# Karara Iron Ore Project Mine Life Extension

Environmental Review Document (EPA Assessment No. 2369, EPBC No. 2023/09566)

**Final**

**April 2026**

umwelt

KARARA MINING LIMITED

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## Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Karara Mining Limited

Project Director: Adam Parker
Project Manager: Emma Molloy
Report No.: R01 / 32429
Date: April 2026

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

# Acknowledgement of Country

Umwelt acknowledges the Traditional Owners of Country throughout Australia and their continuing values, culture and connection to the land, waters and sky.

We pay our respects to Elders past and present.

The below image is from the artwork *Yapung Maryiyang* (Pathway Forward) by Saretta Fielding.

## Disclaimer

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## Document Status

| Rev No. | Reviewer Name | Date | Approved for Issue Name | Date |
|---|---|---|---|---|
| V2 | Megan Stalker | 11 Sept 2025 | Adam Parker | 11 Sept 2025 |
| V3 | Emma Molloy | 25 Feb 2026 | Emma Molloy | 26 Feb 2026 |
| V4 | Emma Molloy | 30 Mar 2026 | Emma Molloy | 01 Apr 2026 |

# Invitation to Make a Submission

The Environmental Protection Authority (EPA) invites people to make a submission on the environmental review for the Karara Iron Ore Project Mine Life Extension Proposal (this Proposal).

Karara Mining Limited (KML) proposes to extend the life of mine of the Karara Iron Ore Project, located approximately 320 km northeast of Perth. The Environmental Review Document (ERD) has been prepared in accordance with the EPA's *Procedures Manual (Part IV Divisions 1 and 2)*. The ERD is the report by the proponent on their environmental review which describes this Proposal and its likely effects on the environment.

The ERD is available for a public review period of four weeks from DATE, closing on DATE.

Information on the proposal from the public may assist the EPA to prepare an assessment report in which it will make recommendations on the proposal to the Minister for the Environment.

**Why write a submission?**

The EPA seeks information that will inform EPA's consideration of the likely effect of the proposal, if implemented, on the environment. This may include relevant new information that is not in the ERD, such as alternative courses of action or approaches.

In preparing its assessment report for the Minister for the Environment, the EPA will consider the information in submissions, the proponent's responses, and other relevant information.

Submissions will be treated as public documents unless provided and received in confidence, subject to the requirements of the *Freedom of Information Act 1992*.

**Why not join a group?**

It may be worthwhile joining a group or other groups interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group. If you form a small group (up to ten people) please indicate the names of each participant. If your group is larger, please indicate how many people your submission represents.

**Developing a submission**

You may agree or disagree with, or comment on information in the ERD. When making comments on specific elements in the ERD:

- clearly state your point of view and give reasons for your conclusions
- reference the source of your information, where applicable
- suggest alternatives to improve environmental outcomes.

**What to include in your submission**

Include the following in your submission to make it easier for the EPA to consider your submission:

- your name and address
- date of your submission
- whether you want your contact details to be confidential

- a summary of your submission, if it is long
- a list of points so that issues raised are clear, preferably by environmental factor
- refer each point to the page, section and if possible, paragraph of the ERD
- attach any reference material, if applicable. Make sure your information is accurate.

**The closing date for public submissions is:** DATE.

The EPA prefers submissions to be made electronically via the EPA's Consultation Hub at https://consultation.epa.wa.gov.au.

Alternatively, submissions can be:

- posted to: Chair, Environmental Protection Authority, Locked Bag 10, Joondalup DC WA 6919, or
- delivered to: Environmental Protection Authority, Prime House, 8 Davidson Terrace, Joondalup 6027.

If you have any questions on how to make a submission, please contact EPA Services at the Department of Water and Environmental Regulation on 6364 7000.

# Executive Summary

**Table ES 1 General Proposal Content Description**

| | |
|---|---|
| **Proposal Title** | Karara Iron Ore Project – Mine Life Extension (KIOP MLE) |
| **Proponent Name** | Karara Mining Limited (KML) |
| **Short Description** | This Proposal is to revise the existing Karara Iron Ore Mine (KIOP), located 320 km north-northeast of Perth in the Midwest Region of Western Australia to include a Mine Life Extension (MLE).<br>The Proposal includes an expansion to the development envelope, extension of the tailings storage facility and waste rock dump at the existing KIOP (MS 805) and incorporation of the areas approved under MIOP (MS 806), which will be utilized for the ongoing operations at Karara. |

**Table ES 2 Proposal Content Elements**

| Proposal Element | Location | Existing Extent for Approved Proposals (MS 805 and MS 806) | Proposed Amendment Extent | Combined Proposal Maximum Extent |
|---|---|---|---|---|
| **Physical Elements** | | | | |
| **Development Envelope** | **Figure ES 1** to **Figure ES.3** | Not defined | New element | Up to 13,481 ha |
| **Area of Disturbance** | **Figure ES 1** to **Figure ES.3** | MS 805:<br>3,027 ha<br><br>MS 806:<br>1,059.35 ha | 1,186.3 ha new disturbance, of which 1,184.8 ha is native vegetation.<br>Removal of 568 ha of disturbance from MS 805 and MS 806 | Up to 4,698 ha |
| **Pit Dimensions** | **Figure ES.2** | **Karara**: Approx. 3,400 m long, 1,300 m wide, 300 m deep.<br>**Blue Hills North**: 1,390 m long, 360 m wide, 133 m deep.<br>**Terapod**: 1,440 m long, 360 m wide, 140 m deep | No change | **Total combined pits:** 366 ha.<br>• **Karara**: max 3,400 m long, max 1,300 m wide, average 300 m deep below natural ground level.<br>• **Blue Hills North**: 1,390 m long, 360 m wide, 133 m deep.<br>• **Terapod**: 1,440 m long, 360 m wide, 140 m deep |
| **Waste Rock Dump (WRD)** | **Figure ES.2** | MS 805: 365 ha<br>MS 806: 193 ha (includes ROM and WRD) | Additional 179 ha for KIOP | **KIOP WRD**: 544 ha<br>Max height 450 mAHD (106 m above ground level).<br>**MIOP WRDs and ROM pads**:<br>**Blue Hills North**: 135 ha<br>**Terapod**: 58 ha |

| Proposal Element | Location | Existing Extent for Approved Proposals (MS 805 and MS 806) | Proposed Amendment Extent | Combined Proposal Maximum Extent |
|---|---|---|---|---|
| **Tailings Storage Facility (TSF)** | **Figure ES.2** | Area not defined | Additional 261 ha for KIOP | **KIOP TSF**:<br>860 ha<br>Max height 402 mAHD |
| **Site Infrastructure** | **Figure ES.2** and **Figure ES.3** | • Processing plant<br>• ROM pad<br>• Bulk fuel storage and refuelling pads<br>• Explosive compound and magazine<br>• Wastewater treatment facility<br>• Reverse osmosis plant<br>• Landfill<br>• Air strip<br>• Borefields<br>• Powerline<br>• Rail siding<br>• Site access | New infrastructure areas surrounding the WRD and TSF expansion areas at KIOP.<br>New infrastructure area for the abandonment bund adjacent to the pit at KIOP.<br>Incorporate infrastructure approved under MIOP to support ongoing operations at KIOP. | Combined infrastructure approximately 2,736 ha |
| **Operational Elements** | | | | |
| **Pit Stages and Concentrate Production Rate** | NA | MS 805: Stages 2–5, up to approx. 37.6 Mtpa (Stages 4 & 5).<br>MS 806: Stages 1–2, approx. 3 Mtpa | Include additional stages 6-8 with a reduction in concentrate production rate by up to approx. 29.4 Mtpa | Stage 2 to Stage 8: approx. 8.2 Mtpa of concentrate |
| **Waste Rock Volumes** | NA | MS 805: approx. 37.6 Mtpa.<br>MS 806: Not defined | Increase total waste rock volume by approx. 245 Mt | Stage 2 to Stage 8: approx. 17 Mtpa.<br>Over the Life of mine: approx. 462 Mt |
| **Dewatering** | NA | MS 805: peak 1,300 kL/day [475 MLpa].<br>MS 806: 0.72 GLpa [720 MLpa] | Increase of peak dewatering rate by 400 kL/day [145 MLpa]. This higher dewatering rate is expected to be required for about 5 years | Dewatering flow rate up to approx. 0.6 GLpa to end of mine life |

| Proposal Element | Location | Existing Extent for Approved Proposals (MS 805 and MS 806) | Proposed Amendment Extent | Combined Proposal Maximum Extent |
|---|---|---|---|---|
| **Proposal Elements with Greenhouse Gas Emissions** | | | | |
| **Construction elements.**<br>**The amendment is continuing operations, so there are no specific construction activities** | | | | |
| **Operation Elements** | | | | |
| **Scope 1** | Fuel combustion, rail haulage, land clearing | Not defined | Total 1,722,936 tonnes $CO_2$-e (2024–2053)<br>Peak annual 143,653 tpa $CO_2$-e | Total 1,722,936 tonnes $CO_2$-e (2024–2053)<br>Peak annual 143,653 tpa $CO_2$-e |
| **Scope 2** | Electricity | Not defined | Total 3,284,721 tonnes $CO_2$-e (2024–2053)<br>Peak annual 265,000 tpa $CO_2$-e | Total 3,284,721 tonnes $CO_2$-e (2024–2053)<br>Peak annual 265,000 tpa $CO_2$-e |
| **Scope 3** | Purchased goods and services, downstream transport, processing of products | Not defined | Total 353,766,597 tonnes $CO_2$-e (2024–2053)<br>Peak annual 12,184,227 tpa $CO_2$-e | Total 353,766,597 tonnes $CO_2$-e (2024–2053)<br>Peak annual 12,184,227 tpa $CO_2$-e |
| **Rehabilitation** | | | | |
| **Rehabilitation will be undertaken in accordance with KML environmental procedures: Land Rehabilitation (CORP-EN-PRO-1002), Rehabilitation Performance Monitoring (CORP-EN-PRO-1040), Rehabilitation Schedule (CORP-EN-SCH-1006) and Mine Closure Plan (CORP-EN-PLN-1038).** | | | | |
| **Commissioning** | | | | |
| **Commissioning of the mine infrastructure are subject to the operational limits above. Construction and commissioning were completed as part of KIOP. The Mine Life Extension is for ongoing operations.** | | | | |
| **Decommissioning** | | | | |
| **Decommissioning of mine infrastructure will be managed through KML's Mine Closure Plan (CORP-EN-PLN-1038).** | | | | |
| **Other Elements which Affect Extent of Effects on the Environment** | | | | |
| **Proposal Time** | **Maximum project life** | **MS 805**:<br>25 years (commenced in 2010).<br>**MS 806**: 10 years | Additional 20 years | About 46 years (completion of closure implementation by 2055) |
| | **Construction phase** | Not specified | No change | 0 years |
| | **Operations phase** | Not specified | Additional 20 years | 44 years (2010 to 2053) |
| | **Decommissioning phase** | Not specified | No change | 3 years (2053 to 2055) |

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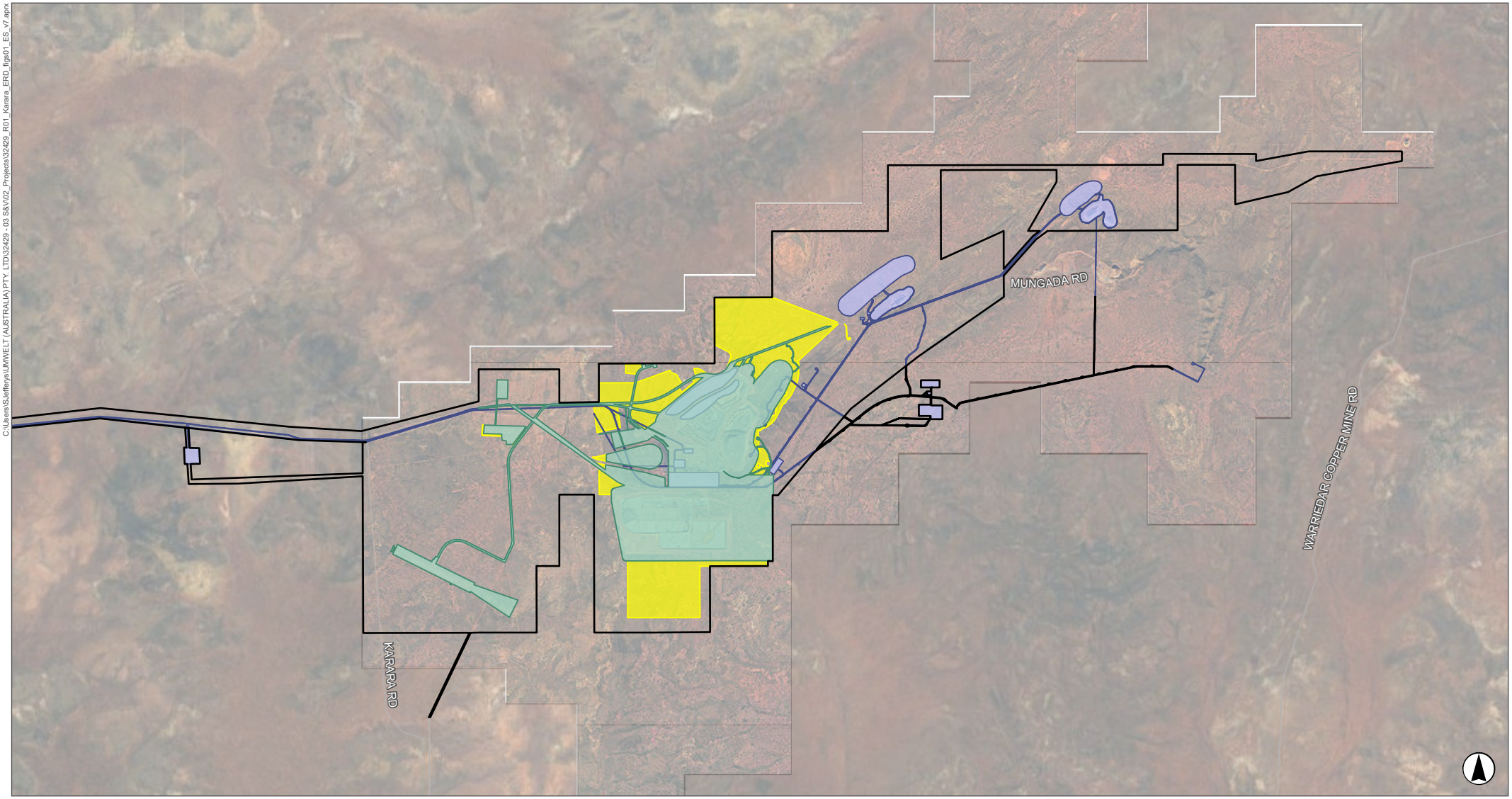


Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Approved under KIOP (MS 805)
- Approved under MIOP (MS 806)
- Mine Life Extension (KIOP MLE) Mitigated Disturbance Footprint
- Minor Road

# FIGURE ES.1

## Combined Proposal Development Envelope with MS 805, MS 806 and New Disturbance Footprint – Mine Area

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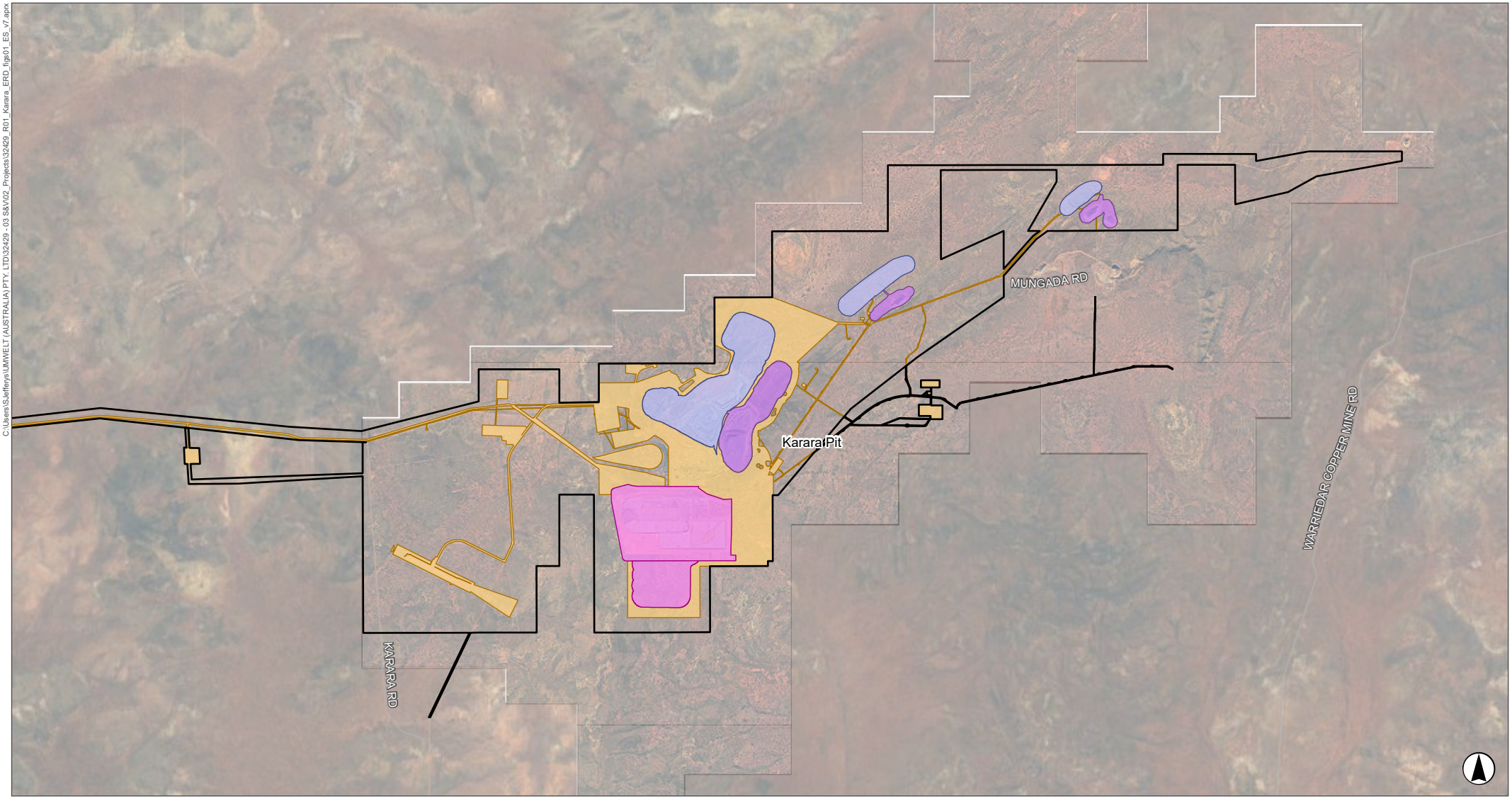
**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Infrastructure
- Pit
- TSF
- WRD
- Minor Road

