOO_364 and YALGOO_420. These VSAs have between 98.4% to 99.8% of their pre-European extents remaining within the Tallering IBRA subregion (as at 2018) (**Section 3.3.1**). Therefore, these communities are well represented in the region.

All other Woodman Environmental (2012) FCTs that will be impacted by the KIOP MLE Project (excluding FCT 1 that has already been discussed in **Section 8.2.3** in the context of VT O) have predicted cumulative impacts that are less than 15% in RAA 1 (**Section 7.2.1.2**). In the wider region, the relevant pre-European VSAs in the Tallering IBRA subregion have a minimum 95.7% remaining in the subregion (**Section 3.3.1**) (when excluding VSA Yalgoo_125, described as "bare areas; salt lakes", which is not a community type that will be directly or indirectly impacted by the KIOP MLE Project). Therefore, landscape-scale substantial loss of vegetation is not predicted to occur as a result of the KIOP MLE Project.

None of the pre-European VSAs relevant to the Mine Area of the KIOP MLE Proposal have representation within conservation tenure. However, this is not a risk to these VSAs as their pre-European extents remain high (**Section 3.3.1**).

8.2.4.2 Wheatbelt Area

The remaining VT within the Wheatbelt Area that will be impacted by the KIOP MLE Project is VT AB. This VT is potentially equivalent to DPIRD (2019) pre-European VSA Mingenew_352, which has 47% of its original extent remaining in the Merredin IBRA subregion and has no areas protected for conservation (**Section 3.3.1**). The patch of vegetation that is represented by VT AB is intersected by the indirect impact zone of the Wheatbelt Area only, and consequently 100% of its mapped extent in the impact zone could potentially be indirectly impacted (**Section 7.1.2**). However, as discussed in **Section 6.2**, the indirect impact zone represents a worst-case scenario, assuming total loss / deterioration of flora and vegetation within this boundary, but actual total loss of vegetation within this zone is considered unlikely. Furthermore, the vegetation mapped as VT AB within the indirect impact zone forms part of a small patch of remnant vegetation (total size approximately 1.2 ha) which is isolated in a cereal cropping paddock (**Figure 3.2**). Therefore, this vegetation would already be subject to pressures from edge effects, weeds and fragmentation, and consequently the potential impact to VT AB is unlikely to be significant.

8.3 Listed Significant Vegetation

An assessment against the residual impact significance model was undertaken for the two listed significant vegetation communities that will be directly or indirectly impacted by the KIOP MLE Proposal. The results are discussed in the following sections and summarised in **Table 8.3**.

Table 8.3 Summary of Results of Assessment of Significance of Residual Impacts to Listed Significant Vegetation Against GoWA (2014) Clearing Principal (d)

Community	Status (WA)	Status (EPBC)	Unacceptable Impact	Significant Impact	Potentially Significant Impact	Impact Not Likely to be Significant
Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)	PEC (P1)	-	-	-	✓	-
Eucalypt woodlands of the Western Australian Wheatbelt	PEC (P3)	TEC (CR)	-	-	-	✓
Count			**0**	**0**	**1**	**1**

8.3.1 Blue Hills PEC

The assessment against the residual impact significance model found that residual impacts to the Blue Hills PEC are potentially significant and may require an offset. The KIOP MLE Proposal is predicted to have a direct impact of 98 ha, representing 1.6% of the remaining mapped extent of the PEC, and the cumulative impact to the PEC is predicted to be 14.6% (**Section 6.3.1.2**). However, the PEC is known from a restricted geographic distribution:

- Extent of occurrence likely to be no more than 44,000 ha based on calculation of the area of a minimum convex polygon enclosing all occurrences (occurrences as per DBCA (2023a) spatial data of the PEC boundaries, noting that these boundaries include a DBCA-applied buffer of 500 m to each occurrence.
- Area of occurrence estimated to be 6,061 ha when accounting for existing impacts and the impact of the KIOP MLE Proposal (**Section 7.2.1.3**).

The Blue Hills PEC also represents preferred habitat for a large number of significant flora taxa, including at least nine which have records in the Combined Proposal DE. This includes *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1) which was identified in **Section 8.1.3** as having a potentially significant residual impact.

The vegetation of the Blue Hills PEC is floristically unique and contains a high number of endemic and near-endemic flora taxa (Markey & Dillon, 2008), and consequently it may not be possible to fully mitigate direct impacts via rehabilitation.