# FIGURE ES.2

## Combined Proposal Development Envelope and Disturbance Footprint – Mine Area

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**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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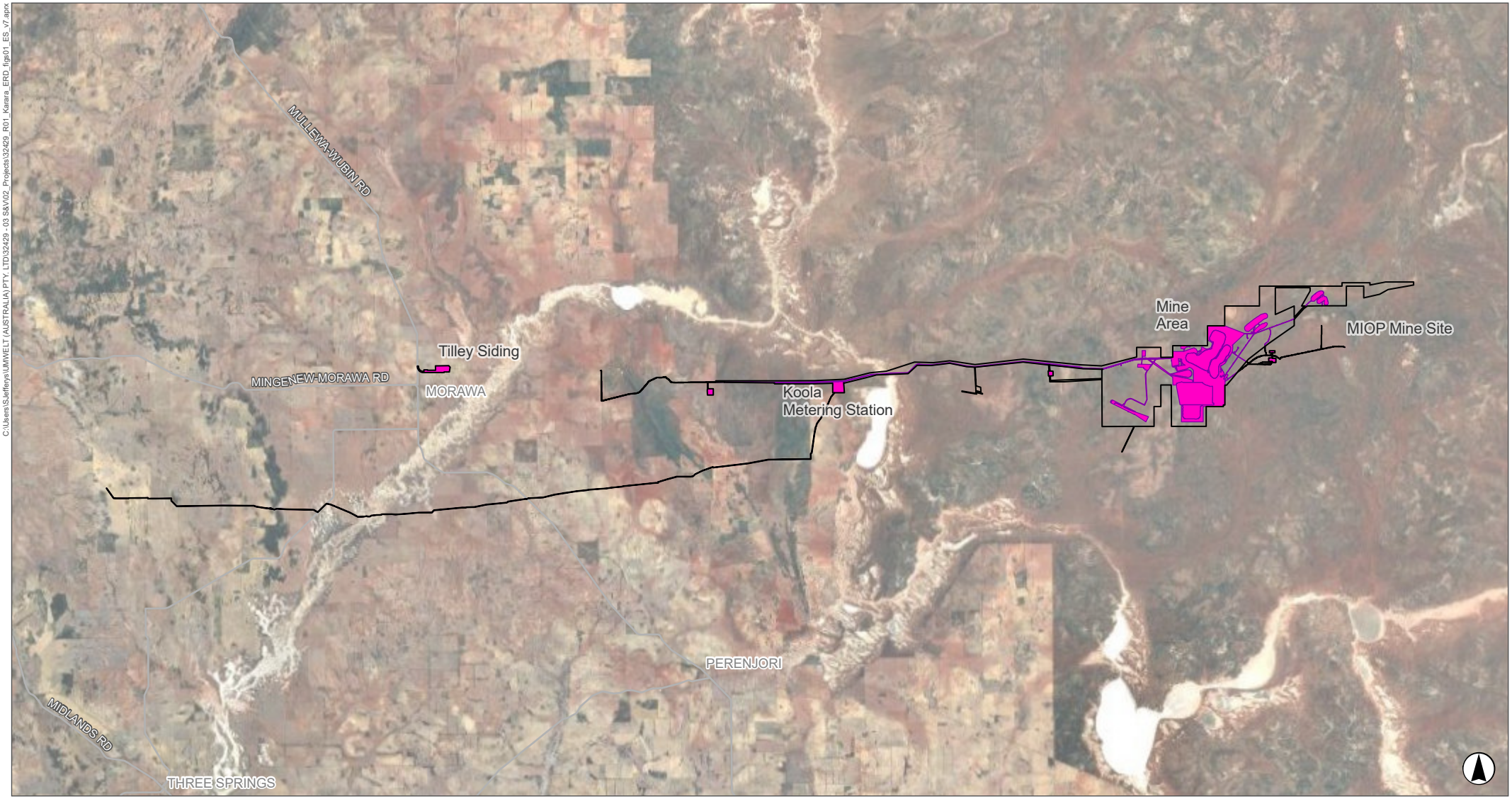


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Scale: 1:500,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Main Road

# FIGURE ES.3

Combined Proposal Development Envelope and Disturbance Footprint – Mine Area and Regional Infrastructure

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**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

**Table ES 3 Summary of Potential Impacts, Proposed Mitigation and Outcomes for Relevant Environmental Factors**

| Flora and Vegetation | |
|---|---|
| **Potential impacts** | Potential impacts from the proposed amendment (KIOP MLE Mitigated Proposal):<br>• Loss of native vegetation at a local scale from clearing.<br>• Loss of significant flora species from clearing (12 priority species and one potentially undescribed species).<br>• Loss of significant vegetation communities (one priority ecological community and one vegetation type) from clearing.<br>• Indirect impacts from dust, water and sediment runoff, fragmentation and weeds.<br>Cumulative impacts from the Combined Proposal:<br>• Impact to native vegetation that has already experienced high cumulative loss regionally.<br>• Loss of significant flora individuals from clearing:<br>  ○ *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (Priority 1)<br>  ○ *Persoonia pentasticha* (Priority 3)<br>• Impact to regionally significant vegetation communities from clearing:<br>  ○ 'Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)' priority ecological community (Blue Hills PEC)<br>  ○ Vegetation type (VT) O.<br>• Indirect impacts from dust, water and sediment runoff, fragmentation and weeds. |
| **Mitigation hierarchy** | KML will continue to implement mitigation measures for the approved projects as required under implementation conditions for MS 805 and MS 806.<br>**Avoid**<br>• Obtain a ground disturbance permit prior to conducting clearing of vegetation (CORP-EN-PRO-1004).<br>**Minimise** potential impacts to flora and vegetation in accordance with existing KML management system documents:<br>• Flora and Vegetation Management Plan (CORP-EN-PLN-1011)<br>• Flora and Vegetation Health Monitoring Plan (CORP-EN-PLN-1012)<br>• Approvals Request and Ground Disturbance Procedure (CORP-EN-PRO-1004)<br>• Flora, Weeds and Plant Pathogens (CORP-EN-PRO-1009)<br>• Seed Collection, Cleaning and Storage (CORP-EN-PRO-1037)<br>• Dust Monitoring Procedure (CORP-EN-PRO-1005).<br>**Rehabilitate** progressively for the Combined Proposal 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. Undertake rehabilitation in accordance with existing KML management system documents:<br>• Land Rehabilitation (Document Number: CORP-EN-PRO-1002)<br>• Rehabilitation Performance Monitoring (Document Number: CORP-EN-PRO-1040)<br>• Rehabilitation Schedule (Document Number: CORP-EN-SCH-1006)<br>• Mine Closure Plan (Document Number: CORP-EN-PLN-1038). |
| **Residual impacts, including assessment of significance** | A total of 12 of the 41 significant flora taxa identified within the Survey Area (plus one potentially undescribed species) have records within the KIOP MLE mitigated disturbance footprint and indirect impact zone, comprising:<br>• 3 Priority 1 taxa<br>• 9 Priority 3 taxa<br>• 1 potentially undescribed taxon<br>• no records of EPBC or BC Act listed flora taxa. |

| Flora and Vegetation | |
|---|---|
| | The KIOP MLE mitigated disturbance footprint will also directly impact 89 ha of Blue Hills BIF PEC (P1). |
| **Proposed environmental outcomes** | The proposed amendment (KIOP MLE Mitigated Proposal) is proposed to have the following environmental outcomes:<br>1. Direct disturbance of no more than 1,186 ha, of which 1,185 ha is native vegetation.<br>2. Management and monitoring of impacts to the Blue Hills PEC in accordance with existing condition 6 of MS 805 and MS 806.<br>3. Progressive rehabilitation in accordance with existing condition 12 of MS 805 and condition 11 of MS 806. |
| **Assessment of offsets** | KML will propose offsets for the potentially significant residual impacts to:<br>• *Persoonia pentasticha* (P3)<br>• *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)<br>• *Crassula* sp. nov (undescribed species). |

| Terrestrial Fauna | |
|---|---|
| **Potential impacts** | Potential direct impact from the proposed amendment is habitat loss from direct clearing of fauna habitat for 27 species, including the following listed species:<br>• Gilled Slender Blue-tongue<br>• Malleefowl<br>• Ornate Trapdoor Spider<br>• Southern Whiteface<br>• Western Spiny-tailed Skink.<br>Potential indirect impacts as a result of the proposed amendment include:<br>• Vibration, noise, light and dust<br>• Fragmentation<br>• Vehicle strike<br>• Habitat degradation from weed invasion<br>• Increase in non-native fauna competing for resources. |
| **Mitigation hierarchy** | KML will continue to implement mitigation measures for the approved projects as required under implementation conditions for MS 805 and MS 806.<br>**Avoid**<br>• Obtain a ground disturbance permit prior to conducting clearing of vegetation (CORP-EN-PRO-1004).<br>**Minimise** potential impacts to terrestrial fauna in accordance with existing KML management system documents:<br>• Approvals Request and Ground Disturbance Procedure (CORP-EN-PRO-1004)<br>• Western Spiny-tailed Skink Management, Monitoring and Translocation Procedures (CORP-EN-PRO-1024)<br>• Fauna Management Plan (CORP-EN-PLN-1008)<br>• Terrestrial Fauna Management Environmental Procedure (CORP-EN-PRO-1010)<br>• Fauna Sighting and Mortality Form (CORP-EN-FRM-1045)<br>• Malleefowl Management and Monitoring Environmental Procedure (CORP-EN-PRO-1035). |

| Terrestrial Fauna | |
|---|---|
| | **Rehabilitate** progressively for the Combined Proposal 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. Undertake rehabilitation in accordance with existing KML management system documents:<br>• Land Rehabilitation (Document Number: CORP-EN-PRO-1002)<br>• Rehabilitation Performance Monitoring (Document Number: CORP-EN-PRO-1040)<br>• Rehabilitation Schedule (Document Number: CORP-EN-SCH-1006)<br>• Mine Closure Plan (Document Number: CORP-EN-PLN-1038).<br>KML has employed the following mitigation measures to reduce impacts to ecological factors:<br>**Avoid**<br>• The portion of the Proposal has been removed from the significant amendment.<br>**Minimise**<br>• Reduction of impacts from TSF (136 ha less), WRD (26 ha less) and abandonment bund area (6.5 ha less) as part of mitigation efforts to the Proposal.<br>• The removal of Syncline Turner haul road (88 ha) from the Proposal<br>• The removal of the Rail Loop from the Proposal as this area is currently managed under NVCP 3399/4 (approved until 2027) |
| **Residual impacts, including assessment of significance** | Residual impacts from the proposed amendment (KIOP MLE Proposal) to terrestrial fauna habitat (Vegetation Substrate Associations, VSAs):<br>• VSA 1 – 100.1 ha<br>• VSA 2 – 3.8 ha<br>• VSA 3 – 269.6 ha<br>• VSA 4 – 342.4 ha<br>• VSA 5 – 149.1 ha<br>• VSA 6 – 80.7 ha<br>• VSA 7 – 2.39.1 ha<br>• VSA 8, 9, 11, 12 – 0 |
| **Proposed environmental outcomes** | The proposed amendment (KIOP MLE mitigated Proposal) is expected to have the following environmental outcomes:<br>Direct disturbance of no more than 1,186.3 ha, of which 1,182.3 ha is fauna habitat.<br>Management and monitoring of impacts to the Blue Hills PEC in accordance with existing condition 6 of MS 805 and MS 806.<br>Management and monitoring of groundwater dependant vegetation in accordance with existing condition 7 of MS 805 and MS 806.<br>Progressive rehabilitation in accordance with existing condition 12 of MS 805 and condition 11 of MS 806. |
| **Assessment of offsets** | Significant residual impacts will occur to three species listed under the EPBC Act and BC Act, requiring offsets:<br>• Western Spiny-tailed Skink (BC Act: Vulnerable; EPBC: Endangered)<br>• Malleefowl (BC Act: Vulnerable; EPBC: Vulnerable)<br>• Ornate Trapdoor Spider (BC Act: Endangered).<br>Potentially significant residual impacts will also occur to the Gilled Slender Blue-tongue (BC Act: Vulnerable), Aganippe (*Idiosoma*) sp.) (potential new species) and the Karara Millipede, which is locally significant. |

| Landforms | |
|---|---|
| **Potential impacts** | The already approved KIOP (MS 805) and MIOP (MS 806) have a permanent impact to the Blue Hills Range System of 427.0 ha, which is 22.0% of the Banded Iron Formation (BIF) ranges local assessment unit. Of this, 357.0 ha is impacting Mt Karara (70.6% of the Mt Karara landform).<br>The proposed KIOP MLE includes expansion of impacts to Mt Karara BIF landform, which is part of the Blue Hills Range System. Based on the significance considerations in the *Environmental Factor Guideline – Landforms* (EPA, 2018), Mt Karara is not considered a significant example of a BIF landform. |
| **Discuss if information is fit for purpose to inform impact assessment** | The supporting studies and ERD provide the information required for environmental impact assessment as specified in the Environmental Factor Guideline – Landforms, including description of the landform, significance of the landform, calculation of predicted impacts (including cumulative impacts), description of mitigation measures and significance of the residual impact. |
| **Mitigation hierarchy** | The proposed KIOP MLE has been designed to avoid impacts to BIF landforms outside of Mt Karara.<br>The waste rock dump (WRD) expansion has been designed to minimise impacts to BIF landforms.<br>Temporary impacts to landforms, such as infrastructure, will be reshaped during mine closure to blend to the natural surface, restoring landform values as much as possible. |
| **Residual impacts, including assessment of significance** | The proposed KIOP MLE will increase the residual (permanent) impact to Mt Karara by 32.5 ha, which is an additional 6.4% impact. The combined permanent impact to Mt Karara including the approved extent of KIOP and MIOP is 389.5 ha (77.0% of the landform).<br>The proposed KIOP MLE is unlikely to result in a change in International Union for the Conservation of Nature and Natural Resources (IUCN) Threat Category for significant flora, terrestrial fauna and ecological communities that are reliant on the BIF landform. |
| **Proposed environmental outcomes** | Temporary impacts to landforms, such as infrastructure, will be reshaped during mine closure to blend to the natural surface, restoring landform values as much as possible.<br>Re-establishment of vegetation in rehabilitation will achieve at least 70% species composition comparable with the pre-mining vegetation within five years of cessation of productive mining. |
| **Assessment of offsets (if relevant)** | Not applicable. |

| Inland Waters | |
|---|---|
| **Potential impacts** | Water-dependent environmental values that could be impacted by changes to inland waters due to the proposed new activities are ephemeral surface water features (claypans and gnamma holes) and surface and surface and groundwater dependent vegetation types.<br>Mongers Lake (ephemeral lake system and registered Aboriginal heritage site) is crossed by current KIOP linear infrastructure but there are no proposed new disturbance or changes to activities near this system.<br>The proposed KIOP MLE new disturbance footprint could impact inland waters by changes to surface water flow. This ERD also presents the predicted impacts from groundwater drawdown and discharge of dewater associated with the life of mine pit. Although the Proposal does not include any changes to the approved pit shape, the previous hydrogeological models did not model the full pit extent. |

| Inland Waters | |
|---|---|
| **Discuss if information is fit for purpose to inform impact assessment** | The predicted impacts to inland waters have been modelled. The hydrogeological model has been updated and calibrated several times throughout operations to incorporate updated information, which increases confidence in the modelling predictions. The calibration demonstrated reasonable match between measured and modelled groundwater levels.<br><br>The surface water models follow recognised methods and consider the proposed changes compared to the current operational status. |
| **Mitigation hierarchy** | Minimise impacts by:<br>• Manage water abstraction from Karara mine site in accordance with *Karara Mining Limited Groundwater Licence Operating Strategy GWL171229 The Karara Iron Ore Project*.<br>• Manage surface water in accordance with KML Environmental Procedure – Surface Water (CORP-EN-PRO-1011).<br>Pit dewater will be discharged into Terapod West pit, which will enable groundwater drawdown from mining of Terapod West pit to recover (rehabilitation of impacts). |
| **Residual impacts, including assessment of significance** | There are not predicted to be any significant residual impacts from groundwater drawdown at the Karara mine site associated with the Proposal, as there are no significant groundwater-dependent environmental values within the predicted groundwater drawdown extent.<br><br>The proposed MLE new disturbance footprint is not expected to result in any significant residual impacts to surface water, as the predicted impact will be only a small change in surface water flow depth in existing drainage lines south of the TSF. |
| **Proposed environmental outcomes** | Discharge of saline pit water is managed to ensure no impact to flora and vegetation health in the vicinity of the saline water disposal area.<br><br>Tailings discharge and surface water at the TSF is managed to prevent spill of high-salinity water or tailings into the environment. |
| **Monitoring and management of environmental outcomes** | Annual vegetation health monitoring.<br>Daily inspection of the TSF discharge and return water pipelines, TSF toe drain and seepage collection sump.<br>Annual environmental report to Department of Mines, Petroleum and Exploration. |

| Greenhouse Gas Emissions | |
|---|---|
| **Potential impacts** | The Proposal is an extension of the ongoing operations at KIOP and will not substantially change the Scope 1 or Scope 2 peak annual emissions compared to the current operations.<br>Scope 1 emissions as considered by EPA includes:<br>• fuel use by light and heavy vehicles, generators, etc. (this is the Scope 1 emissions reported under NGER Act and considered by Safeguard Mechanism)<br>• diesel combustion by rail contractor for transport of concentrate to Geraldton Port<br>• land clearing (calculated based on additional 1,522 ha for MLE).<br>The base case peak annual EPA Scope 1 emissions are predicted as 149,167 t $CO_2$-e per annum. Only 88,287 t $CO_2$-e per annum is Scope 1 emissions as considered under the NGER Act. Therefore, the Proposal will not be regulated under the Safeguard Mechanism.<br>The base case peak annual Scope 2 emissions are predicted as 265,000 t $CO_2$-e per annum. |

| Greenhouse Gas Emissions | |
|---|---|
| **Discuss if information is fit for purpose to inform impact assessment** | KML's GHG management plan includes all the contents specified in the EPA Greenhouse Gas Environmental Management Plan template. The Executive Summary in KML's GHG management plan includes all items specified in Attachment 1 'GHG EMP executive summary' of the template.<br>Information specified by the GHG Emissions Environmental Factor Guideline has been presented in the ERD, including details on predicted Scope 1, 2 and 3 emissions, how emissions are proposed to be mitigated, consideration of best practice, emissions intensity and benchmarking information. |
| **Mitigation hierarchy** | Mitigations will be applied to reduce EPA Scope 1 and Scope 2 emissions.<br>Avoid:<br>• Rail haulage contractor intending to switch from diesel powered trains to net zero emission trains in 2030.<br>Minimise:<br>• Staged electrification of light and heavy vehicles.<br>• Optimise design of WRD to reduce fuel consumption.<br>• Approx 80% of electricity needs sourced from renewable energy generator from 2031.<br>Offset:<br>• Use offsets to achieve net zero emissions from 2050 for minor emissions remaining after mitigation. |
| **Residual impacts, including assessment of significance** | Total EPA Scope 1 GHG emissions for remaining life of project: 1,722,936 t $CO_2$-e (including mitigation measures and offsets). Peak annual operational EPA Scope 1 emissions: 143,653 t $CO_2$-e per annum (predicted in 2028). |
| **Proposed environmental outcomes** | Net zero Scope 1 GHG emissions from KIOP by 2050. |
| **Monitoring and management of environmental outcomes** | Predicted Scope 1 emissions considered by EPA are largely NGER-covered Scope 1 emissions. KML reports NGER-covered Scope 1 emissions annually and this data is made publicly available on the Commonwealth Clean Energy Regulator website. |
| **Assessment of offsets** | Estimated 30,483 t CO2-e required to be offset from 2050-2053 to achieve net zero Scope 1 emissions. KML proposes to purchase and surrender Australian Carbon Credit Units to meet offset requirements. |

| Social Surroundings | |
|---|---|
| **Potential impacts to significant values** | The Aboriginal Cultural Heritage Inquiry System (ACHIS) was searched in July 2025 and identified 19 registered and 108 lodged Aboriginal heritage sites within 3 km of the Project. Of relevance to the Proposal, there are nine registered and 39 lodged Aboriginal heritage sites within the Combined Proposal development envelope (DE).<br>Seven newly identified Aboriginal heritage sites have been recorded in the Proposal DE (Horizon Heritage Management, 2020). |
| **Discuss if information is fit for purpose to inform impact assessment** | To date, Aboriginal cultural heritage surveys have been completed over 24,752.9 ha, which covers 59.1% of the Combined Proposal DE and 94.5% of the Combined Proposal disturbance footprint.<br>The most recent survey predominantly targeted locations proposed for disturbance, including proposed WRD and TSF expansion areas. |

| Social Surroundings | |
|---|---|
| **Mitigation hierarchy** | One of the registered sites within the Combined Proposal DE, Haul Road Stone Arrangement (DPLH ID 26059), will be avoided completely.<br>The Combined Proposal disturbance footprint has been designed to avoid impact on six of the newly identified Aboriginal heritage sites. |
| **Residual impacts, including assessment of significance** | Eight registered sites within the Combined Proposal DE are within the Combined Proposal disturbance footprint. KML holds section 18 consents for disturbance of these registered sites. Seven of these registered sites are within the KIOP and MIOP approved disturbance footprints. One additional registered site will be impacted by the proposed KIOP MLE disturbance footprint.<br>One newly identified Aboriginal heritage site (Karara South CMT) is located within the proposed KIOP MLE disturbance footprint. This site is a culturally modified tree that will be salvaged and relocated at the request of the Widi Mob Traditional Owners. |
| **Proposed outcomes** | Avoid impacts to six newly identified Aboriginal heritage sites that are outside of the Combined Proposal disturbance footprint.<br>Yamatji Nation People are informed of ground disturbance and relevant development issues in a timely manner. |
| **Monitoring and management of outcomes** | All obligations relating to cultural heritage from legislation, section 18 Ministerial consent notices and section 18 applications are recorded in the obligations register and audited as per the audit schedule. Those are generally audited annually with records in KML incidents reporting system INX InControl as to any breach of section 18 consents or incidents of unauthorised disturbance to Aboriginal heritage sites. |

# Abbreviations

| Abbreviation | Meaning |
|---|---|
| **ACHIS** | Aboriginal Cultural Heritage Inquiry System |
| **AHA** | *Aboriginal Heritage Act 1972* (WA) |
| **AHMP** | Aboriginal cultural heritage management plan |
| **ARD** | Acid rock drainage |
| **BC Act** | *Biodiversity Conservation Act 2016* (WA) |
| **BIF** | Banded iron formation |
| **$CO_2$-e** | Carbon dioxide equivalent |
| **DAWE** | Department of Agriculture, Water and the Environment |
| **DBCA** | Department of Biodiversity, Conservation and Attractions (WA) |
| **DCCEEW** | Department of Climate Change, Energy, the Environment and Water |
| **DE** | Development Envelope |
| **DIA** | Department of Indigenous Affairs |
| **DMPE** | Department of Mines, Petroleum and Exploration (WA) |
| **DPLH** | Department of Planning, Lands and Heritage |
| **DWER** | Department of Water and Environmental Regulation (WA) |
| **EOO** | Extent of occurrence |
| **EP Act** | *Environmental Protection Act 1986* (WA) |
| **EPA** | Environmental Protection Authority (EPA) |
| **EPBC Act** | *Environment Protection and Biodiversity Conservation Act 1999* (Cth) |
| **ERD** | Environmental review document |
| **GHG** | Greenhouse gas |
| **HIOP** | Hinge Iron Ore Project |
| **HMVT** | Highly modified vegetation type |
| **IBRA** | Interim Biogeographic Regionalisation for Australia |
| **IBSA** | Index of biodiversity surveys for assessments |
| **ILUA** | Indigenous Land Use Agreement |
| **KIOP** | Karara Iron Ore Project |
| **KML** | Karara Mining Limited |
| **LIC** | Linear infrastructure corridor |
| **MDCP** | Mine development and closure proposal |
| **MIOP** | Mungada Iron Ore Project |
| **MLE** | Mine life extension |
| **MNES** | Matters of National Environmental Significance |
| **MS** | Ministerial Statement |
| **Mtpa** | Million tonnes per annum |
| **NAF** | Non-acid forming |
| **PAF** | Potentially acid forming |
| **PEC** | Priority ecological community |

| Abbreviation | Meaning |
|---|---|
| **PEVSA** | Pre-European vegetation system Association |
| **tpa** | Tonnes per annum |
| **TEC** | Threatened ecological community |
| **TO** | Traditional owner |
| **TSF** | Tailings storage facility |
| **VSA** | Vegetation substrate association |
| **VT** | Vegetation type |
| **WRD** | Waste rock dump |
| **YPSHA** | Yamatji Proponent Standard Heritage Agreement |

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Appendix 6-1 KIOP MLE Fauna Assessment of Proposed Development Envelopes 2020 and 2024 (BCE, 2025)

Appendix 6-2 Terrestrial Fauna Impact Assessment KIOP MLE (Umwelt, 2025d)

Appendix 6-3 Fauna Management Plan (CORP-EN-PLN-1008)

Appendix 6-4 Terrestrial Fauna Management Environmental Procedure (CORP-EN-PRO-1010)

Appendix 6-5 Fauna Sighting and Mortality Form (CORP-EN-FRM-1045)

Appendix 6-6 Environmental Procedure – Malleefowl Management and Monitoring (CORP-EN-PRO-1035)

Appendix 6-7 Environmental Procedure – Western Spiny-tailed Skink, Management, Monitoring and Translocation (CORP-EN-PRO-1024)

Appendix 6-8 Karara Iron Ore Project Mine Life Extension – Southern Whiteface Bioregional Assessment (Umwelt, 2026a)

Appendix 7-1 Landforms Assessment Technical Report – Karara Iron Ore Project Mine Life Extension (Umwelt, 2025c)

Appendix 8-1 Karara Mining Limited Groundwater Licence Operating Strategy GWL171229 The Karara Iron Ore Project (Karara Mining Limited, 2025)

Appendix 8-2 Karara Iron Ore Project Mine Life Extension Project – Surface Water Hydrology Assessment (Stantec, 2024)

Appendix 8-3 Numerical Modelling of Dewatering Flows & Potential Impacts of Extended Mining (Rockwater Pty Ltd, 2024)

Appendix 8-4 Recalibration of Numerical Groundwater Model & Predicting Impacts of Planned Mining (Rockwater Pty Ltd, 2021)

Appendix 8-5 Karara Mining Limited Operating Strategy Yandanooka Borefield – Parmelia Aquifer (Karara Mining Limited (KML), 2020)

Appendix 8-6 Karara Iron Ore Project Surface Water Baseline and Impact Assessment (MWH, 2008)

Appendix 8-7 Groundwater Impact Assessment, Karara Mine Site (Rockwater Pty Ltd, 2008)

Appendix 8-8 Surface Water Management Procedure (CORP-EN-PRO-1011)

Appendix 9-1 Mt Karara Pit Extension Subterranean Fauna Desktop Assessment (Rockwater, 2025)

Appendix 9-2 Greater Karara Iron Ore Project Subterranean Fauna Biological Report (Ecologia, 2008)

Appendix 10-1 Karara Iron Ore Project Life of Mine Extension GHG Management Plan (Greenbase, 2025)

Appendix 11-1 Historic Aboriginal Heritage Surveys Undertaken for the Project

Appendix 11-2 Karara Mining Limited Aboriginal Heritage Management Plan (2025)

Appendix 11-3 Aboriginal Heritage Survey Report Karara Iron Ore Mine – Long Term Mine Planning Survey Areas (Horizon Heritage, 2020)

Appendix 12-1 Dust Management Plan (CORP-EN-PLN-1010)

Appendix 12-2 Dust Management and Monitoring Procedure (CORP-EN-PRO-1005)

Appendix 13-1 Karara Iron Ore Project Mine Life Extension – Offset Strategy

# 1.0 Proposal

The purpose of this document is to present the environmental impact assessment for the Karara Iron Ore Project Mine Life Extension significant amendment (the Proposal). The Proposal is a significant amendment to the Karara Iron Ore Project (KIOP) approved under Ministerial Statement (MS) 805 and incorporates the Mungada Iron Ore Project (MIOP) approved under MS 806 with the intention of combining these areas into one updated Ministerial Statement.

Karara Mining Limited (KML) referred the Proposal to the Environmental Protection Authority (EPA) under section 38 of the *Environmental Protection Act 1986* (EP Act). The EPA Chair determined that the Proposal should be assessed at the level of Referral Information with additional information (required under s. 40(2)(a) of the EP Act) and four-week public review of the additional assessment information. The EPA issued a section 40(2)(a) notice with the information required for assessment.

KML also referred the significant amendment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cth). The referral decision (EPBC No. 2023/09566) was that the proposed action is a controlled action for listed threatened species and communities (section 18 and 18A of the EPBC Act) to be assessed by accredited assessment under the EP Act. The Department of Climate Change, Energy, the Environment and Water (DCCEEW) provided comments on adequacy of referral information and further information required for assessment.

An Environmental Review Document (ERD) was submitted in September 2025, and comments were received from EPA Services, the Department of Biodiversity, Conservation and Attractions (DBCA) and DCCEEW.

This updated ERD provides the additional information required by the EPA and DCCEEW and address comments on the draft (September 2025) ERD. This ERD comprises:

- description of the existing approvals and compliance status
- description of the significant amendment
- proposal content document
- environmental impact assessment of the preliminary key environmental factors, including cumulative impact assessment and holistic assessment
- proposed environmental outcomes for the significant amendment
- supporting studies and survey reports
- environmental management plans
- assessment of residual impacts significance, offset template and offset approach
- Index of Biodiversity Surveys for Assessments (IBSA) data submissions.

This ERD has been prepared in accordance with the following EPA procedures, instructions and guidance:

- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA, 2024b)
- *Instructions: How to identify the content of a proposal* (EPA, 2024d)
- *Instructions: How to prepare an environmental review document* (EPA, 2024e)

- *Instructions: How to prepare EP Act Part IV environmental management plans* (EPA, 2024c)
- other EPA instructions and EPA factor guideline and technical guidance relevant to each factor.

## 1.1 Approved Proposals

KML operates the KIOP and MIOP, both located 320 km north-northeast of Perth and 225 km east-southeast of Geraldton in the Midwest region of Western Australia (WA) (**Figure 1.1**).

KIOP was approved under 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 the linear infrastructure corridor (LIC) including raw water pipeline to borefield near Mingenew. The approved disturbance footprint under MS 805 is shown in **Figure 1.1** (linear infrastructure corridor) and **Figure 1.2** (Karara mine site).

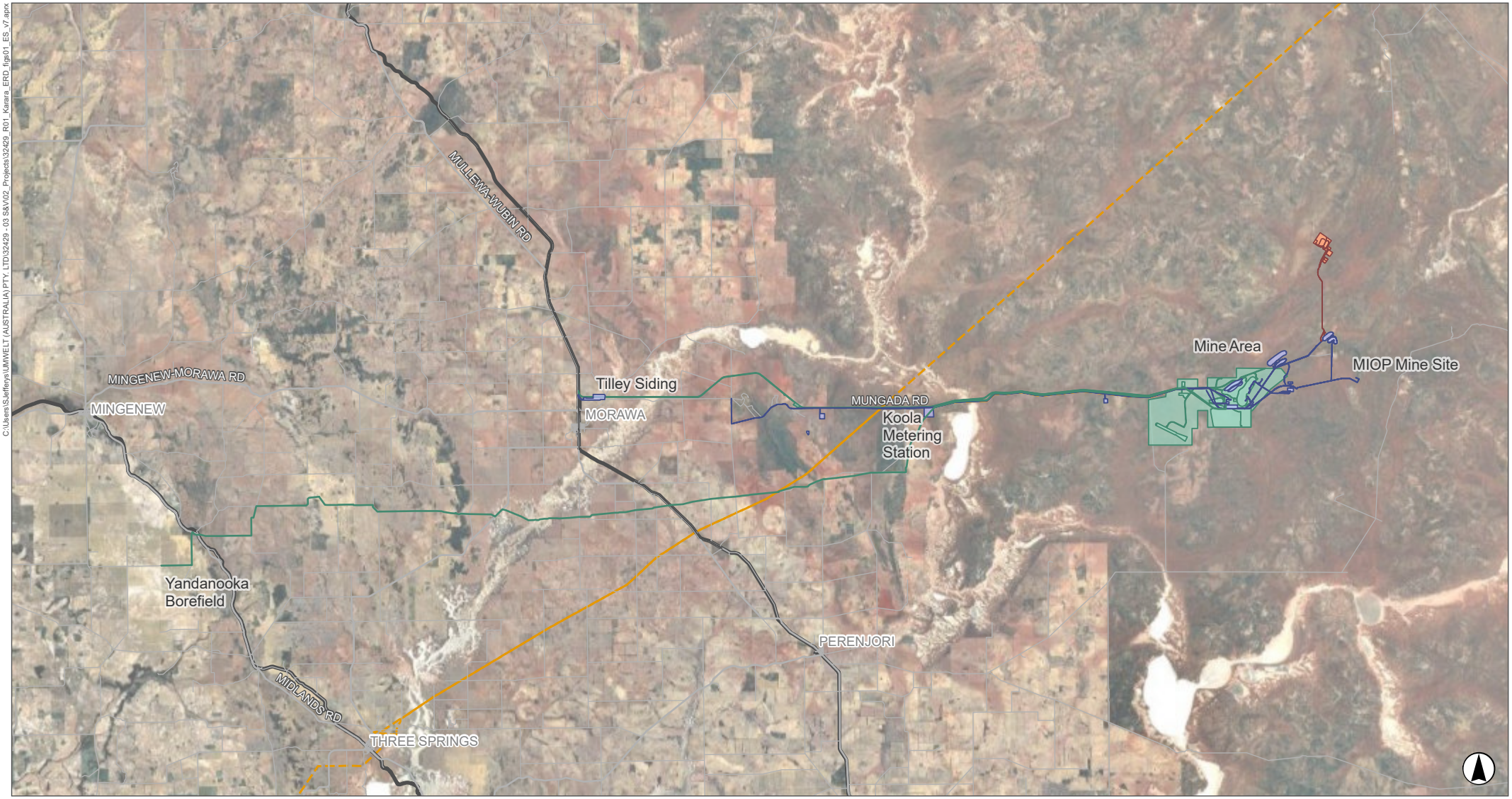
Construction at the KIOP commenced in 2010, with mining and processing commencing in 2012. Since the issue of MS 805, five amendments to the KIOP have been approved under section 45C of the EP Act. Portion of the WRD and TSF have been rehabilitated in accordance with the rehabilitation schedule as approved by the Department of Water and Environmental Regulation (DWER) under condition 12-1(2) of MS 805.

MIOP was approved under MS 806 in 2009 and consists of the Blue Hills North and Terapod open pits and WRDs and regional infrastructure, including access road to Morawa, Tilley Rail Siding, and powerline corridor from Karara to Koola metering station to connect to the South West Interconnected System. The approved disturbance footprint under MS 806 is shown in **Figure 1.1** (regional infrastructure) and **Figure 1.3** (excluding regional infrastructure).

Mining at MIOP commenced in 2011 and was completed in 2014. Since the issue of MS 806, one amendment to the MIOP has been approved under section 45C of the EP Act. MIOP is currently in suspension from active mining. Rehabilitation has been completed over most of the waste rock dumps and infrastructure footprints that are not required to support ongoing KIOP operations. However, MIOP infrastructure such as turkey nests, pipelines, access roads, laydown and hardstand areas, powerlines, rail siding and pits for water storage are currently utilised by KIOP. This infrastructure will be required to support the KIOP mine life extension.

Annual compliance assessment reports have been provided to the former Office of the EPA, now DWER, since 2010 for both MS 805 and 806. Reports for MS 805 indicate that KML is consistently compliant with project approval conditions, and there have been no significant non-compliances to date. 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 re-established with not less than 70% species composition, although average of 70% species composition was achieved for the MIOP as a whole for the area. DWER is aware of this ongoing minor non-compliance and requested KML to continue annual rehabilitation monitoring at MIOP. It is expected this ongoing non-compliance will be resolved when the Proposal is approved under a new Ministerial Statement.

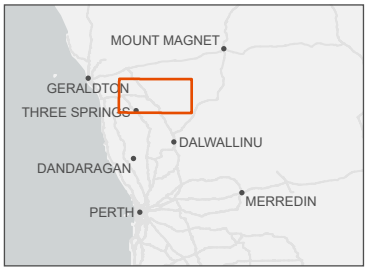
KML also operates the Hinge Iron Ore Project (HIOP), which was approved under MS 968 and is located 10 km north of MIOP. Active mining ceased in 2016, and the project is in the rehabilitation stage. KML has an environmental management plan (CORP-EN-PLN-1020) that covers all three mining operations (KIOP, MIOP and HIOP). HIOP does not form part of the KIOP mine life extension.