Future impacts to the Blue Hills PEC are likely, particularly from mining, given BIF landforms are highly prospectable for minerals (Markey & Dillon, 2008).

8.3.2 Eucalypt Woodlands of the Wheatbelt TEC

The KIOP MLE Proposal is predicted to directly impact 1.4 ha of the Eucalypt Woodlands of the Wheatbelt TEC, and potentially indirectly impact a further 2.3 ha. The vegetation that will be directly impacted is in Completely Degraded condition, while the vegetation that may be indirectly impacted is in Good to Degraded condition.

The assessment against the residual impact significance model found that the residual impact to the Eucalypt Woodlands of the Wheatbelt TEC is not likely to be significant. While the KIOP MLE Project will impact the TEC, which is listed under the EPBC Act, the impact does not meet the criteria for "significant impacts requiring an offset" as the areas to be impacted are not considered to represent habitat necessary to maintain the survival of the community. The KIOP MLE new disturbance footprint intersects patches of vegetation that are in Completely Degraded condition due to occurring in narrow strips of vegetation in pasture grazed by sheep or cropped for agriculture (**Section 3.3.3.1**; **Figure 3.2**). In isolation, the vegetation would not have met the condition or size thresholds of the Commonwealth Approved Conservation Advice (DoE, 2015). However, the occurrences represent either the fringes of or small protrusions of vegetation from larger occurrences outside the Combined Proposal DE which do meet the size and condition thresholds (a minimum size of 5 ha and condition of at least Degraded) (Umwelt 2025). This includes the large patch of TEC in the far western part of the KIOP MLE new disturbance footprint that is in at least Good condition across a minimum extent of 57 ha. Therefore, removal of this vegetation would not negatively affect the maintenance of the remaining patches, nor would it result in the remaining patches no longer meeting the size thresholds.

The indirect impact area intersects vegetation that is in Good to Degraded condition. Most of the mapped TEC in the indirect impact zone is vegetation that represents the interface between larger patches of TEC in better condition, and pasture or roads (**Figure 3.2**). As discussed in the context of VT AB, the indirect impact zone represents a worst-case scenario, and this vegetation would already be experiencing pressures from edge effects and weeds. Therefore, the potential impact to the TEC is unlikely to be significant.

9.0 Assessment Against Significant Impact Guidelines 1.1

The KIOP MLE Proposal will directly and indirectly impact the 'Eucalypt woodlands of the Western Australian Wheatbelt' TEC (**Section 7.1.3**), which is an EPBC listed community and represents a matter of national environmental significance (MNES). Therefore, this community was also assessed against the Department of Climate Change, Energy, the Environment and Water (DCCEEW) *significant impact guidelines 1.1* (published as Department of the Environment (DoE, 2013)). The KIOP MLE Proposal is not predicted to impact any other EPBC-listed communities additional to the Eucalypt Woodlands TEC, or any EPBC-listed flora taxa.

The assessment against the significant impact criteria of the direct and indirect impacts to the Eucalypt Woodlands TEC as a result of the KIOP MLE Proposal is presented in **Table 9.1**. Implementation of the KIOP MLE Proposal is likely to trigger three of the seven significant impact criteria. However, the significance of these impacts is low due to the small scale and current condition of vegetation within the direct and indirect impact areas.

Table 9.1 Assessment of Eucalypt Woodlands of the Wheatbelt TEC Against DCCEEW Significant Impact Guidelines 1.1

Significant Impact Criteria	Likelihood	Rationale
Reduce the extent of an ecological community	Likely	There will be direct impact to 1.4 ha of the TEC and potential indirect impact to 2.3 ha.
Fragment or increase fragmentation of an ecological community	Unlikely	The vegetation that will be directly impacted represents either the fringes of or small protrusions of vegetation from larger occurrences outside the Combined Proposal DE which do meet the size and condition thresholds (a minimum size of 5 ha and condition of at least Degraded). Fragmentation is not predicted to occur due to the small scale and narrow impact.
Adversely affect habitat critical to the survival of an ecological community	Unlikely	The direct impact of 1.4 ha will be to vegetation in Completely Degraded condition. The indirect impact area intersects vegetation that is in Good to Degraded condition. Most of the mapped TEC in the indirect impact zone is vegetation that represents the interface between larger patches of TEC in better condition, and pasture or roads. This vegetation would already be experiencing pressures from edge effects and weeds, and complete loss of the vegetation from indirect impacts is unlikely. Larger occurrences of the TEC outside the Combined Proposal DE will remain, and this vegetation is in better condition (including the large patch of TEC in the far western part of the KIOP MLE new disturbance footprint that is in at least Good condition across a minimum extent of 57 ha). The combined impact of 3.7 ha represents approximately 0.04% of the TEC remaining in the

Significant Impact Criteria	Likelihood	Rationale
		Katanning, Merredin and Western Mallee IBRA subregions (estimated to be 903,173 ha).
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Likely	There will be direct impact to 1.4 ha of the TEC via clearing, which may result in localised soil disturbance within the impact area.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species	Likely	There will be direct impact to 1.4 ha of the TEC and thus a loss of functionally important species including *Eucalyptus loxophleba* subsp. *loxophleba*.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to become established. • Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.	Unlikely	The direct impact of 1.4 ha will be to vegetation in Completely Degraded condition. The indirect impact area comprises vegetation that is already experiencing pressures from edge effects and weeds.
Interfere with the recovery of an ecological community	N/A	There is no adopted or made Recovery Plan for this TEC.

10.0 Conclusion

10.1 Summary of Impact Assessment

10.1.1 Significant Flora Taxa

The KIOP MLE Proposal will directly and indirectly impact 14 significant flora taxa, as well as suitable habitat for an additional taxon:

- *Acacia karinae* (P3)
- *Allocasuarina tessellata* (P3)
- *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- *Calandrinia kalanniensis* (P2) (impact to preferred habitat)
- *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3)
- *Crassula* sp. nov. (PU)
- *Drummondita fulva* (P3)
- *Grevillea globosa* (P3)
- *Grevillea scabrida* (P3)
- *Gunniopsis divisa* (P3)
- *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)
- *Micromyrtus trudgenii* (P3)
- *Persoonia pentasticha* (P3)
- *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)
- *Rhodanthe collina* (P3).

The assessment against the residual impact significance model found that residual impacts to *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1) are potentially significant and may require an offset due to a predicted cumulative impact to the taxon of 72% within RAA 1.

10.1.2 Vegetation

Excluding CACC areas, the KIOP MLE Proposal will impact a total of 1,612 ha of vegetation (1,441 ha directly and 171 ha indirectly). This impact includes 1,587 ha total impact (1,429 ha direct and 158 ha indirect) to preferred habitat for any of the 41 significant flora taxa known from the Combined Proposal DE.

The assessment against the residual impact significance model found that residual impacts to five VTs are potentially significant and may require an offset (VTs O, HMVT D, HMVT E, HMVT F and HMVT G) due to the high cumulative impact to these vegetation communities at a regional scale.

10.1.3 Listed Significant Vegetation

The KIOP MLE Proposal will impact the Blue Hills PEC (98 ha directly and 20 ha indirectly) and the Eucalypt Woodlands of the Wheatbelt TEC (1.4 ha directly and 2.3 ha indirectly). The direct impact to these two communities contributes to a total predicted cumulative regional impact of 15% and 85%, respectively.

The residual impact to the Blue Hills PEC is potentially significant and may require an offset due to the TEC's small extent and area of occurrence, the degree of existing impact, and the likelihood of future impacts. The vegetation of the Blue Hills PEC is floristically unique and contains a high number of endemic and near-endemic flora taxa (Markey & Dillon, 2008), and consequently it may not be possible to fully mitigate direct impacts via rehabilitation.

The residual impact to the Eucalypt Woodlands of the Wheatbelt TEC is not likely to be significant as the impact area is not considered to contain habitat necessary to maintain the survival of the community.

10.1.4 Vegetation Condition

The KIOP MLE Proposal is predicted to directly impact 15% of the Excellent rated vegetation of the Combined Proposal DE (Mine Area), and 34% of the Completely Degraded vegetation (Wheatbelt Area). Vegetation outside the KIOP MLE new disturbance footprint will remain outside of direct impacts. At least 85% of vegetation rated as Excellent and 99% of vegetation rated as Very Good will remain in the Combined Proposal DE.

11.0 References

Beard, J. S. (1976). *Vegetation Survey of Western Australia, Murchison 1:1 000 000*. Map and Explanatory Notes to Sheet 7. University of Western Australia Press, Perth, Western Australia.

Beard, J. S. (2015). *Plant Life of Western Australia* (A. S. George & N. Gibson, Eds; 2nd edn). Rosenberg Publishing. Kenthurst, New South Wales.