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

**Legend**

- HIOP (MS 968) Disturbance Footprint
- MIOP (MS 806) Disturbance Footprint
- KIOP (MS 805) Development Envelope and Disturbance Footprint
- Main Road
- Minor Road
- Railway
- Electricity Transmission Powerline




# FIGURE 1.1
## Regional Location of Approved Projects (HIOP, MIOP and KIOP)

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**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), Western Power (2025), MRWA (2024), KML (2025)

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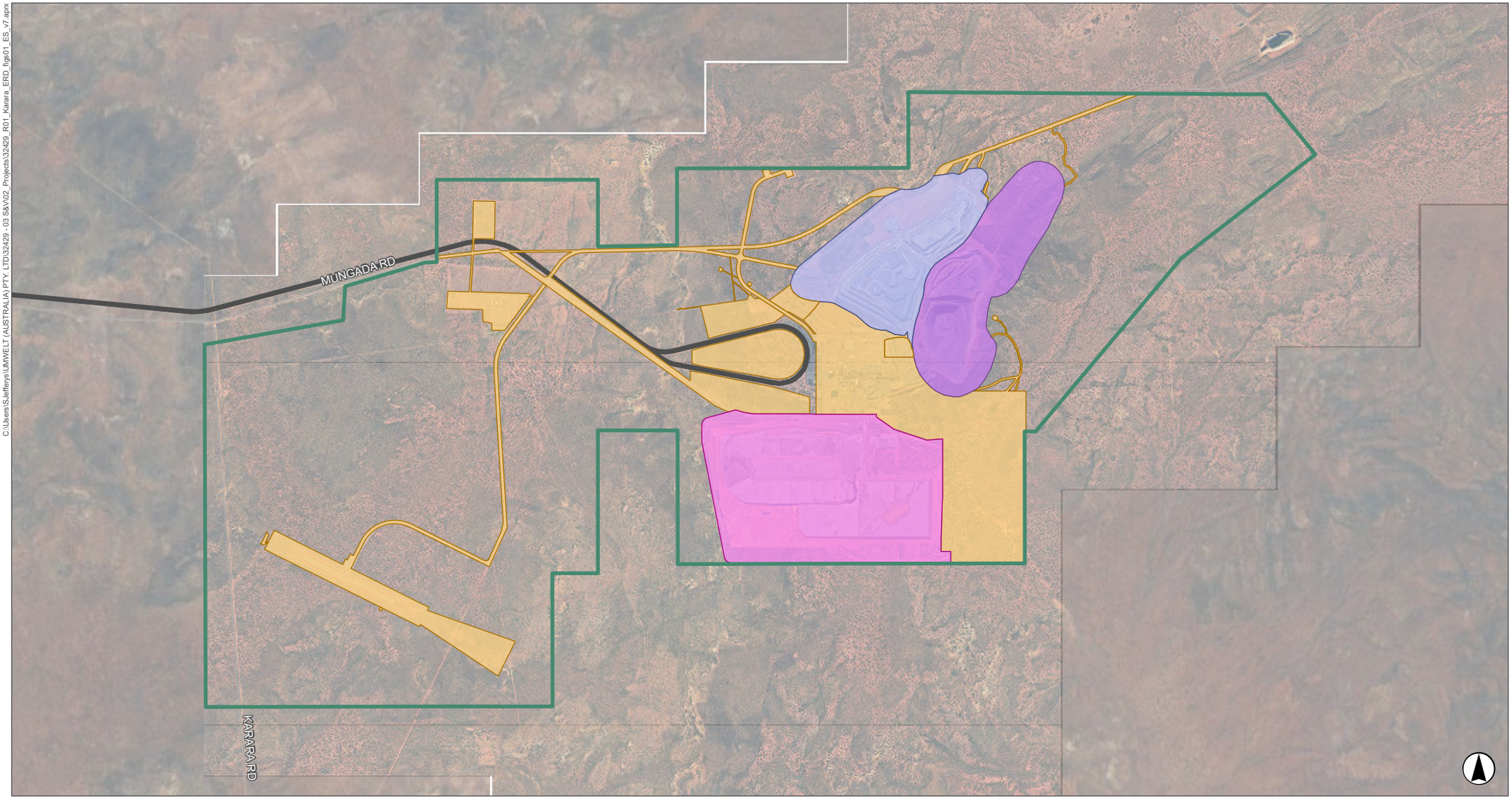


Scale: 1:75,000 at A4, GDA2020 MGA Zone 50

**Legend**

- KIOP (MS 805) Development Envelope
- Railway

**KIOP Disturbance Footprint**

- Infrastructure
- Pit
- TSF
- WRD

**FIGURE 1.2**

Karara Iron Ore Project (MS 805) – Approved Development Envelope and Disturbance Footprint for the Mine Area

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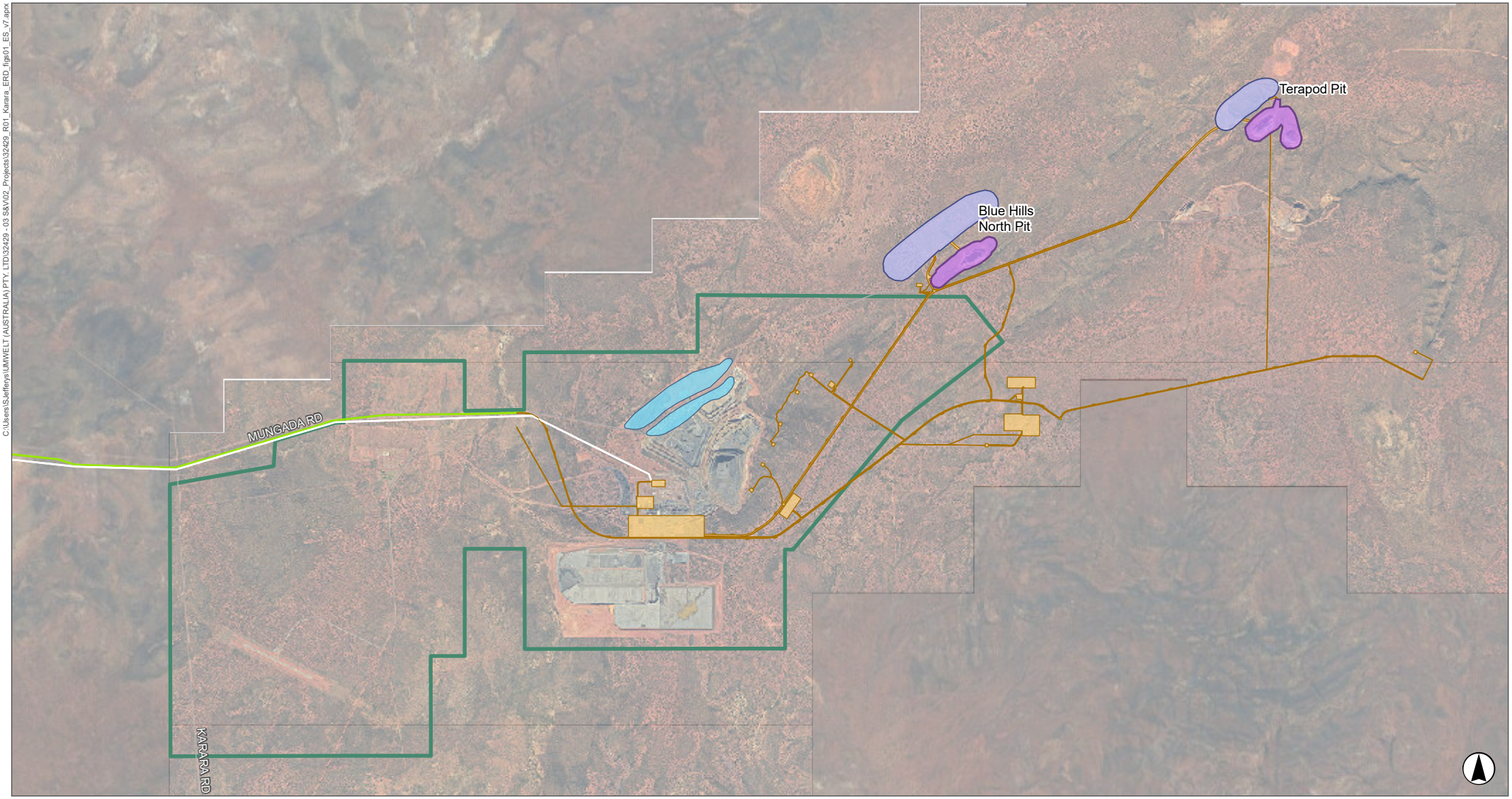
**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)




Scale: 1:100,000 at A4, GDA2020 MGA Zone 50

**Legend**

- KIOP (MS 805) Development Envelope
- Powerline Corridor
- **MIOP (MS 806) Disturbance Footprint**
- Waste Rock Dump
- Gravel Pit
- Haul Road
- Infrastructure
- Pit

# FIGURE 1.3

## Mungada Iron Ore Project (MS 806) Approved Disturbance Footprint – Mine Area

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0 2 4 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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## 1.2 Significant Amendment

The KIOP Mine Life Extension (MLE) is proposed by KML as a significant amendment to KIOP, whilst incorporating aspects of MIOP required for continuing operations at KIOP.

In response to comments on the draft (September 2025) ERD, KML has reduced the Development Envelope and proposed disturbance footprint for the KIOP MLE to mitigate impacts to ecological values. The mitigated disturbance footprint only proposes disturbance areas around the Karara mine site. The reduced areas were documented in an application under s43A of the EP Act (minor amendment) submitted in February 2026. This ERD presents and assesses the impacts of the mitigated Proposal that was the subject of the s43A application.

**Figure 1.4** focuses on the Mine Area and shows the approved areas of MS 805 and MS 806 and the proposed KIOP MLE mitigated disturbance footprint.

**Figure 1.5** shows the total extent of the approved areas of MS 805 and MS 806 and the proposed KIOP MLE mitigated disturbance footprint. Some of the approved areas of MS 805 and MS 806 that are shown in this figure will not form part of the Combined Proposal, which is shown in subsequent figures.

Descriptions used in this ERD are outlined below:

- **Proposal or Combined Proposal mitigated development envelope (Combined Proposal mitigated DE**).

  This is the Combined DE for the significant amendment, which includes the existing DE for MS 805 and provides a DE for MS 806, and has been reduced as per the s43A minor amendment.

  This boundary includes the KIOP MLE mitigated disturbance footprint (defined below) and has an area of 13,481 ha. The Combined Proposal DE spans approximately 123 km, and for the purpose of this assessment has been split into two broad areas, which are hereafter named:

  - **Mine Area:** entirely within the Yalgoo IBRA region, encompassing the KIOP and MIOP mine sites
  - **Wheatbelt Area:** linear corridors entirely within the Avon Wheatbelt IBRA region

- **Proposal or Combined Proposal mitigated disturbance footprint (Combined Proposal DF)**.

  The Combined Proposal mitigated DF has a maximum disturbance area of 4,698 ha and includes the mitigated disturbance footprint for the KIOP MLE (1,186.3 ha) plus the approved extents under MS 805 (KIOP) and MS 806 (MIOP), subject to minor amendments to exclude areas that have not been developed and are not required, and those tenements no longer held by KML. However, the sum of these individual areas is not equal to the Combined Proposal mitigated DF area. 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.

- **KIOP MLE Mitigated Proposal or KIOP MLE mitigated disturbance footprint.**

  This is the mitigated disturbance footprint required for the KIOP MLE incorporating the minor amendment. The new disturbance area is 1,186.3 ha. The KIOP MLE mitigated disturbance footprint is entirely contained within the Combined Proposal mitigated DE and proposes disturbance only within the Mine Area.

**Table 1.1** outlines the approved extent under MS 805 and MS 806, the proposed changes to extent for the KIOP MLE, and the Combined Proposal extent. This table focuses on the elements as listed in MS 805 and MS 806. The Proposal Content Document for the Combined Proposal (in **Section 1.3**) provides a modernised structure for the proposal elements that aligns with current practice.

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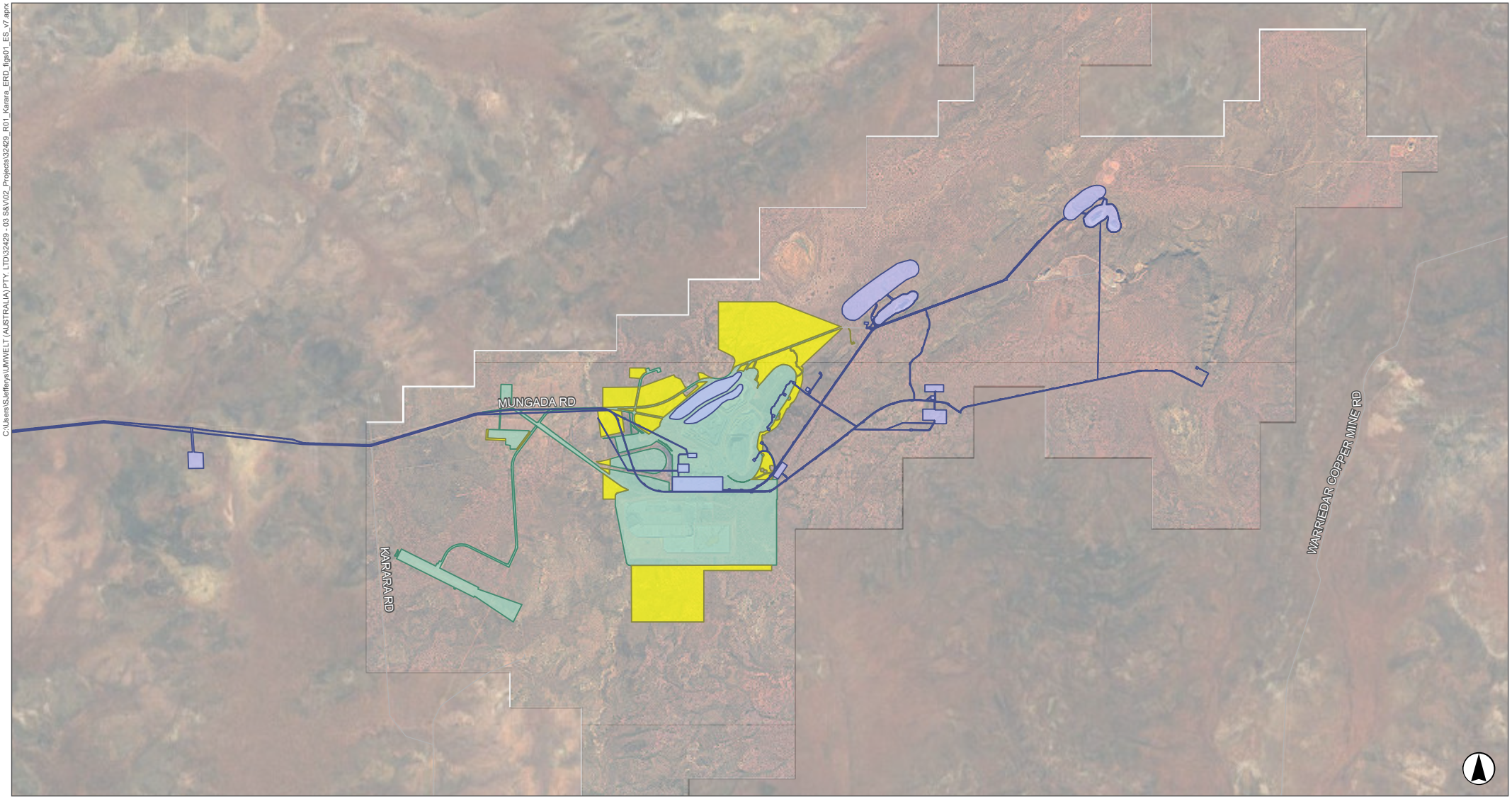


**Legend**

- KIOP (MS 805) Disturbance Footprint
- MIOP (MS 806) Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint

**FIGURE 1.4**

MS 805, MS 806 and Proposed Mitigated Disturbance Footprint – Mine Area

Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

0 3 6 km

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**Image Source:** KML (2024), ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025)

Scale: 1:550,000 at A4, GDA2020 MGA Zone 50

**Legend**

- KIOP (MS 805) Disturbance Footprint
- MIOP (MS 806) Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Main Road

**FIGURE 1.5**

MS 805, MS 806 and Proposed Mitigated Disturbance Footprint – Whole Extent

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0 11 22 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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**Table 1.1 Approved Proposal Elements and Proposed Amendments**

| Element | MS 805 (KIOP) Approved Extent | MS 806 (MIOP) Approved Extent | Proposed New / Changed Extent | Combined Proposal Extent |
|---|---|---|---|---|
| **Project Life** | Approximately 25 years [commenced 2010]. | Approx 10 years. | Additional 21 years. | 46 years [completion of closure implementation in 2055]. |
| **Development Envelope** | Not defined. | Not defined. | Include DE as a defined area. | 13,481 ha. |
| **Area of Disturbance** | Approx 3,027 ha. | Approx 1,059 ha. | Additional 1,186 ha<br><br>Removal of 568 ha from approved extent of KIOP and MIOP. | 4,698 ha. |
| **Pit Stages and Concentrate Production Rate** | Stage 2 – approx. 15.4 Mtpa<br>Stage 3 – approx. 22.8 Mtpa<br>Stages 4 & 5 – approx. 37.6 Mtpa. | Stages 1 & 2 – approx. 3 Mtpa. | Decreased annual volume compared to KIOP. | Stage 2 to Stage 8: approx. 8.2 Mtpa of concentrate. |
| **Pit Dimensions** | Single open cut pit (Karara):<br>• Approx. 3,400 m long<br>• Approx. 1,300 m wide<br>• Approx. 300 m deep. | Two open cut pits:<br>• Blue Hills North: 1,309 m long 360 m wide 133 m deep<br>• Terapod: 1,440 m long 360 m wide 140 m deep. | No changes. | Karara:<br>• 3,400 m long<br>• 1,300 m wide<br>• 300 m deep<br>Blue Hills North:<br>• 1,309 m long<br>• 360 m wide<br>• 133 m deep<br>Terapod:<br>• 1,440 m long<br>• 360 m wide<br>• 140 m deep. |
| **Waste Rock Volumes** | Stage 2 – approx. 23.1 Mtpa<br>Stage 3 – approx. 34.2 Mtpa<br>Stages 4 & 5 – approx. 37.6 Mtpa. | Not defined. | Decreased annual volume but increased life of mine volume by 245 Mt due to longer mine life. | Stage 2 to Stage 8: approx. 17 Mtpa. |
| **Waste Rock Dumps** | Single WRD located next to the pit, approx. 365 ha. | One WRD and ROM pad per pit:<br>• Blue Hills North: 135 ha<br>• Terapod: 58 ha. | Karara WRD: additional 179 ha.<br><br>Blue Hills North WRD (30 ha) and Terapod WRD (32 ha) have been rehabilitated. | KIOP WRD: 544 ha. Maximum height 450 mAHD (106 m above ground level).<br><br>MIOP WRD and ROM pads:<br>• Blue Hills North: 135 ha<br>• Terapod: 58 ha. |

| Element | MS 805 (KIOP) Approved Extent | MS 806 (MIOP) Approved Extent | Proposed New / Changed Extent | Combined Proposal Extent |
|---|---|---|---|---|
| **Potential Acid Forming (PAF) Material** | Approx 20% (9.4 Mtpa) of the waste rock is classified as PAF and would be contained inside isolated cells in the WRD. | Stage 1 – approx. 15% across both Terapod and Blue Hills North.<br>Stage 2 – Blue Hills North: approx. 67.5% and Terapod: approx. 13% (PAF would be contained inside isolation cells in the WRD for both stages). | No change. | Not a key element, therefore not included in the PCD. |
| **Tailings Storage Facility** | Dry-stack and wet tailings cells within the final TSF landform, being a single dry stack TSF. | Managed as part of the KIOP. | Karara tailings storage facility: additional 261 ha. | Karara tailings storage facility: 860 ha.<br>Maximum height 402 mAHD. |
| **Dewatering** | The groundwater table is predicted to be intersected by the pit in Year 3 which would require pit dewatering of approx. 600 kL/day, increasing to approx. 1,300 kL/day in Year 16, and decreasing to approx. 830 kL/day in Year 23 . | Not required for Stage 1.<br>Stage 2: total – 0.72 GLpa (Blue Hills North – 0.40 GLpa and Terapod – 0.32 GLpa). | Dewatering flow rate:<br>• Approx. 1,300 kL/day from Year 16 (2026) [no change]<br>• Approx. 1,700 kL/day from Year 24 (2034)<br>• Approx. 650 kL/day from Year 29 (2039) to end of mine life (2050). | Dewatering flow rate up to approx. 0.6 GLpa to end of mine life. |
| **Site Access** | Upgrading a number of existing roads.<br>Borrow material for road base (approx. 200,000 $m^3$) would be sourced from five pits located within 1.5 km. | Upgrading a number of existing roads.<br>Borrow material for road base (approx. 200,000 $m^3$) would be sourced from five pits located within 1.5 km. | No change | Maintenance of existing roads. |

| Element | MS 805 (KIOP) Approved Extent | MS 806 (MIOP) Approved Extent | Proposed New / Changed Extent | Combined Proposal Extent |
|---|---|---|---|---|
| **Supporting Infrastructure** | • Processing plant<br>• Run-of-mine (ROM) pad<br>• Bulk fuel storage and re-fuelling pads<br>• Explosive compound and magazine<br>• Wastewater treatment facility<br>• Reverse osmosis plant<br>• Landfill<br>• Airstrip. | • Borefield<br>• Powerline<br>• Rail siding. | Expansion to infrastructure surrounding the WRD and TSF and pit.<br><br>Incorporate 224 ha of infrastructure approved under MIOP to support ongoing operations at KIOP. | Combined infrastructure approximately 2,736 ha. |

## 1.3 Proposal Content

The Proposal Content Document represents the Combined Proposal and is intended to replace the proposal elements for KIOP and MIOP. This Proposal Content Document (PCD) provides a modernised structure for the proposal elements that aligns with current practice. The PCD tables and figures are provided below, and the standalone PCD is provided as **Appendix 1-1**.