Beard, J. S., Beeston, G. R., Harvey, J. M., Hopkins, A. J. M., & Shepherd, D. P. (2013). The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second Edition. *Conservation Science Western Australia*, *9*(3), 1–152.

Bennett. (2004). *Flora and Vegetation: Blue Hills* (Unpublished report prepared for Kellogg Brown&Root Pty Ltd on behalf of CSR Ltd; p. 110). Bennett Environmental Consulting Pty Ltd (Bennett).

Boggs, D. (2007). *Playas of the Yarra Yarra Drainage System, Western Australia* [Bachelor of Science (Environmental Science) (Honours) Thesis]. The University of Western Australia.

Butler, R. (2009). *Vulnerability of plant functional types to dust deposition in the Pilbara, NW Australia* [Bachelor of Science (Environmental Science) (Honours) Thesis]. The University of Western Australia.

CALM. (2003). *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*. Department of Conservation and Land Management (CALM). https://library.dbca.wa.gov.au/static/FullTextFiles/021927.pdf

DBCA. (2014). *Ecological Impact and Invasiveness Ratings from the Department of Parks and Wildlife Midwest Region Species Prioritisation Process 2014*. Department of Biodiversity, Conservation and Attractions (DBCA). https://www.dbca.wa.gov.au/parks-and-wildlife-service/threat-management/plant-diseases/weeds

DBCA. (2019). *2018 Statewide Vegetation Statistics (formerly the CAR Reserve Analysis): Full Report*. Last updated 30 April 2019. Remote Sensing and Spatial Analysis Program, Department of Biodiversity, Conservation and Attractions (DBCA). https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

DBCA. (2023a). *DBCA Threatened and Priority Ecological Communities Database*. Database interrogation. Department of Biodiversity, Conservation and Attractions (DBCA).

DBCA. (2023b). *DBCA WA Herbarium Specimen and Threatened and Priority Flora (TPFL) Databases*. Database interrogation. Department of Biodiversity, Conservation and Attractions (DBCA).

DBCA. (2025). *Phytophthora dieback*. Department of Biodiversity, Conservation and Attractions (DBCA). https://www.dbca.wa.gov.au/management/threat-management/plant-diseases/phytophthora-dieback

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2022). *Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions)* [Dataset]. http://www.environment.gov.au/fed/catalog/search/resource/details.page?uuid=%7B8B9E3F42-9856-4487-AE9E-C76A322809A1%7D

Department of Primary Industries and Regional Development. (2019). *Pre-European Vegetation (DPIRD-006)* [Data set]. https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006

Didham, R. K. (2010). Ecological Consequences of Habitat Fragmentation. In *Encyclopedia of Life Sciences* (p. 384). John Wiley & Sons, Ltd. Chichester, UK.

DoE. (2013). *Matters of National Environmental Significance: Significant Impact Guidelines 1.1—* Environmental Protection and Biodiversity Conservation Act 1999 (p. 39). Department of the Environment (DoE). Canberra, Australian Capital Territory.

DoE. (2015). *Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt* (p. 141). Department of the Environment (DoE). Canberra, Australian Capital Territory. https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=128

DoEE. (2018). *Threat abatement plan for disease in natural ecosystems caused by* Phytophthora cinnamomi. Department of the Environment and Energy (DoEE). Canberra, Australian Capital Territory.

DPIRD. (2019). *Pre-European Vegetation (DPIRD-006)*. Spatial data. Last updated 23 July 2019. Department of Primary Industries and Regional Development (DPIRD). https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006

DPIRD. (2022). *Soil Landscape Mapping—Systems (DPIRD-064)*. Spatial data. Last updated 18 July 2022. Department of Primary Industries and Regional Development (DPIRD). https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-systems

DPIRD. (2025). *Native Vegetation Extent- Best Available (DPIRD-005)*. Spatial data. Last updated 15-06-2025. Department of Primary Industries and Regional Development (DPIRD). https://catalogue.data.wa.gov.au/dataset/native-vegetation-extent

EPA. (2016a). *Environmental Factor Guideline: Flora and Vegetation*. Environmental Protection Authority.

EPA. (2016b). *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*. Environmental Protection Authority.