**Table 1.2 General Proposal Content Description**

| | |
|---|---|
| **Proposal Title** | Karara Iron Ore Project – Mine Life Extension |
| **Proponent Name** | Karara Mining Limited (KML) |
| **Short Description** | This Proposal is to revise the existing Karara Iron Ore Mine (KIOP), located 320 km north-northeast of Perth in the Midwest Region of Western Australia to include a Mine Life Extension (MLE).<br>The Proposal includes an expansion to the development envelope, extension of the tailings storage facility and waste rock dump at the existing KIOP (MS 805) and incorporation of the areas approved under MIOP (MS 806), which will be utilised for the ongoing operations at Karara. |

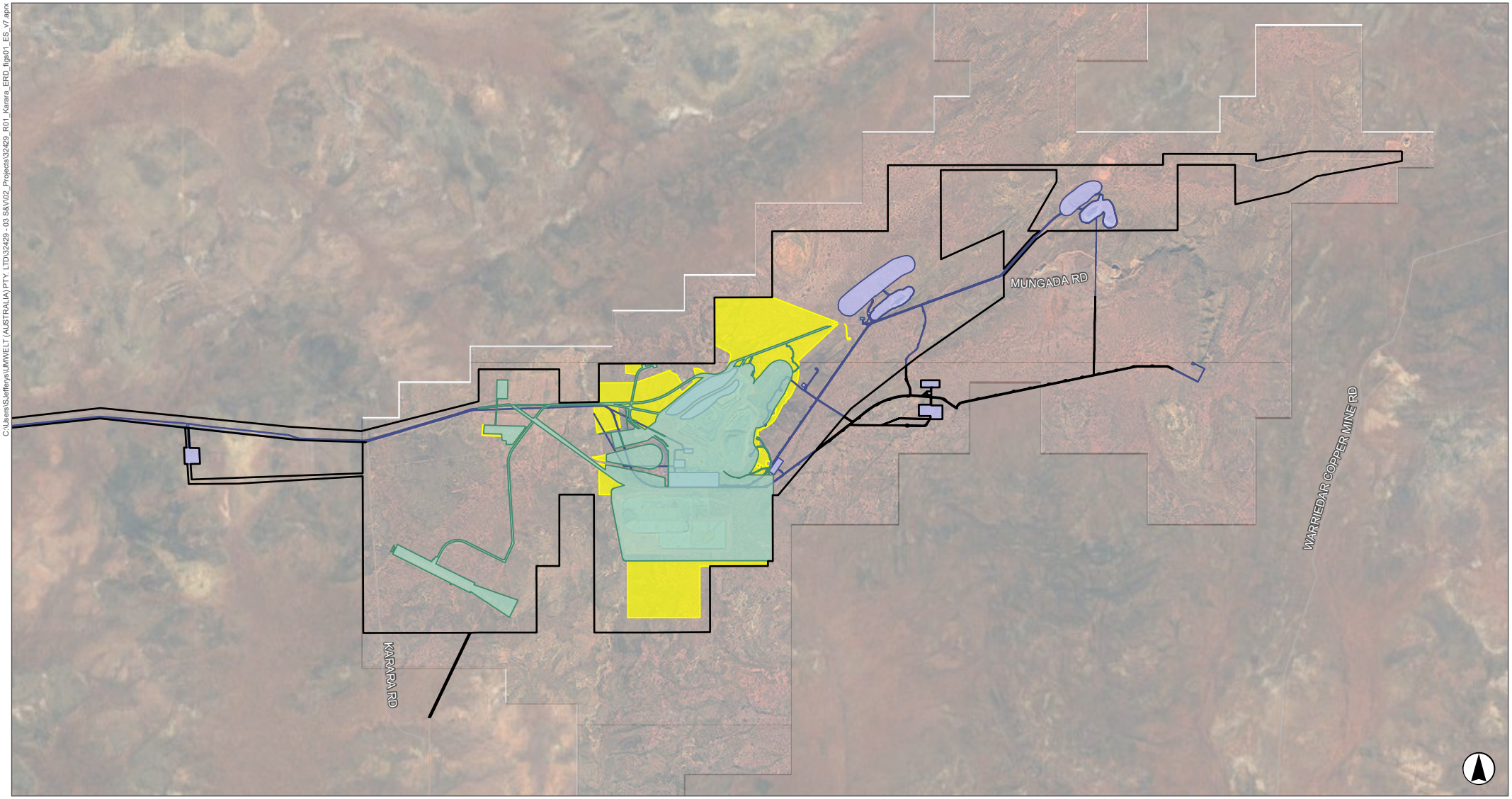
**Table 1.3 Proposal Content Elements**

| Proposal Element | Location / Description | Existing Extent for Approved Proposals (MS 805 and MS 806) | Proposed Amendment Extent | Combined Maximum Extent |
|---|---|---|---|---|
| **Physical Elements** | | | | |
| **Development Envelope** | **Figure 1.6**<br>**Figure 1.7**<br>**Figure 1.8** | Not defined. | New element. | Up to 13,481 ha |

| Proposal Element | Location / Description | Existing Extent for Approved Proposals (MS 805 and MS 806) | Proposed Amendment Extent | Combined Maximum Extent |
|---|---|---|---|---|
| **Area of Disturbance** | **Figure 1.6**<br>**Figure 1.7**<br>**Figure 1.8** | MS 805: 3,027 ha<br>MS 806: 1,059.35 ha | 1,186.3 ha new disturbance, of which 1,184.8 ha is native vegetation.<br>Removal of 568 ha of disturbance from MS 805 and MS 806. | Up to 4,698 ha |
| **Pit Dimensions** | **Figure 1.7** | Karara: Approx. 3,400 m long, 1,300 m wide, 300 m deep.<br>Blue Hills North: 1,390 m long, 360 m wide, 133 m deep.<br>Terapod: 1,440 m long, 360 m wide, 140 m deep. | No change. | Total combined pits 366 ha.<br>Karara: max 3,400 m long, max 1,300 m wide, average 300 m deep below natural ground level.<br>Blue Hills North: 1,390 m long, 360 m wide, 133 m deep.<br>Terapod: 1,440 m long, 360 m wide, 140 m deep. |
| **WRD** | **Figure 1.7** | MS 805: 365 ha<br>MS 806: 193 ha (includes ROM and WRD). | Additional 179 ha for KIOP. | KIOP WRD:<br>• 544 ha<br>• Max height 450 mAHD (106 m above ground level).<br>MIOP WRDs and ROM pads:<br>• Blue Hills North: 135 ha<br>• Terapod: 58 ha. |
| **TSF** | **Figure 1.7** | Area not defined. | Additional 261 ha for KIOP. | Karara TSF:<br>• 860 ha<br>• Max height 402 mAHD. |
| **Site Infrastructure** | **Figure 1.7**<br>**Figure 1.8** | Processing plant<br>ROM pad<br>Bulk fuel storage and refuelling pads<br>Explosive compound and magazine<br>Wastewater treatment facility<br>Reverse osmosis plant<br>Landfill<br>Air strip<br>Borefields | New infrastructure areas surrounding the WRD and TSF expansion areas at KIOP.<br>New infrastructure area for the abandonment bund adjacent to the pit at KIOP.<br>Incorporate infrastructure | Combined infrastructure approximately 2,736 ha. |

| Proposal Element | Location / Description | Existing Extent for Approved Proposals (MS 805 and MS 806) | Proposed Amendment Extent | Combined Maximum Extent |
|---|---|---|---|---|
| | | Powerline<br>Rail siding<br>Site access. | approved under MIOP to support ongoing operations at KIOP. | |
| **Operational Elements** | | | | |
| **Pit Stages and Concentrate Production Rate** | NA | MS 805: Stages 2-5, up to approx. 37.6 Mtpa (Stages 4 & 5).<br>MS 806: Stages 1-2, approx. 3 Mtpa | Include additional stages 6-8 with a reduction in concentrate production rate by up to approx. 29.4 Mtpa. | Stage 2 to Stage 8: approx. 8.2 Mtpa of concentrate. |
| **Waste Rock Volumes** | NA | MS 805: approx. 37.6 Mtpa<br>MS 806: Not defined. | Increase total waste rock volume by approx. 245 Mt. | Stage 2 to Stage 8: approx. 17 Mtpa.<br>Over the life of mine: approx. 462 Mt. |
| **Dewatering** | NA | MS 805: peak 1,300 kL/day [475 MLpa]<br>MS 806: 0.72 GLpa [720 MLpa]. | Increase of peak dewatering rate by 400 kL/day [145 MLpa]. This higher dewatering rate is expected to be required for only 5 years. | Dewatering flow rate up to approx. 0.6 GLpa to end of mine life. |
| **Greenhouse Gas Emissions** | | | | |
| **Construction**<br>**The amendment is continuing operations, so there are no specific construction activities.** | | | | |
| **Operation** | | | | |
| **Scope 1** | Fuel combustion, rail haulage, land clearing. | Not defined. | Total 1,722,936 tonnes CO2-e (2024-2053)<br>Peak annual 143,653 tpa CO2-e | Total 1,722,936 tonnes CO2-e (2024-2053)<br>Peak annual 143,653 tpa CO2-e |
| **Scope 2** | Electricity. | Not defined. | Total 3,284,721 tonnes CO2-e (2024-2053)<br>Peak annual 265,000 tpa CO2-e | Total 3,284,721 tonnes CO2-e (2024-2053)<br>Peak annual 265,000 tpa CO2-e |
| **Scope 3** | Purchased goods and services, downstream transport, processing of products. | Not defined. | Total 353,766,597 tonnes CO2-e (2024-2053)<br>Peak annual 12,184,227 tpa CO2-e | Total 353,766,597 tonnes CO2-e (2024-2053)<br>Peak annual 12,184,227 tpa CO2-e |
| **Commissioning** | | | | |
| **Commissioning of the mine infrastructure are subject to the operational limits above. Construction and commissioning were completed as part of the Karara Iron Ore Project. The Mine Life Extension is for ongoing operations.** | | | | |

| Proposal Element | Location / Description | Existing Extent for Approved Proposals (MS 805 and MS 806) | Proposed Amendment Extent | Combined Maximum Extent |
|---|---|---|---|---|
| **Rehabilitation** | | | | |
| **Rehabilitation will be undertaken in accordance with KML environmental procedures: Land Rehabilitation (CORP-EN-PRO-1002), Rehabilitation Performance Monitoring (CORP-EN-PRO-1040), Rehabilitation Schedule (CORP-EN-SCH-1006) and Mine Closure Plan (CORP-EN-PLN-1038).** | | | | |
| **Decommissioning** | | | | |
| **Decommissioning of mine infrastructure will be managed through KML's Mine Closure Plan (CORP-EN-PLN-1038).** | | | | |
| **Other Elements Which Affect Extent of Effects on the Environment** | | | | |
| **Proposal Time** | Max project life | MS 805: 25 years (commenced in 2010).<br>MS 806: 10 years. | Additional 20 years. | About 46 years (completion of closure implementation by 2055). |
| | Construction phase | Not specified. | No change. | 0 years. |
| | Operations phase | Not specified. | Additional 20 years. | 44 years (2010 to 2053). |
| | Decommissioning phase | Not specified. | No change. | 3 years (2053 to 2055). |

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Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Approved under KIOP (MS 805)
- Approved under MIOP (MS 806)
- Mine Life Extension (KIOP MLE) Mitigated Disturbance Footprint
- Minor Road

**FIGURE 1.6**

Combined Proposal Development Envelope with MS 805, MS 806 and New Disturbance Footprint – Mine Area

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**Image Source:** KML (2024), ESRI Basemap (2022, 2025) | **Data Source:** Landgate (2022, 2025), KML (2025)

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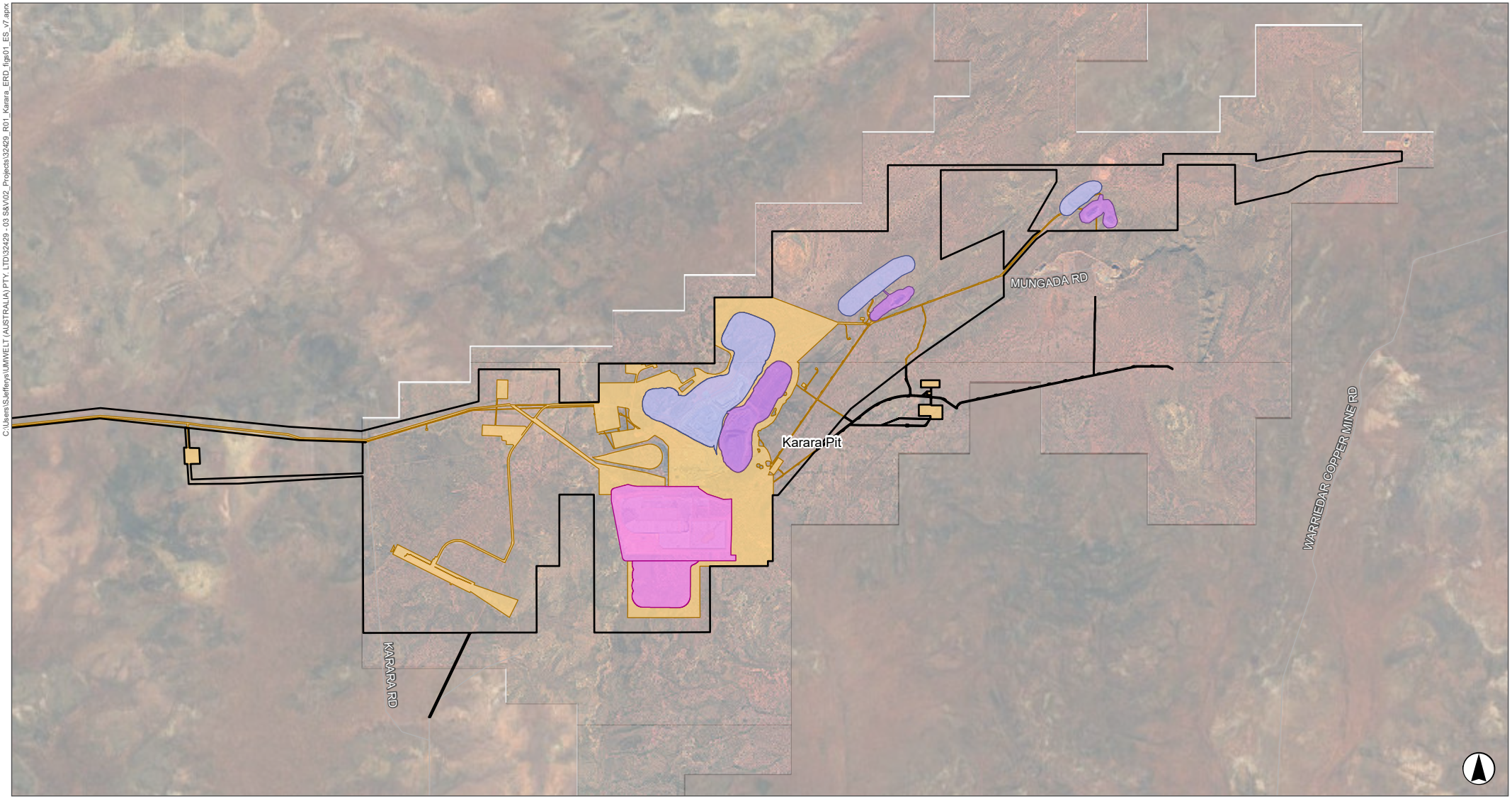


Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Infrastructure
- Pit
- TSF
- WRD
- Minor Road

# FIGURE 1.7
## Combined Proposal Development Envelope and Disturbance Footprint – Mine Area

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**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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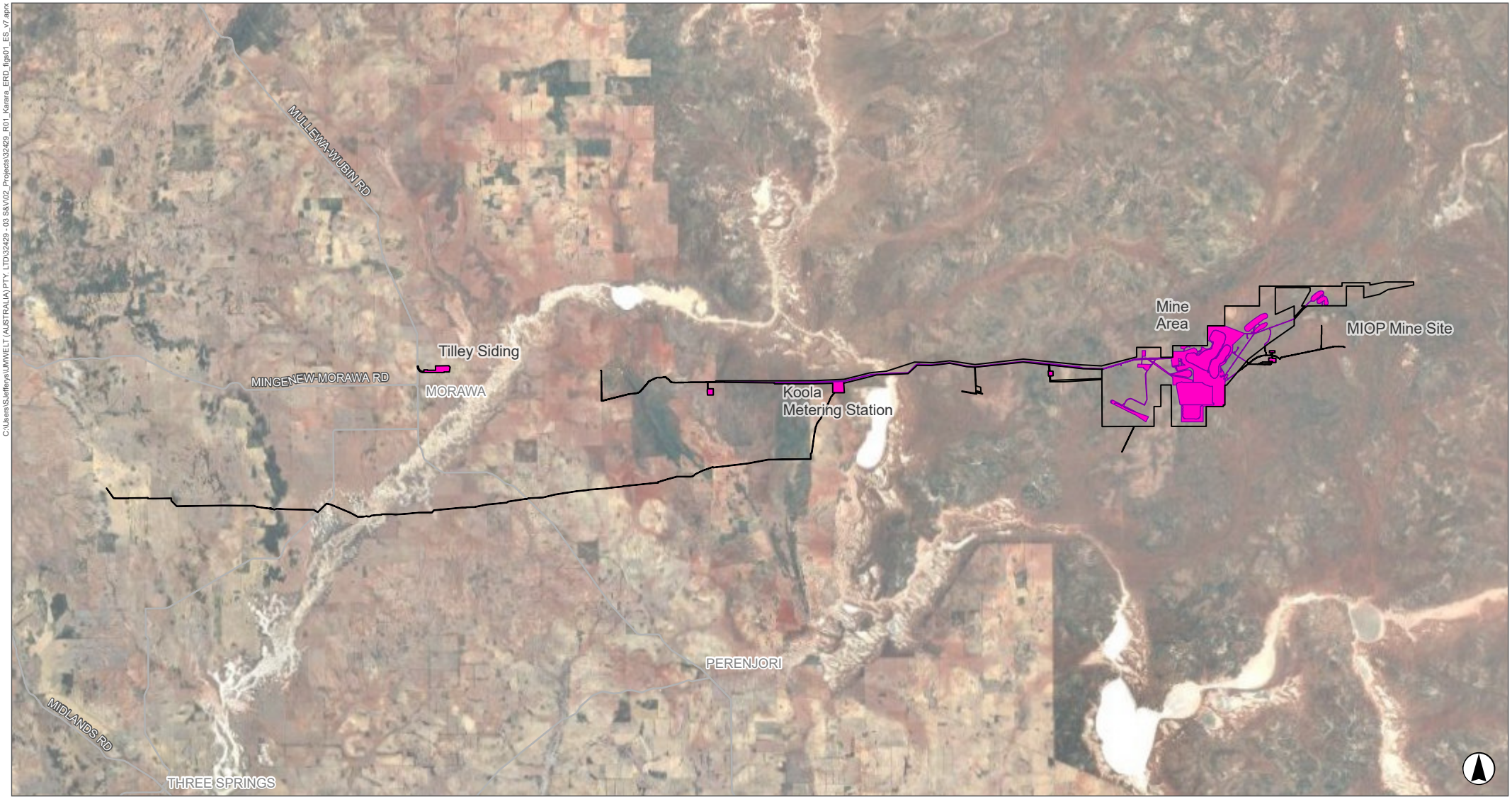


Scale: 1:500,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Main Road

# FIGURE 1.8

Combined Proposal Development Envelope and Disturbance Footprint – Mine Area and Regional Infrastructure

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**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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## 1.4 Proposal Description

This section provides further details of the components of the Proposal (also referred to as the Combined Proposal) to support understanding of the intended activities.

The key attributes of the Proposal comprise:

- remove the western section of the raw water pipeline to the Mingenew Borefield originally approved under MS 805, as it was never constructed
- incorporate MIOP footprint approved under MS 806 to support mining activities at KIOP
- increase the footprint of the WRD at KIOP to allow additional storage
- extend the TSF footprint at KIOP to the south and east
- add an infrastructure area to the east of the mine pit envelope at KIOP to allow sufficient area for a revised abandonment bund
- amend the KIOP development envelope to incorporate the above changes.