EPA. (2020). *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)*. Environmental Protection Authority. https://epa.wa.gov.au/sites/default/files/Forms_and_Templates/Instructions%20-%20IBSA%20Data%20Packages.pdf

Esri. (2025). *World Imagery—Overview*. Esri. https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9

GoWA, L. (2014). *WA Environmental Offsets Guidelines* (p. 39). Government of Western Australia (GoWA).

Groves, E., Hardy, G., & McComb, J. (2020). *Western Australian Native Plants Susceptible and Resistant to* Phytophthora cinnamomi. Centre for *Phytophthora* Science and Management. Murdoch University. https://www.cpsm-phytophthora.org/resources_supRes.php

Hislop, M. (2021). New species of Western Australian *Styphelia* (Ericaceae: Epacridoideae: Styphelieae) from the *S. pendula* and *S. conostephioides* groups. *Nuytsia—The Journal of the Western Australian Herbarium*, *32*(Volume 32, 9 Dec 2021), 199–238. https://doi.org/10.58828/nuy01015

KML. (2024). *Annual Environmental Report:* Acacia woodmaniorum *Translocations 2024* (p. 18). Report (CORP-EN-REP-1175, 24 December 2024) prepared by Karara Mining Limited (KML).

KML. (2025). *Karara_Disturbance_20250319.shp* [Data set]. Spatial data. Last updated 19 March 2025. Karara Mining Limited (KML).

Lienert, J. (2004). Habitat fragmentation effects on fitness of plant populations – a review. *Journal for Nature Conservation*, *12*(1), 53–72. https://doi.org/10.1016/j.jnc.2003.07.002

Luquet, E., Garner, T. W. J., Léna, J.-P., Bruel, C., Joly, P., Lengagne, T., Grolet, O., & Plénet, S. (2012). Genetic erosion in wild populations makes resistance to a pathogen more costly. *Evolution*, *66*(6), 1942–1952. https://doi.org/10.1111/j.1558-5646.2011.01570.x

Maia. (2017). *Blue Hills M59/595 and M59/596 Mungada East Expansion Project, Revised Impacts to Conservation Significant Flora, Priority Ecological Community and Floristic Community Types* (Unpublished report (150716V3, V3) prepared for Sinosteel Midwest Corporation Ltd; p. 42). Maia Environmental Consultancy Pty Ltd (Maia).

Markey, A. S., & Dillon, S. J. (2008). Flora and vegetation of the banded iron formations of the Yilgarn Craton: The central Tallering Land System. *Conservation Science Western Australia*, *7*(1), 121–149.

Maslin, B. R., & Buscumb, C. (2007). Two new *Acacia* species (Leguminosae: Mimosoideae) from banded ironstone ranges in the Midwest region of south-west Western Australia. *Nuytsia*, *17*, 263–272.

Matsuki, M., Gardener, M. R., Smith, A., Howard, R. K., & Gove, A. (2016). Impacts of dust on plant health, survivorship and plant communities in semi-arid environments: Impacts of Dust on Plants. *Austral Ecology*, *41*(4), 417–427. https://doi.org/10.1111/aec.12328

Mattiske. (2004). *Priority flora search—Gossan Hill and Surrounds* (Report prepared for Newmont Golden Grove Operations). Mattiske Consulting Pty Ltd (Mattiske).

Shearer, B. L., Crane, C. E., Barrett, S., & Cochrane, A. (2007). *Phytophthora cinnamomi* invasion, a major threatening process to conservation of flora diversity in the South-west Botanical Province of Western Australia. *Australian Journal of Botany*, *55*(3), 225–238. https://doi.org/10.1071/BT06019

Shearer, B. L., Crane, C. E., & Cochrane, A. (2004). Quantification of the susceptibility of the native flora of the South-West Botanical Province, Western Australia, to *Phytophthora cinnamomi*. *Australian Journal of Botany*, *52*, 435–443. https://doi.org/10.1071/BT03131

Stantec. (2024). *Karara Iron Ore Project Mine Life Extension Project—Surface Water Hydrology Assessment*.

Turner, G. F. (2013). *Vulnerability of Vegetation to Mining Dust at the Jack Hills, Western Australia* [Master of Science Thesis]. The University of Western Australia.

Umwelt. (2021). *Karara Project Expansion: Detailed and Targeted Flora and Vegetation Assessment* (Unpublished report (KML20-33-01, Rev 0) prepared for Karara Mining Ltd; p. 1305). Umwelt (Australia) Pty Ltd (Umwelt).

Umwelt. (2022). *Flora, Vegetation and Fauna Impact Assessment—Karara Project Expansion* (Report (21553/R01, V3, 22 November 2022) prepared for Karara Mining Limited). Umwelt (Australia) Pty Limited (Umwelt).

Umwelt. (2025). *2023 and 2024 Detailed and Targeted Flora and Vegetation Assessment: Karara Iron Ore Project Mine Life Extension* (Report (23712/R04, V2, 20 August 2025) prepared for Karara Mining Limited). Umwelt (Australia) Pty Limited (Umwelt).

WA Herbarium. (1998-). *Florabase: The Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. Western Australian Herbarium (WA Herbarium). https://florabase.dpaw.wa.gov.au/

Woodman Environmental. (2004a). *Flora and Vegetation Survey of the Keronima, Western Corridor, Austin, Mug's Luck, Bobby McGee, Apollo and Promises Project Areas: Minjar Gold Project* (Report (GGNL04-02, Rev 0, 14 April 2004) prepared for Gindalbie Gold NL; p. 23). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2004b). *Keronima – Black Dog Flora Survey and Plant Community Mapping* (Report (GGNL04-11, Rev 0, 10 May 2004) prepared for Gindalbie Gold NL; p. 32). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2004c). *Mt Karara Flora Survey and Plant Community Mapping* (Unpublished report (GGNL04-18-01, Rev 0) prepared for Gindalbie Gold N.L). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2005). *Investigations into Priority Flora Locations: Minjar Project* (Report (GGNL04-38, Rev 0, 22 August 2005) prepared for Gindalbie Gold NL; p. 27). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007a). *2007 Spring Annual Species Survey and Impact Assessment Report, Mungada Ridge Hematite Project, Karara–Mungada Project Survey Area* (Report (8 November 2007) prepared for Gindalbie Metals Limited; p. 43). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007b). *Exploration Drilling Programme Blue Hills North Prospect Flora and Vegetation Impact Assessment* (Report (KMS07-20-19, Rev A, 11 March 2008) prepared for Karara Management Services). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007c). *Exploration Drilling Programme Bow Prospect Flora and Vegetation Impact Assessment* (Report (KMS07-20-11, Rev A, 7 December 2007) prepared for Karara Management Services). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007d). *Exploration Drilling Programme Crescent Prospect Flora and Vegetation Impact Assessment* (Report (KMS07-20-11, Rev A, 7 December 2007) prepared for Karara Management Services). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007e). *Exploration Drilling Programme Hinge Prospect Flora and Vegetation Impact Assessment* (Report (KMS07-20-15, Rev A, 7 December 2007) prepared for Karara Management Services). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007f). *Exploration Drilling Programme Summit Prospect Flora and Vegetation Impact Assessment* (Unpublished report (KMS07-20-12, Rev A, 7 December 2007) prepared for Karara Management Services). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007g). *Flora and Vegetation of the Rothsay Survey Area* (Unpublished report (GIN05-21-02, Rev 0) prepared for Gindalbie Metals Ltd). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007h). *Haulage Route, Tilley Siding East and Associated Borrow Pits of the Proposed Mungada Ridge Hematite Project* (Unpublished report (GIN05-21-05, Rev 0) prepared for Gindalbie Metals Ltd). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007i). *Investigations into the Populations of* Acacia woodmaniorum *ms* (Report (GIN05-21-03, Rev 2, 20 June 2007) prepared for Gindalbie Metals Limited; p. 24). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007j). *Investigations into the Populations of* Polianthion collinum (Report (GIN05-21-04, Rev 0, January 2007) prepared for Gindalbie Metals Limited; p. 21). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007k). *Minjar Gold Project Beryl West Prospect Proposed RC Drilling Flora and Vegetation Assessment* (Unpublished report (Monarch07-18-02, Rev 0) prepared for Monarch Gold Mining Company Ltd; p. 22). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007l). *Minjar Gold Project Elroy and Elroy North Prospects Proposed RC Drilling Flora and Vegetation Assessment* (Unpublished report (Monarch07-18-03, Rev 0) prepared for Monarch Gold Mining Company Ltd; p. 21). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007m). *Minjar Gold Project Lexie Prospect Proposed RC Drilling Flora and Vegetation Assessment* (Unpublished report (Monarch07-18-01, Rev 0) prepared for Monarch Gold Mining Company Ltd; p. 19). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2007n). *Mount Mulgine Project Proposed Drilling Flora and Vegetation Assessment* (Report (VM07-08-01, Rev 0, 22 May 2007) prepared for Vital Metals Limited; p. 13). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2008a). *Additional Regional Survey for* Acacia woodmaniorum *(Declared Rare Flora)* (Unpublished report (GIN05-21-23, Rev 0) prepared for Gindalbie Metals Ltd). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2008b). *Exploration Drilling Programme Brak Prospect Flora and Vegetation Impact Assessment* (Unpublished report (KMS07-20-23, Rev 0, 21 August 2008) prepared for Karara Management Services; p. 20). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2008c). *Exploration Drilling Programme Johnnys Prospect Flora and Vegetation Impact Assessment* (Unpublished report (KMS07-20-21, Rev 0, 2 September 2008) prepared for Karara Management Services; p. 25). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2008d). *Karara-Mungada Project Survey Area Flora and Vegetation* (Unpublished report (GIND05-21-01, Rev 9) prepared for Gindalbie Metals Ltd; p. 182). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2008e). *Mount Mulgine Project Proposed Drilling 2008 Flora and Vegetation Assessment* (Report (VM08-28, Rev 0, 18 August 2008) prepared for Vital Metals Limited; p. 25). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009a). *Exploration Drilling Programme Jasper Hill Flora and Vegetation Impact Assessment* (Report (KML-09-01-01, Rev 0, 20 February 2009) prepared for Karara Mining Limited; p. 23). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009b). *Exploration Drilling Programme Porcupine Area Flora and Vegetation Impact Assessment* (Report (GML-09-27-01, Rev 0, 19 August 2009) prepared for Gindalbie Metals Limited; p. 31). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009c). *Flora and Vegetation Assessment of the Proposed Linear Infrastructure Corridor: Proposed Karara Iron Ore Project* (Report (KML09-20-02, Rev 0, 16 October 2009) prepared for Karara Mining Limited; p. 146). Woodman Environmental Consulting Pty Limited (Woodman Environmental).