Further description of the WRD and TSF expansions and required infrastructure areas are provided below.

### 1.4.1 Expansion to the Waste Rock Dump

The Proposal requires an expansion of the WRD to the north and northwest. This will allow for storage of an additional 245 Mt of waste material, as well as haul roads and topsoil and overburden stockpiles. This expansion is a result of KML's improved understanding of the orebody and ore grade, which indicates an increase in the volume of waste rock produced is required.

The design approach for the WRD will be the same as the existing WRD. The WRD will be internally draining and will be surrounded by approximately 2 m high perimeter bund constructed from waste rock material. Surface water runoff within the perimeter bund is captured and evaporated/infiltrated within the WRD.

During operations, waste rock will be hauled from the Karara mine pit by rear dump haul tracks.

The final WRD will be designed to blend with the surrounding landscape, with a final height not exceeding 450 metres Relative Level (mRL). The WRD will be shaped to ensure the final landform is safe and stable, including low rate of erosion. The WRD continuous linear final batter gradient will be no steeper than 17°, in accordance with KML *Environmental Procedure – Land Rehabilitation (CORP-EN-PRO-1002)* (**Appendix 1-2**). The slope will be covered with a mix of Banded Iron Formation (BIF) gravel and topsoil and will be shallow ripped before being revegetated via re-spread of vegetation and seeding with native species.

Updated waste rock geochemical characterisation has been undertaken to support the mine life expansion (RGS Environmental, 2021) (**Appendix 1-3**). The characterisation concluded that 56% of the waste rock samples were non-acid forming (NAF), with 44% classified as uncertain, potentially acid forming or acid-forming (potential PAF material). The risk of saline drainage was assessed, with 66% of material classified as low risk of saline drainage, 11% moderate risk, and 23% high risk. The high-risk materials were largely associated with PAF material. Thus, the saline drainage risk will be mitigated by the PAF management methods. The classification concluded there was a low risk of metalliferous leaching.

The WRD will be constructed to ensure appropriate storage of material, including segregation and isolation of PAF material. NAF waste rock will be used in construction of the mine site infrastructure, WRD perimeter safety bunds and rehabilitation of the dry TSF. PAF waste rock will be co-disposed in specially designed and constructed PAF cells within the WRD. These cells will ensure that PAF material is isolated to prevent leaching of acid rock drainage (ARD).

The design of the PAF isolation cells will be consistent with those currently used for existing KIOP operations, which have proven to be efficient in isolating PAF and preventing ARD. The PAF cells will be surveyed and demarcated. The inventory of materials is updated annually to ensure that there are adequate quantities of NAF materials suitable for encapsulating PAF material or other wastes requiring containment. PAF is managed in accordance with the KML's Environmental Procedure for Potentially Acid Forming Material Management (CORP-EN-PRO-1051) outlined in **Appendix 1-4**.

### 1.4.2 Expansion to the Tailings Storage Facility

Tailings from KIOP are primarily deposited as dry-stacked tailings, which results in a smaller TSF footprint, improved water recovery and more stable landform compared to a wet TSF, whilst facilitating progressive rehabilitation. Dry tailings are deposited via conveyor and stacker in "sweeps" at a moisture content of approximately 15%, whilst wet tailings are pumped to the TSF at approximately 45% solids. Due to constraints within the processing plant, KML has also undertaken placement of tailings through conventional wet TSF, as well as a dry-stack TSF. Additional filters have been installed to increase capacity for filtering tailings, resulting in virtually all tailings being dry-stack tailings except in emergencies when the filter equipment is unavailable.

The currently approved TSF phases at KIOP include the Dry Stack TSF (Sweeps 1-12), Wet TSF 1 (within Dry Stack TSF footprint), Wet TSF 2A and Wet TSF 2B, as shown in **Figure 1.9** (see Mining Proposal Reg ID 118480). The approved TSF design report (Red Earth Engineering, 2023) is included as **Appendix 1- 5**).

A review of the Dry Stack TSF capacity was prepared by Red Earth Engineering in 2021. The review concluded that the Dry Stack TSF needs to be expanded to accommodate KML's life of mine tailings generation, which was expected to be 12 million tonnes per annum (tpa) of dry-stack tailings for a further 35 years (i.e. until approximately 2055, including contingency allowance).

KML proposes to extend the Dry Stack TSF footprint further to the south and east to meet the required tailings storage capacity (**Figure 1.9**). Red Earth Engineering (2021) has updated the design, showing a dry-stack design with three lifts. The two future lifts would be approximately 24 m in height, resulting in a maximum of 402 mRL, which is lower than the currently proposed height of 430 mRL (Red Earth Engineering, 2021) (**Appendix 1-6**). The operation and monitoring of the proposed TSF will be conducted as per the existing KIOP TSF requirements, including an annual operational inspection conducted by external consultants.

### 1.4.3 Infrastructure

The Proposal requires additional disturbance for support infrastructure, including:

- construction of new access roads, drainage infrastructure and relocation of production bores and associated infrastructure surrounding the WRD and TSF expansion areas
- expansion to the east and north-east of the approved pit to facilitate access to the ore body, relocate production bores and associated infrastructure, and accommodate the required alignment of the abandonment bund. There will be no expansion to the open pit shape which was approved in MS 805.

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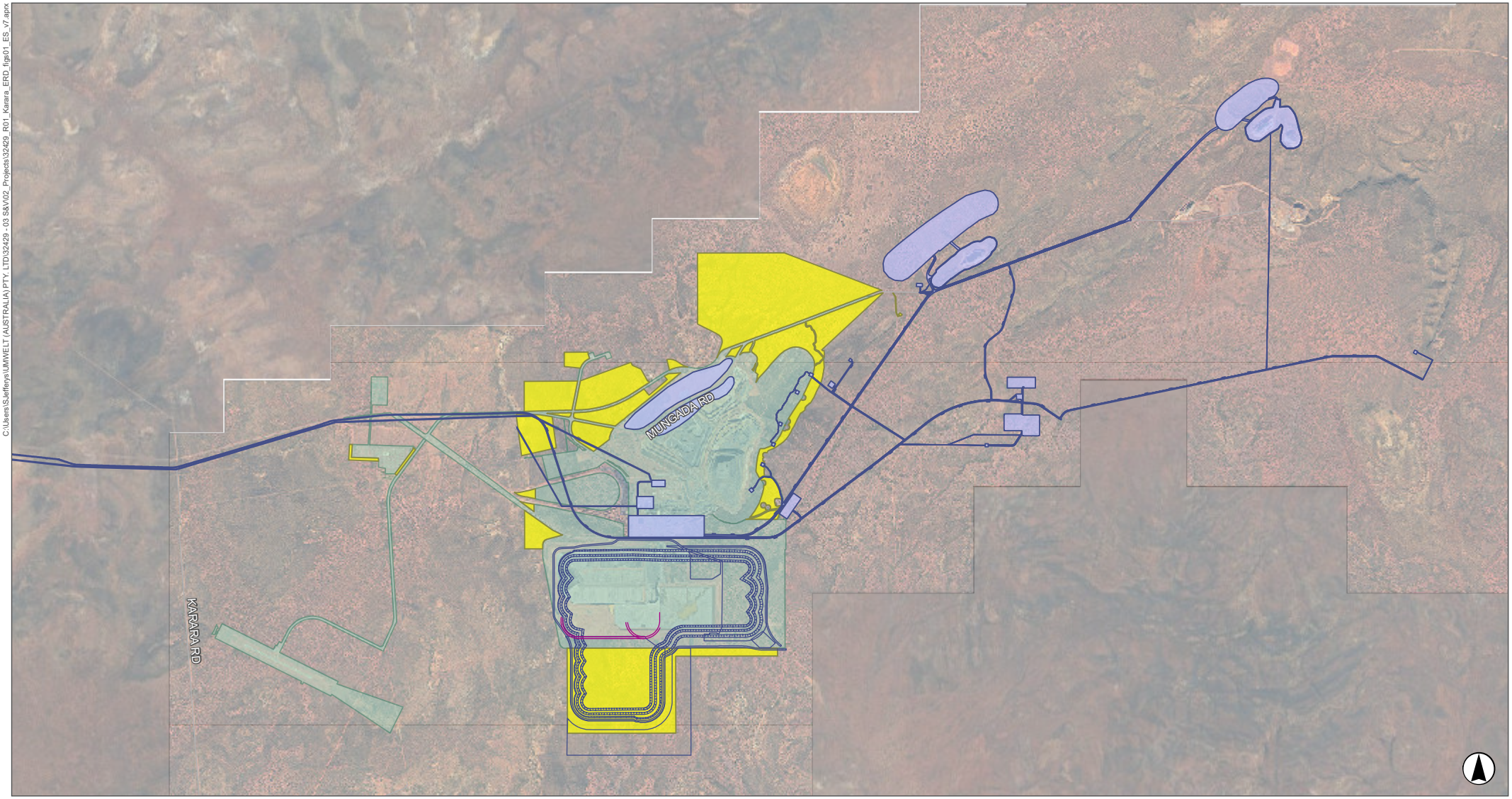


**Legend**

- Sweep 11 and 12
- TSF Design (Red Earth Engineering, 2021)
- KIOP (MS 805) Disturbance Footprint
- MIOP (MS 806) Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint

Scale: 1:100,000 at A4, GDA2020 MGA Zone 50

# FIGURE 1.9
## Current and Proposed TSF Operating Footprint

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0 2 4 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2024), KML (2025)

## 1.5 Proposal Alternatives

The following sections describe alternatives that were considered for the proposed WRD and TSF expansions.

### 1.5.1 Waste Rock Dump

Options instead of the proposed WRD expansion include:

- no changes to approved WRD
- backfill of open pits with waste rock
- alternative design for WRD expansion.

Each of these options is described below.

The approved WRD is not sufficient to meet the waste rock storage requirements of the MLE. Although the pit size will not increase compared to the pit approved under MS 805, more waste rock is expected to be generated than was forecast when the original application was prepared. KML's understanding of the orebody and grade has increased during operations and has identified that an increased volume of waste rock and overburden will be generated for the MLE.

The option to backfill waste rock into the Karara open pit is not available due to the sequence of mining and the availability of resource at depth, below the current pit basement. The option to truck waste to backfill the Terapod West, Blue Hills and Hinge open pits was considered. However, these pits are relatively small and would only accommodate a limited volume of waste rock. Furthermore, the Blue Hills and Terapod pits are currently used for discharge of pit dewater. These pits are satellite operations, and the substantially larger haul distance would increase greenhouse gas emissions compared to the current (and proposed) WRD. Therefore, backfill of waste rock into open pits was not considered a viable option.

An alternative is to build the WRD higher, which would reduce the overall footprint. However, this could result in concerns regarding landscape and visual amenity, as well as the potential impact on surrounding land users.

The proposed WRD design is an expansion of the existing WRD that considers local topography to minimise the overall footprint required and potential impacts from changes to hydrology. The location close to the open pit minimises greenhouse gas emissions from transport of waste rock. The WRD expansion to the north is away from the BIF landform, with the objective to minimise impacts to significant ecological values.

The WRD expansion footprint has been reviewed by KML to mitigate impacts to conservation significant flora as much as possible. The infrastructure area associated with the WRD (for storage of stripped topsoil) was adjusted to exclude an area containing large numbers of *Lepidosperma* sp. Blue Hills (P1). Although occurrences of this species remain within the proposed WRD expansion, it is not feasible to exclude or avoid impacts to those individuals that are within the WRD landform footprint, as it would impact on the safety and stability of the landform and is unlikely to result in long-term protection of the plants.

### 1.5.2 Tailings Storage Facility

The following options were considered as alternatives to the proposed Dry Stack TSF expansion:

- increasing the height of the Dry Stack TSF
- changing tailings deposition to wet TSF only.

Each of these options is described below.

Increasing the overall height of the TSF was considered by increasing the number of lifts. However, with advice from the consultant tailings engineers, this was deemed inappropriate due to the higher risk of failure, difficulty in rehabilitation, and potential impacts on landscape and visual amenity (as the TSF would be higher than the surrounding BIF ridges).

A change to direct wet TSF only was also considered, with the idea of ceasing dry-stack material altogether. However, a wet TSF would require a larger disturbance footprint and significantly more water and power to produce tailings. Therefore, this option was also considered inappropriate.

The Dry Stack TSF expansion, as an expansion of the existing facility, will minimise the required additional disturbance compared to a separate new TSF facility. It will also utilise existing infrastructure.

The proposed Dry Stack TSF expansion to the south is away from the BIF landform, to aim to minimise impacts on significant ecological values.

The TSF expansion footprint has been reviewed by KML to mitigate impacts to conservation significant flora as much as possible. The infrastructure area associated with the TSF (for storage of stripped topsoil, access roads and monitoring bores) was reduced to exclude an area containing large numbers of *Grevillea globosa* (P3), *Caesia* sp. Koolanooka Hills (P1) and Rhodanthe collina (P3). Although conservation significant flora plants remain within the proposed TSF expansion footprint, it is not feasible to exclude or avoid impacts to plants that are within the TSF landform footprint, as it would impact on the safety and stability of the landform and is unlikely to result in long-term protection of the plants.

## 1.6 Local and Regional Context

The KIOP and associated infrastructure is in the Midwest region of Western Australia, with the Karara mine site lying approximately 210 km east-southeast of Geraldton and 320 km north-northeast of Perth (straight line distance). The Karara mine site is in the Shire of Perenjori, and Perenjori is the nearest town at approximately 50 km away (straight line distance). There is an access road and rail siding (Tilley Siding) that terminate near Morawa in the Shire of Morawa (approximately 70 km west of the Karara mine site). KIOP also draws groundwater from Yandanooka borefield, which is approximately 20 km south of Mingenew in the Shire of Mingenew (approximately 120 km west of the Karara mine site).

The Proposal includes new disturbance at the Mine Area only. Further information about the regional context for the Mine Area is provided in the following sections.

### 1.6.1 Mine Area Context

The Proposal is within the Yalgoo Interim Biogeographic Regionalisation for Australia (IBRA) bioregion, Tallering IBRA subregion (**Figure 1.10**).

The KIOP Mine Area lies within or near the following conservation areas (**Figure 1.10**):

**Table 1.4 Conservation Reserves Near the Mine Area**

| Conservation Area | Land Tenure | Proximity to KIOP Mine Area |
|---|---|---|
| **Mungada Ridge National Park** | Class A reserve (R53978)<br>National Park vested in Department of Biodiversity, Conservation and Attractions (DBCA) and Bundi Yamatji Aboriginal Corporation | Combined Proposal Development Envelope abuts the National Park.<br>Proposed KIOP MLE disturbance footprint is 9.6 km from the National Park boundary. |
| **Karara Conservation Park** | Class C reserve (R45650) vested in DBCA and Bundi Yamatji Aboriginal Corporation | The Mine Area is in an enclave of Karara Conservation Park i.e. the Combined Proposal Development Envelope and proposed KIOP MLE disturbance footprint are adjacent to but outside of the conservation reserve. |
| **Karara Rangeland Park** | Ex-pastoral stations that have been acquired by DBCA and are now part of the DBCA estate.<br>Areas of Karara Rangeland Park that are outside of National Park and Conservation Park do not have any legal protection for conservation. | The KIOP Mine Area is entirely in Karara Rangeland Park, on ex-Karara pastoral station. |

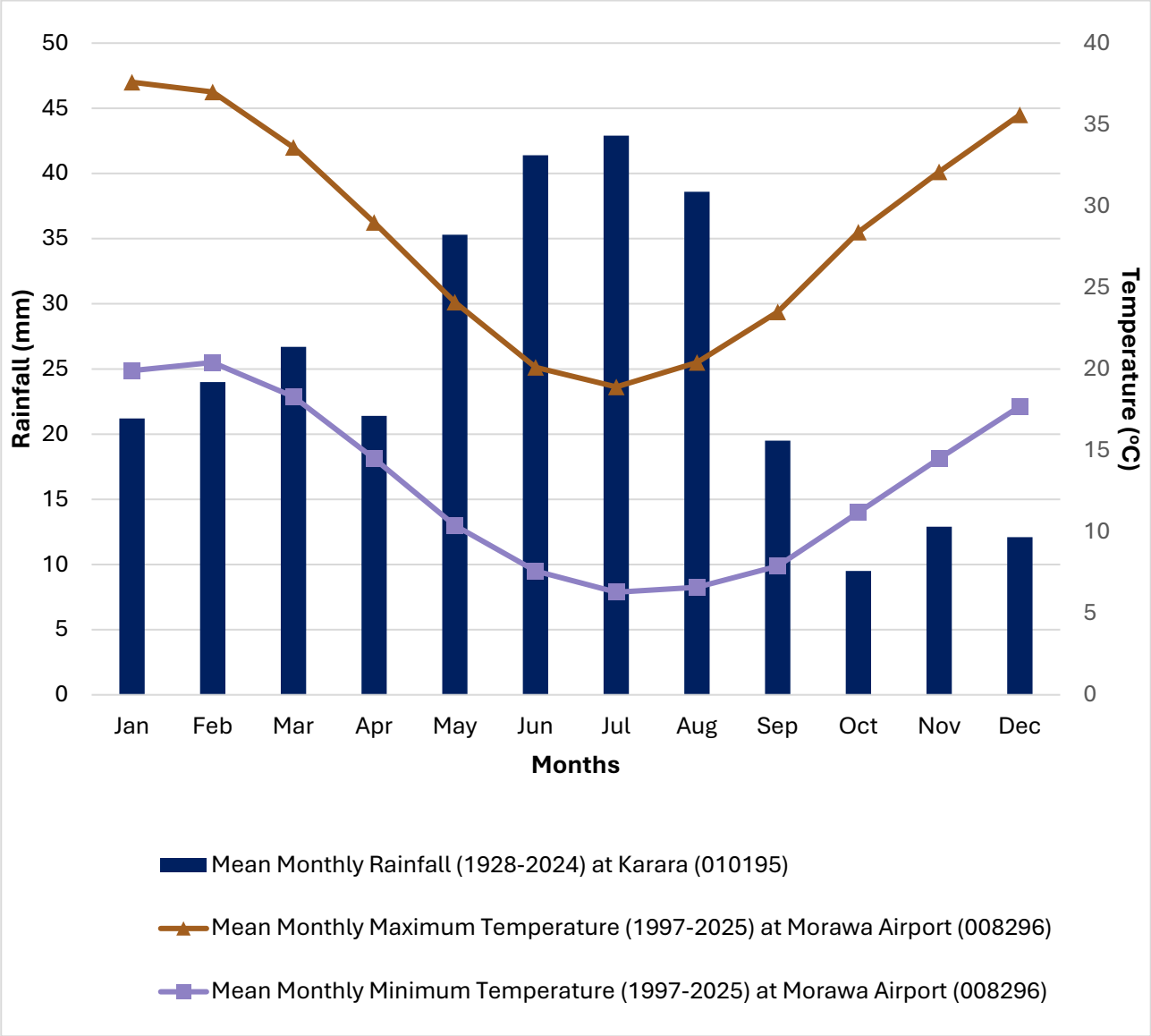
The Mine Area is in the BIF Blue Hills Range System, which comprises five separate ranges: Mt Karara, Blue Hills, Windaning Hill, Mungada Ridge, and Jasper Hill. KIOP is in the Mt Karara range and MIOP is in the Blue Hills range. Prior to commencement of mining, Mt Karara was approximately 400 mAHD.

BIF ranges across the Midwest region are recognised as having very significant biodiversity value and supporting endemic flora and fauna species (Department of Environment and Conservation (DEC), 2007). The *Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields* (DEC, 2007) was prepared to facilitate a strategic approach in environmental impact assessments to consider biodiversity conservation and resource utilisation. The key principles in environmental assessments in the strategic review have been considered in the Landforms impact assessment for the Proposal. The Mine Area is in the Gascoyne proclaimed groundwater management area but is not in any proclaimed surface water management area.

### 1.6.2 Current Climate

The regional climate is semi-arid and is in the hot deserts climate zone (BWh), as per the Koeppen-Geiger classification (Peel et al., 2007), and the climate at the Proposal area is characterised by seven to eight months of dry weather with cold, wet winters and hot, dry summers (Payne et al., 1998).

The closest Bureau of Meteorology (BoM) station is Karara (site number 010195), which is located approximately 6 km southwest of the Proposal. This meteorological station was in operation from 1928 until September 2024 but only records rainfall data. The closest BoM station that records full suite of data is Morawa Airport (site number 008296), which is located approximately 74 km west of the Proposal. Mean annual rainfall and temperature data from these two weather stations are presented in **Graph 1.1** and discussed below (BoM, 2025a, 2025b).




**Graph 1.1 Mean Monthly Rainfall and Temperature Summary**

Mean annual rainfall at Karara is 305 mm, ranging from an average monthly rainfall of 10 mm in October to 43 mm in July (BoM, 2025b). In general, Karara receives most of its rainfall during winter (May to August) and conditions are driest between October to December. Winter rainfall is a result of passage of low-pressure or frontal weather systems, and summer rainfall is associated with thunderstorms and / or ex-tropical cyclone activity.

Mean maximum temperatures ranges from 37.6 °C in Jan to 18.9 °C in July. Mean minimum temperatures ranges from 20.4°C in February to 6.3 °C in July (BoM, 2025a).

The prevailing winds in the region are typically:

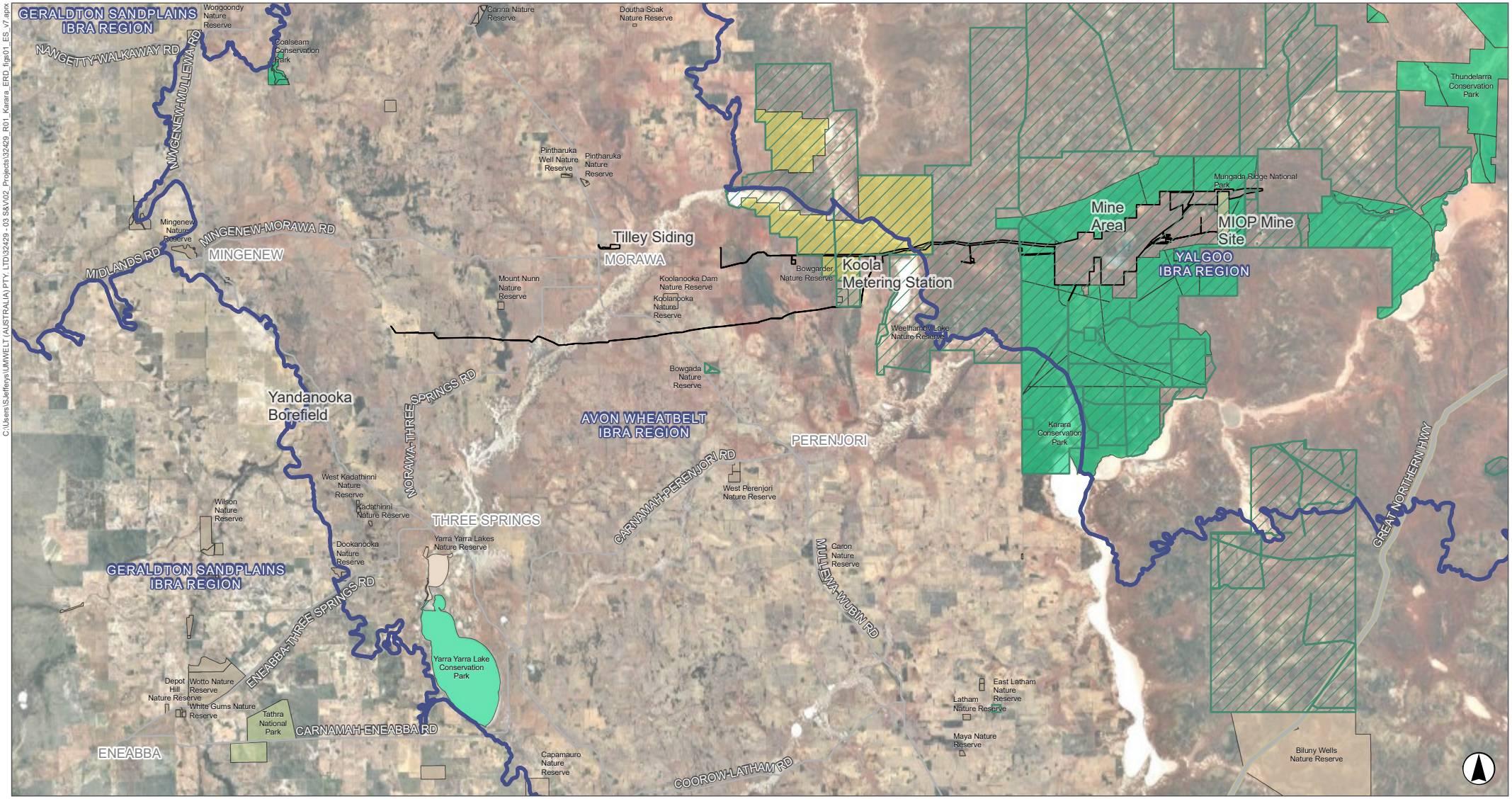
- Summer – the dominant wind direction is from the SSE through to the SSW
- Autumn – the dominant wind direction is from the east
- Winter – the dominant wind direction is from the southeast and east-southeast
- Spring – the dominant wind direction is from the south.

### 1.6.3 Future Climate Projections

The Proposed MLE mitigated disturbance footprint lies only within the Rangelands region (Mine Area). The future climate projections draw on the *Western Australian Climate Projections Summary* (Government of Western Australia, 2021b) and the *Climate Change in Australia Regional Climate Change Explorer - Sub Cluster* (CSIRO, 2025). More details can be found on the CSIRO Climate Change in Australia website.

Future climate projections for the Rangelands region include:

- higher temperatures in all seasons
- hotter and more frequent hot days, more warm spells, less frost
- less rainfall in winter and spring
- increased intensity of heavy rainfall events
- fewer but possibly more intense tropical cyclones
- increased evaporation rates, reduced soil moisture
- harsher fire weather climate.

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Scale: 1:750,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- IBRA Regions
- Karara Rangeland Park
- Highway
- Main Road

**Legislated Lands and Waters**

- National Park
- Nature Reserve
- Conservation Park
- Timber Reserve

# FIGURE 1.10

## Proposal Regional Context with IBRA Bioregions and DBCA Managed Lands

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**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), DBCA (2025), KML (2025)

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# 2.0 Legislative Context

## 2.1 Environmental Impact Assessment Process

### 2.1.1 Part IV of the Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the primary legislation in Western Australia for overseeing environmental protection and impact assessments. Part IV of the EP Act outlines the procedures for referral and assessment of proposals that could have a significant environmental impact.

The Proposal was referred under section 38 of the EP Act on 21 February 2022 as a significant amendment. The referral was revised and resubmitted under section 38C of the EP Act on 13 June 2022 with a further revision submitted on 21 December 2022. The revisions were in response to EPA Services queries to clarify the proposed new disturbance and to incorporate areas previously approved under Ministerial Statements 805 and 806. On 21 June 2023, the EPA determined that the Proposal would be assessed under Part IV of the EP Act, with the level of assessment identified as '*Referral Information with additional information required under section 40(2)(a) with a 4-week public review period*'.

A Notice Requiring Information for Assessment was issued on 16 October 2023. The EPA requested additional information regarding flora and vegetation, terrestrial fauna, landforms, mitigation hierarchy and offsets, subterranean fauna, inland waters, social surroundings and greenhouse gas.

This Environmental Review Document (ERD) has been prepared in accordance with relevant guidelines to address the request for further information under s. 40(2)(a) of the EP Act. This ERD assesses the environmental impacts from the Proposal, which includes the KIOP MLE components and cumulative impacts with Ministerial Statements 805 and 806.

### 2.1.2 Section 87 of the Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary legislation at the Commonwealth level that protects matters of national environmental significance (MNES). The Department of Climate Change, Energy, the Environment and Water (DCCEEW) administers the EPBC Act.

The Proposal was referred to the Commonwealth Minister for Environment on 31 May 2023 (EPBC 2023/09566). On 1 September 2023, the Minister decided that the Proposal was a 'controlled action' under the EPBC Act due to listed threatened species and communities.

The Proposal will be assessed by accredited assessment under the EP Act.

DCCEEW issued comments on the adequacy of the referral information and further information required for assessment. This ERD has been prepared to address the comments and further information required by DCCEEW.

Other EPBC Act approvals relevant to the Proposal are:

- EPBC 2006/3017: KIOP. Approved in 2009, varied in 2011 and 2018 and correction notice issued in 2020
- EPBC 2009/5040: Karara to Tilley Rail Project. Approved in 2010.

## 2.2 Other Approvals and Regulation

The Proposal will proceed on the following tenements held by Karara Mining Limited and its fully owned subsidiary DSO Ventures Pty Ltd:

- Mining leases: M59/644; M59/645; M59/649; M59/721; M59/730; M59/735; M59/736.
- Miscellaneous licences: L59/76; L59/78; L59/79; L59/80; L59/86; L59/93; L59/99; L59/101; L59/104; L59/107; L59/108; L59/109; L59/110; L59/115; L59/90; L59/120; L59/128; L59/129; L59/136; L70/103; L70/104; L70/105; L70/112; L70/116; L70/126.
- General purpose leases: G59/37; G59/38; G59/39; G59/44; G59/46.

**Table 2.1** outlines other state approvals that are required for mining operations for the Proposal, including the decision-making authorities and approvals processes.

**Table 2.1 Decision Making Authorities and Processes**

| Decision-making Authority | Legislation or Agreement Regulating the Activity | Approval in Place and What it Covers | Approval Required | Relevant Proposal Elements |
|---|---|---|---|---|
| **Chief Executive Officer (CEO), DWER** | Part V of the EP Act | Licence L8721/2013/2, latest amendment 20 August 2024. Prescribed premises categories and limits:<br>• Ore processing: 30 Mtpa<br>• Mine dewatering: 573,600 tpa<br>• Crushing & screening: 400,000 tpa<br>• Sewage facility: 600 $m^3$/day<br>• Landfill: 5,000 tpa.<br>The licence approves Blue Hills North and Terapod West pits to take dewater from Karara pit.<br>Works Approval W6762/2022/1, expires 23 March 2026. Approves installation of equipment and time limited operations for dewatering of 573,600 tpa from Karara Pit to Terapod West Pit. | Starting in Year 24 (2034) the mine dewatering rate is expected to exceed 573,600 tpa. An application to amend Licence L8721/2013/2 will be required to support increased mine dewatering discharge rate. | Open pit dewatering and discharge to Terapod West Pit. |
| **CEO, DWER** | Part V of the EP Act | No approval in place for the proposed dry-stack TSF expansion. | Works Approval for the proposed dry-stack TSF expansion. | Environmental risks, controls and monitoring of emissions and discharges to the environment. |
| **CEO, DWER** | Part V of the EP Act<br>Environmental Protection (Clearing of Native Vegetation) Regulations 2004 | Native Vegetation Clearing Area Permit 3399/4, valid from 13 February 2010 to 12 February 2027. Approves clearing of up 67 ha within General Purpose Lease 59/38 (rail loop) with conditions for pre-clearing inspection for Western Spiny-tailed Skink and translocation of any individuals.<br>Expired Native Vegetation Clearing Permit CPS 3867/1 (expired 2015) for clearing for Yandanooka borefield water pipeline. | Activities in the current and expired native vegetation clearing permit areas are primarily maintenance, which typically would not require native vegetation clearing.<br>Any disturbance of native vegetation that is not within a current NVCP area or approved Ministerial Statement development envelope would require review and assessment for clearing of native vegetation. | Areas covered by current and expired native vegetation clearing permits have been removed from the proposal as no new activities are proposed. |
| **Minister for Water** | *Rights in Water and Irrigation Act 1914* (RIWI Act) | KML holds the following licences to take groundwater:<br>• GWL 169773 – 350,000 kL, expiry April 2024 (currently under renewal assessment)<br>• GWL 170861 – 5,000,000 kL, expiry November 2027<br>• GWL 171229 – 1,000,000 kL, expiry June 2035. | No further approval required. GWL 170861 and GWL 171229 permits groundwater abstraction at the Yandanooka borefield and the KIOP respectively. The approved volume of abstraction is sufficient to meet pit dewatering and ore processing requirements. | Open pit dewatering. |
| **Minister for Environment** | *Biodiversity Conservation Act 2016* (BC Act) | Section 40 Authorisations to Take Threatened Species are maintained by KML to ensure that any approved disturbance is managed appropriately on species protected under the BC Act.<br>KML currently holds two flora taking (other purposes) licences (Regulation 61). | Authorisation under s40 of the BC Act will be required for taking threatened fauna.<br>No taking of threatened fauna or impacts to Threatened Ecological Communities are proposed. | Proposed disturbance to habitat values (including burrows, mounds and colonies) of the following threatened fauna:<br>• *Idiosoma formosum* (ornate shield-backed trapdoor spider, ranked endangered)<br>• *Cyclodomorphus branchialis* (gilled slender blue-tongue, ranked vulnerable)<br>• *Egernia stokesii badia* (western spiny-tailed skink, ranked vulnerable)<br>• *Leipoa ocellata* (malleefowl, ranked vulnerable) |

| Decision-making Authority | Legislation or Agreement Regulating the Activity | Approval in Place and What it Covers | Approval Required | Relevant Proposal Elements |
|---|---|---|---|---|
| **Department of Mines, Petroleum and Exploration (DMPE)** | *Mining Act 1978* (Mining Act) | Numerous Mining Proposals have been approved for KML. These provide approval for KIOP and MIOP and later revisions. Key Mining Proposals relevant to activities in the KIOP MLE are:<br>• Red ID 98958 approved 2021 – for waste rock dump expansion to accommodate Stage 4 mining. Area 309 ha, height 450 mAHD (106 m above ground level).<br>• Reg ID 112415 approved 2022 – for life of mine pit (Stage 8), final average depth 46 mAHD (approximately 300 m below natural ground level), 3,400 m long, 1,300 m wide. Topsoil and overburden to be temporarily dumped in the approved WRD footprint and relocated north of the approved WRD when KIOP MLE is approved. Pit dewater disposed to Blue Hills North pit, which was expected to reach capacity in 2023.<br>• Reg ID 114914 approved 2022 – for construction of dewatering infrastructure to discharge and storage dewatering from Karara pit in Terapod West pit.<br>• Reg ID 118480 approved 2023 – for dry stack TSF expansion. Area 425 ha. | Mining Development and Closure Proposal and Activity Statement. | KIOP MLE components, specifically additional land disturbance, updated pit shape and abandonment bund and updated TSF design. |
| **Yamatji Nation and National Native Title Tribunal** | *National Native Title Act 1993* | Native title does not exist in the Proposal land (Yamatji Nation determination WCD2020/001). | No approval required. | Not applicable. |
| **Minister for Aboriginal Affairs**<br>**Relevant government department is Department of Planning, Lands and Heritage (DPLH)** | *Aboriginal Heritage Act 1972* (AH Act) | The following section 18 consents are held by KML for activities associated with the Proposal:<br>1. 25-08081, granted 2009. Purpose: magnetite mine and associated infrastructure<br>2. 25-13333, granted 2010. Purpose: internal road network<br>3. 34-11552, granted 2011. Purpose: Terapod open cut mine<br>4. 25-05668, granted 2009. Purpose: infrastructure corridor<br>5. 25-09042, granted 2009. Purpose: accommodation facilities<br>6. 25-11859, granted 2010. Purpose: haul road and railway<br>7. 34-11426, granted 2011. Purpose: Tilley to Karara railway<br>8. 34-11189, granted 2010. Purpose: raw water pipeline. | Further section 18 consent required for disturbance to Aboriginal heritage values identified within the KIOP MLE. | Any proposed damage or alteration to Aboriginal sites as defined under the AH Act. |

**Table 2.2 Other Statutory Decision-making Processes to Mitigate Potential Environmental Impacts**

| Environmental Factor and Impact | How the Impact is Regulated by Other Decision-making Processes | Limits of the Decision-making Processes to Regulate the Impact | Likely Environmental Outcome of Decision-making Processes and Consistency with EPA Objective | Conditions, Enforcement and Review Process Required by Decision-making Processes | Stakeholder Engagement in Decision-making Processes |
|---|---|---|---|---|---|
| **Terrestrial Environmental Quality** – Topsoil management and availability of growth media for closure and revegetation, storage of mined materials (WRD, TSF) during operations and post-closure landforms, risk of environmental contamination, erosion and sedimentation, or engineering landform failure. | **Mining Development and Closure Proposal (MDCP)**<br>A MDCP must be prepared in accordance with the *Guideline for Preparing Mining Development and Closure Proposals* (Department of Mines, Petroleum and Exploration (DMPE), 2025), submitted to DEMIRS (now DMPE) and an Approvals Statement issued for approval of mining operations.<br>As detailed in the guidelines, the MDCP must provide physical and geochemical characterisation of soil and mined materials including waste rock, ore and tailings. The MDCP must also include detailed design information for all engineered landforms and structures, including tailings storage facility in accordance with *Guide t*o the preparation of a design report for tailings storage facilities (DMP, 2015). The MDCP must also include conceptual closure design for key activities including pit voids, TSF and waste rock landforms.<br>Proponents are required to undertake an environmental risk assessment for all activities including operations and closure. The MDCP must specifically assess the following risks relating to terrestrial environmental quality: acid and metalliferous drainage, saline drainage, sodic or dispersive materials, fibrous minerals and naturally occurring radioactive material across all phases of the mine life. The risk assessment must establish controls and design mine waste landforms and storage facilities to reduce the residual risks as low as reasonably practicable.<br>Each risk pathway must include relevant environmental or closure outcomes and monitoring programs to demonstrate that outcomes are being met. DMPE will consider whether the environmental outcomes meet DMPE's objectives. | No limits identified.<br>Includes activities during construction, operation and closure implementation including post-closure state. | DMPE objective for terrestrial environmental quality is to maintain the quality of land and soils so that environmental values are protected (DEMIRS, 2024), which corresponds with the EPA objective.<br>DMPE standard environmental or closure outcomes (DMPE, 2025):<br>• Mined and processed materials are managed to ensure any seepage and drainage is contained or controlled so that environmental values are protected.<br>• All environmentally hazardous chemicals, rubbish and materials are removed from site or stored in a manner that prevents detrimental impacts to the surrounding environment.<br>• Mined and processed material stockpiles are managed to be safe and geotechnically stable.<br>• Mining activities are managed to prevent erosion and sedimentation leading to detrimental impacts to the surrounding environment.<br>• All suitable topsoil, growth media or rehabilitation resources shall be harvested, stored and maintained in a manner that allows for its successful use in rehabilitation. | Environmental and closure outcomes will be a condition of approval and will be recorded on the Approvals Statement.<br>Annual environmental reports submitted to DMPE each year are required to report on environmental outcomes and include datasheets for TSFs. | The MDCP must include details on the stakeholder engagement undertaken to inform the MDCP, including key stakeholders such as underlying landholders, reserve vestees and Traditional Owner groups. This must include engagement on proposed mining activities, rehabilitation and closure planning. |
| **Inland Waters** – watercourse diversions, surface water management, changes to surface water flow pathways, contamination risk. | **MDCP**<br>An MDCP must be prepared in accordance with the *Guideline for Preparing Mining Development and Closure Proposals* (DMPE, 2025), submitted to DMPE and an Approvals Statement issued for approval of mining operations.<br>The MDCP must provide surface hydrology of the activity envelope and potentially affected downstream environment, environmental values and beneficial uses of surface water, surface water quality characteristics and flow information.<br>The MDCP must also include detailed design information for all engineered structures, including significant surface water diversion structures. The | No limits identified.<br>Includes activities during construction, operation and closure implementation including post-closure state. | DMPE objective for inland waters is to maintain the hydrological regimes, quality and quantity of groundwater and surface water so that environmental values are protected (DEMIRS, 2024), which aligns with the EPA objective.<br>DMPE standard environmental or closure outcomes (DMPE, 2025):<br>• No contamination of surface water due to mining activities.<br>• Surface water managed in a manner that prevents detrimental impacts to hydrological and ecological function and uses of surrounding surface water features and land. | Environmental and closure outcomes will be a condition of approval and will be recorded on the Approvals Statement. | The MDCP must include details on the stakeholder engagement undertaken to inform the MDCP, including key stakeholders such as underlying landholders, reserve vestees and Traditional Owner groups. This must include engagement on proposed mining activities, rehabilitation and closure planning. |