Woodman Environmental. (2009d). *Flora and Vegetation of the Proposed Camp Site and Airstrip. Old Karara Homestead. Baseline and Impact Assessment* (Unpublished report (KML09-61-02, Rev 1) prepared for Karara Mining Ltd; p. 64). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009e). *Flora and Vegetation Survey of the Railway Corridor and Associated Borrow Pits (Karara to Tilley Siding)* (Report (GIN05-21-19, Rev 3, 14 July 2009) prepared for Gindalbie Metals Limited; p. 124). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009f). *Flora and Vegetation Values of the Proposed Campsite Priority 1 Area* (Report (KML09-61-01, Rev 0, 13 November 2009) prepared for Karara Mining Ltd; p. 17). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009g). *Paleochannels Programme of Works Flora and Vegetation Impact Assessment* (Report (KML-09-14-01, Rev 0, 14 April 2009) prepared for Karara Mining Limited; p. 32). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009h). *Regional Survey for* Lepidosperma *sp. Blue Hills (A. Markey & S. Dillon 3468) – Summary Report* (Unpublished report (KML08-57-01, Rev 1) prepared for Karara Mining Ltd; p. 12). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009i). *Regional Survey for* Stylidium *sp. Yalgoo (D. Coultas et al. Opp 01) Summary Report* (Report (KML-09-19-01, Rev 0, 16 December 2009) prepared for Karara Mining Limited; p. 13). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2009j). *Shine Iron Ore Project Flora and Vegetation Studies Interim Report* (Unpublished report (GML08-55-01, Rev 0) prepared for Gindalbie Metals Ltd; p. 49). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2010a). *Exploration Drilling Programme Aroha Prospect Flora and Vegetation Impact Assessment* (Report (GML-09-68-02, Rev 0, 25 February 2010) prepared for Gindalbie Metals Limited; p. 26). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2010b). *Flora and Vegetation Survey of the Yandanooka Borefield Pipeline Routes 5 and 5b* (Report (KML10-02-01, Rev 1, 29 June 2010) prepared for Karara Mining Limited; p. 45). Woodman Environmental Consulting Pty Limited (Woodman Environmental).

Woodman Environmental. (2011a). *Exploration Drilling Programme Dogleg Prospect Flora and Vegetation Impact Assessment* (Report (GML10-24-03, Rev 0, 4 February 2011) prepared for Gindalbie Metals Limited; p. 25). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2011b). *Flora and Vegetation Desktop Review and Impact to Known Significant Flora Locations: Mt Mulgine – Hill Deposit* (Report (HRL11-18-01, Rev 0, 15 November

20011) prepared for Hazelwood Resources Limited; p. 43). Woodman Environmental Consulting Pty Limited (Woodman Environmental).

Woodman Environmental. (2011c). *Flora and Vegetation of the Rothsay Pipeline Survey Area* (Unpublished report (KML10-33-01, Rev 0) prepared for Karara Mining Ltd; p. 106). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Woodman Environmental. (2012). *Regional Flora and Vegetation Survey of the Karara to Minjar Block*. https://smcl.com.au/bluehills-perdocs/Appendix-F/Flora-and-vegetation/Woodman-2012.pdf

Woodman Environmental. (2017). *Pardoo Direct Shipping Ore Project Priority Flora Monitoring 2017* (Report (Atlas17-02-01, Rev 0) prepared for Atlas Iron Pty Ltd; p. 38). Woodman Environmental Consulting Pty Ltd (Woodman Environmental).

Appendix A

Vegetation Associations Forming Components of the Eucalypt Woodlands of the Western Australian Wheatbelt TEC

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Taken from 'Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt' (DoE, 2015).

VA	Description
5	Medium woodland; wandoo & powderbark (*E. accedens*)
7	Medium woodland; York gum (*E. loxophleba*) & wandoo
8	Medium woodland; salmon gum & gimlet
13	Medium open woodland; wandoo
131	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee scrub, redwood & black marlock
141	Medium woodland; York gum, salmon gum & gimlet
142	Medium woodland; York gum & salmon gum
145	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; thicket, acacia-casuarina-melaleuca alliance
352	Medium woodland; York gum
494	Medium woodland; salmon gum mixed with merrit & desert bloodwood (*Eucalyptus* sp.)
511	Medium woodland; salmon gum & morrel
536	Medium woodland; morrel & rough fruited mallee (*E. corrugata*)
686	Medium woodland; York gum & red mallee
931	Medium woodland; yate
938	Medium woodland; York gum & yate
939	Succulent steppe with woodland; York gum, sparse tea-tree scrub & samphire
941	Mosaic: Medium woodland; salmon gum & morrel/Shrublands; mallee scrub, redwood
945	Mosaic: Medium woodland; salmon gum / Shrublands; mallee scrub, redwood & black marlock
946	Medium woodland; wandoo
947	Medium woodland; powderbark & mallet
948	Medium woodland; York gum & river gum
962	Medium woodland; mallet (*E. astringens*)
963	Medium woodland; yate & paperbark (*Melaleuca* spp.)
967	Medium woodland; wandoo & yate
974	Medium woodland; York gum, salmon gum & morrel
981	Medium woodland; wandoo, York gum & yate
993	Medium woodland; York gum & *Allocasuarina huegeliana*
1023	Medium woodland; York gum, wandoo & salmon gum (*E. salmonophloia*)
1025	Mosaic: Medium woodland; York gum, salmon gum & morrel / Succulent steppe; saltbush & samphire
1044	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; *Melaleuca thyoides* thicket
1049	Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet
1057	Mosaic: Shrublands; Medium woodland; salmon gum & gimlet / York gum & *Eucalyptus sheathiana* mallee scrub
1059	Mosaic: Medium woodland; salmon gum & gimlet/Shrublands; mallee *Eucalyptus longicornis* & *E. sheathiana* scrub
1065	Mosaic: Shrublands; Medium woodland; wandoo & gimlet / York gum & *Eucalyptus sheathiana* mallee scrub
1067	Medium woodland; salmon gum, morrel, gimlet & rough fruited mallee
1068	Medium woodland; salmon gum, morrel, gimlet & *Eucalyptus sheathiana*
1073	Medium woodland; wandoo & mallet
1085	Medium woodland; wandoo & blue mallet (*E. gardneri*)
1087	Medium woodland; wandoo, morrel & blue mallet
1088	Medium woodland; mallet & blue mallet
1092	Medium woodland; wandoo, York gum & morrel

VA	Description
1094	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; mallee scrub *Eucalyptus eremophila* & black marlock
1095	Medium woodland; York gum, yate & salmon gum
1200	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub *Eucalyptus eremophila* & black marlock (*E. redunca*)
1967	Medium woodland; wandoo, yate & river gum

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