| Environmental Factor and Impact | How the Impact is Regulated by Other Decision-making Processes | Limits of the Decision-making Processes to Regulate the Impact | Likely Environmental Outcome of Decision-making Processes and Consistency with EPA Objective | Conditions, Enforcement and Review Process Required by Decision-making Processes | Stakeholder Engagement in Decision-making Processes |
|---|---|---|---|---|---|
| | MDCP must include conceptual closure design for surface water diversions and management.<br>Proponents are required to undertake an environmental risk assessment for all activities including operations and closure. The MDCP must specifically assess the following risks relating to inland waters (surface water): flooding characteristics (baseline, during operations and post-closure), impacts to environmental values including downstream such as ephemeral creeks or water holes. The risk assessment must establish controls to reduce the residual risks as low as reasonably practicable.<br>Each risk pathway must include relevant environmental or closure outcomes and monitoring programs to demonstrate that outcomes are being met. DMPE will consider whether the environmental outcomes meet DMPE's objectives. | | | | |
| **Inland Waters** – groundwater drawdown during operations and post-closure, contamination risk. | **MDCP**<br>An MDCP must be prepared in accordance with the *Guideline for Preparing Mining Development and Closure Proposals* (DMPE, 2025), submitted to DMPE and an Approvals Statement issued for approval of mining operations.<br>The MDCP must provide regional and local hydrogeological information including flow directions, recharge, interconnection, groundwater quality characterisation (baseline) sufficient to detect impacts from mining activities, and environmental values and beneficial uses of groundwater. The MDCP must include modelled extent of dewatering and recovery and hydrogeological interaction of pit voids / pit lakes and a sampling and analysis plan to detect any impacts to water quality and environmental values. The MDCP must also include details on closure implementation to ensure environmental objectives will be met.<br>Proponents are required to undertake an environmental risk assessment for all activities including operations and closure. The MDCP must specifically assess the following risks relating to inland waters (groundwater): impacts from dewatering and groundwater extraction and impacts to groundwater quality. The risk assessment must establish controls to reduce the residual risks as low as reasonably practicable.<br>Each risk pathway must include relevant environmental or closure outcomes and monitoring programs to demonstrate that outcomes are being met. DMPE will consider whether the environmental outcomes meet DMPE's objectives. | No limits identified.<br>Includes activities during construction, operation and closure implementation including post-closure state. | DMPE objective for inland waters is to maintain the hydrological regimes, quality and quantity of groundwater and surface water so that environmental values are protected (DEMIRS, 2024), which aligns with the EPA objective.<br>DMPE standard environmental or closure outcomes (DMPE, 2025):<br>• No contamination of groundwater due to mining activities.<br>• Groundwater levels are managed to prevent detrimental impact upon the surrounding environment and water users. | Environmental and closure outcomes will be a condition of approval and will be recorded on the Approvals Statement. | The MDCP must include details on the stakeholder engagement undertaken to inform the MDCP, including key stakeholders such as underlying landholders, reserve vestees and Traditional Owner groups. This must include engagement on proposed mining activities, rehabilitation and closure planning. |

| Environmental Factor and Impact | How the Impact is Regulated by Other Decision-making Processes | Limits of the Decision-making Processes to Regulate the Impact | Likely Environmental Outcome of Decision-making Processes and Consistency with EPA Objective | Conditions, Enforcement and Review Process Required by Decision-making Processes | Stakeholder Engagement in Decision-making Processes |
|---|---|---|---|---|---|
| **Inland Waters** – potential changes to groundwater abstraction rate | **Section 5C Licence to Take Water, RIWI Act**<br>To obtain a licence to take groundwater, a hydrogeological assessment must be provided. This must include field investigations (e.g. drilling of bores, test pumping, geophysical logging and analysis of groundwater quality) and hydrogeological modelling to assess potential impacts from abstraction. Further details are provided in *Operational Policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence* (DoW, 2009).<br>A detailed operating strategy is also required to support the licence application, in accordance with *Policy – Use of operating strategies in the water licensing process* (DWER, 2020c). The detailed operating strategy must include identification and management of impacts, monitoring and reporting, environmental impact management, contingency plans and water use efficiency. | Considers the environmental impact from taking water only, doesn't consider potential impacts from use of water. | The licence to take groundwater under section 5C of the RIWI Act is provided on condition that any intention to remove groundwater can illustrate that the removal of such water is ecologically sustainable, environmentally acceptable and/or does not significantly impact other current and future needs (see RIWI Act sch 1 cl. 7).<br>DWER's intent is to support the principle of water conservation such that licensees use water in an efficient and productive manner, and licensees have considered risk and contingency options should water shortages or unexpected impacts from water abstraction occur (DWER, 2020c). | A licence to take water will require compliance with the approved licence conditions and operating strategy. | Applications to take more than 100,000 kL per year are required (by regulation 23 of the Rights in Water and Irrigation Regulations 2000 (WA)) to be advertised for public comment for 14 days. |
| **Terrestrial Environmental Quality** – risk of emissions and discharges from tailings storage facility | **EP Act Part V**<br>A works approval is required for construction of a TSF under Part V of the EP Act. To apply for a works approval, the proponent is required to predict the quantity and type of emissions or discharges during construction, commissioning and operations as well as potential impacts to human or environmental receptors. Proponents must also specify controls to avoid or mitigate impacts from emissions and discharges.<br>The Works Approval Checklist for tailings storage facilities requires a conceptual site model for environmental and public health receptors, TSF design and construction details, pipeline locations and leak detection methods, seepage management, groundwater monitoring program, and baseline groundwater quality and water level.<br>After construction of the TSF, the proponent must submit a critical containment infrastructure report to verify that the TSF has been constructed as approved in the works approval. This report must be approved by DWER before environmental commissioning of the TSF can commence.<br>Environmental commissioning is undertaken in accordance with the works approval. After environmental commissioning, an environmental commissioning report and licence application is submitted to DWER and time limited operations can continue under the works approval until an operating licence is granted. | Considers only construction and operations, not post-closure. | In their decision-making, DWER considers:<br>• Submissions received from directly interested stakeholders or the public.<br>• The environmental context of the premises.<br>• Presence of nearby human and environmental sensitive receptors, including Specified Ecosystems as per *Guidance Statement – Environmental Siting* (DWER, 2020a). Relevant Specified Ecosystems include listed ecological communities, priority flora and fauna, streamlines mapped on Hydrography WA 250K dataset, GEODATA waterbodies, and groundwater contours.<br>• Potential emissions and discharges from the premises (type, volume, concentration and duration).<br>• Likelihood of emission impacting nearby sensitive receptors.<br>• Control measures proposed by the applicant.<br>• Consequence of emissions include whether Specific Consequence Criteria are likely to be met. Specific Consequence Criteria might include default guideline values for water quality protection, guidelines for waste management and air emissions limits, as per *Guideline – Risk assessments* (DWER, 2020b). | The current Licence L8721/2013/2 includes the following types of conditions relating to TSF management:<br>• ensure surface water drainage from the TSF is directed to the drainage retention area.<br>• reuse water from the drainage retention area in the processing plant or for dust suppression<br>• maintain freeboard<br>• tailings pipelines bunded by earthen trenches<br>• undertake daily inspections of TSF, tailings pipelines and drainage retention area<br>• ensure TSF is construction in accordance with key design criteria in the approved design<br>• monitor ambient groundwater quality and standing water level in monitoring bore near the TSF, six monthly.<br>• monitor vegetation health near the TSF quarterly | Works approval and licence applications are advertised for a public comment period. DWER will also directly refer the application to people or public authorities with a direct interest in the application or other stakeholders. The granted works approval and licence is also published on the DWER website, which provides an opportunity for members of the public to lodge an appeal. |

| Environmental Factor and Impact | How the Impact is Regulated by Other Decision-making Processes | Limits of the Decision-making Processes to Regulate the Impact | Likely Environmental Outcome of Decision-making Processes and Consistency with EPA Objective | Conditions, Enforcement and Review Process Required by Decision-making Processes | Stakeholder Engagement in Decision-making Processes |
|---|---|---|---|---|---|
| **Air Quality** – dust emissions | **EP Act Part V**<br>A works approval is required for construction of a TSF under Part V of the EP Act. To apply for a works approval, the proponent is required to predict the quantity and type of emissions or discharges during construction, commissioning and operations as well as potential impacts to human or environmental receptors. Proponents must also specify controls to avoid or mitigate impacts from emissions and discharges. | Considers only construction and operations, not post-closure. | In their decision-making, DWER considers:<br>• Submissions received from directly interested stakeholders or the public.<br>• The environmental context of the premises.<br>• Presence of nearby human and environmental sensitive receptors, including Specified Ecosystems as per *Guidance Statement – Environmental Siting* (DWER, 2020a). Relevant Specified Ecosystems include listed ecological communities, priority flora and fauna, streamlines mapped on Hydrography WA 250K dataset, GEODATA waterbodies, and groundwater contours.<br>• Potential emissions and discharges from the premises (type, volume, concentration and duration).<br>• Likelihood of emission impacting nearby sensitive receptors.<br>• Control measures proposed by the applicant.<br>• Consequence of emissions include whether Specific Consequence Criteria are likely to be met. Specific Consequence Criteria might include air emissions limits as per *Guideline – Risk assessments* (DWER, 2020b). | The current Licence L8721/2013/2 includes the following condition (2) relating to air quality:<br>Manage dust lift-off from active construction and operational areas to protect the environment by preventing and, where that is not possible, minimising dust emissions that may cause unreasonable emissions, pollution or environmental harm. | Works approval and licence applications are advertised for a public comment period. DWER will also directly refer the application to people or public authorities with a direct interest in the application or other stakeholders. The granted works approval and licence is also published on the DWER website, which provides an opportunity for members of the public to lodge an appeal. |
| **Social Surroundings** – impacts to Aboriginal sites | **AH Act – Section 18 consent**<br>A landowner (including lease holder or mining tenement holder) must apply for consent under s18 of the AH Act to use the land for a purpose that might damage, destroy or in any way alter an Aboriginal site.<br>Aboriginal sites are protected under the AHA, even if they haven't yet been identified or recorded.<br>Types of Aboriginal sites that are protected under the AHA include:<br>• Any place of importance where persons of Aboriginal descent have left artefacts, or made modifications, or used in connection with the traditional cultural life of the Aboriginal people, past or present.<br>• Any sacred, ritual or ceremonial site of importance and special significance to persons of Aboriginal descent.<br>• Any place associated with the Aboriginal people that is of historical, anthropological, archaeological or ethnographic importance to the State.<br>• Any place where objects to which the AHA applies are stored. | Section 18 process applies to impacts only within the consent area (e.g. mining tenements held by AVL or subsidiaries). Indirect impacts outside of mining tenement boundaries would be outside of the section 18 consent boundaries.<br>Section 18 process would not consider impacts to social surroundings that are not within the definition of Aboriginal sites, such as off-site impacts to culturally significant flora or fauna or impacts to access to the land for traditional uses. | Under section 18 of the AHA, the Aboriginal Cultural Material Committee is required to determine whether there is any Aboriginal site on the land, evaluate the importance and significance of any site, and provide recommendations to the Minister whether consent should be granted for the proposed use, including recommended conditions. | Conditions on the section 18 consent might relate to the Aboriginal sites or objects, mitigation strategies or use of the land.<br>It is a condition on all section 18 consents that the landowner must notify the Minister if the owner becomes aware of any new information about an Aboriginal site on the land that is the subject of the consent. | The *Consultation policy for section 18 applications* (DPLH, 2023b) outlines the expectations for consultation to be undertaken with Aboriginal people prior to applying under section 18. The Consultation policy indicates that a decision on an application may be deferred until appropriate consultation is undertaken.<br>The landowner and the native title party have the right to appeal the decision of the Minister under s18. |

| Environmental Factor and Impact | How the Impact is Regulated by Other Decision-making Processes | Limits of the Decision-making Processes to Regulate the Impact | Likely Environmental Outcome of Decision-making Processes and Consistency with EPA Objective | Conditions, Enforcement and Review Process Required by Decision-making Processes | Stakeholder Engagement in Decision-making Processes |
|---|---|---|---|---|---|
| | • An application under s18 needs to include the purpose and geographical location of the land use, description of the proposed activities, consultation that has been undertaken with the relevant Aboriginal people, final versions of Aboriginal heritage survey reports, measures to mitigate harm to Aboriginal sites, spatial information for the land use and newly recorded Aboriginal sites. | | | | |

# 3.0 Stakeholder Engagement

## 3.1 Key Stakeholders

KML is undertaking ongoing consultation with a range of stakeholders and interested parties. The Proposal's key stakeholders are listed below:

- Department of Biodiversity, Conservation and Attractions (DBCA)
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) (Cth)
- Department of Mines, Petroleum and Exploration (DMPE)
- Department of Energy and Economic Diversification (DEED)
- Department of Water and Environment Regulation (DWER)
- Environmental Protection Authority (EPA)
- Department of Planning, Lands and Heritage (DPLH)
- Karara Pastoral Station
- Yamatji Nations (Widi Mob)
- Yamatiji Southern Regional Corporation (YSRC)
- City of Greater Geraldton
- Shire of Mingenew
- Shire of Morawa
- Shire of Perenjori
- Shire of Three Springs
- SinoSteel
- Midwest Development Commission (MWDC)
- Mid West Ports Authority.

## 3.2 Stakeholder Engagement Process

KML's core stakeholder engagement principles adopted for the Proposal include early engagement, open and transparent communication, fostering collaboration, welcoming feedback, and integrating community and stakeholder input into the design and implementation of the Proposal.

KML's stakeholder engagement plan for KIOP is provided in **Table 3.1**.

**Table 3.1 Stakeholder Engagement Plan**

| Stakeholder | Frequency | Type | Purpose of Planned Engagement | Issues to be Raised |
|---|---|---|---|---|
| **DWER – EPA Services** | Quarterly during approvals and annual ongoing | Meetings, written reports, telephone & email. | Correspondence and reporting under the EP Act Part IV approval. | • Implementation of approval conditions.<br>• Additional information to be provided as requested.<br>• Ongoing annual reporting or when changes to the project occur. |
| **DCCEEW** | Annual (minimum ongoing) | Meetings, email and telephone. | Project updates. | • Implementation of approval conditions.<br>• Additional information to be provided as requested.<br>• Ongoing annual reporting or when changes to the project occur. |
| **DMPE** | Annual (minimum) | Meetings, inspections, written reports, telephone & email. | Correspondence and reporting on implementation of the Mining Proposals, Mine Closure Plan and Project Management Plan. | • Mining tenement applications.<br>• Mining Proposal and Mine Closure Plan implementation.<br>• Mine Rehabilitation Fund.<br>• Project specific requirements.<br>• Closure updates and requirements.<br>• Project Management Plan assessment.<br>• Reporting. |
| **Industry Regulation – DWER** | Annual (minimum ongoing) | Meetings, written reports, telephone & email. | Correspondence and reporting under EP Act Part V approval. | • Works Approvals and Licenses.<br>• Implementation of approval conditions.<br>• Reporting. |
| **Water – DWER** | Annual (minimum ongoing) | Meetings, inspection, written reports, telephone & email. | Correspondence and reporting under existing RIWI Act 5C licenses. | • RIWI Act approvals (5C & 26D)<br>• Ongoing water requirements for the Project<br>• Groundwater Operating Strategy including management and engagement. |
| **DBCA** | Six-monthly (minimum) | Meetings, written reports, telephone & email. | Correspondence and reporting on implementation of the Project, with specific reference to land management activities associated with the Karara Rangeland Park, and mine closure activities. | • Ongoing monitoring and reporting.<br>• Impacts of the Project development on land management within the Karara Rangeland Park.<br>• Project specific requirements for conservation values.<br>• Closure updates and requirements. |

| Stakeholder | Frequency | Type | Purpose of Planned Engagement | Issues to be Raised |
|---|---|---|---|---|
| **Yamatji Nations (Widi Mob)** | Annual (minimum ongoing) | Meetings, email and telephone. | Correspondence and reporting on implementation of the Project, with specific reference to land management activities associated with the Karara block, and mine closure activities. | • Heritage matters.<br>• Closure updates and requirements.<br>• Project design and infrastructure requirements.<br>• Ongoing operations. |
| **Landholders hosting KML infrastructure** | Annual (minimum ongoing) | Meetings, email and telephone. | Project updates. | • Project changes.<br>• Impacts to lands.<br>• Employment opportunities. |
| **Shire of Perenjori**<br>**Shire of Morawa**<br>**City of Greater Geraldton**<br>**Shire of Three Springs**<br>**Shire of Mingenew** | Annual (minimum ongoing) | Meetings, email and telephone. | Project updates. | • Project update.<br>• Maintenance strategies for local roads.<br>• Community engagement initiatives. |
| **Mid-West Ports Authority** | Annual (minimum ongoing) | Meetings, email and telephone. | Project status and port requirements. | • Shipping and transport logistics.<br>• Port monitoring.<br>• Reports. |
| **Mid-West Development Commission** | Annual (minimum ongoing) | Meetings, email and telephone. | Project updates. | • Impacts to traditional lands.<br>• Employment opportunities. |
| **Relevant Ministers** | As project requires | Letters and meetings. | Letter summarising the Project status (i.e. approvals to date and path forward). | • Project implementation issues. |

### 3.2.1 Stakeholder Consultation Outcomes

Since the start of the construction and mining activities at the Project in 2009, KML has continued to engage with relevant stakeholders on matters associated with the Project to ensure that the stakeholder concerns are addressed, and potential impacts are managed. The Stakeholder Engagement Register forms part of the KML Environmental Management System (EMS) and is routinely updated following stakeholder consultation.

A summary of the stakeholder engagement records for **the Proposal** is provided in **Table 3.2**. Issues raised by stakeholders have focused on:

- conservation significant flora and vegetation
- conservation significant fauna (Malleefowl and Western Spiny-tailed Skink)
- protection of Aboriginal heritage sites.

KML will continue to engage with the stakeholders on matters that may affect their interests, activities, or statutory obligations, as well as any changes that materially alter the nature and scale of mine closure risks.

KML will also maintain liaison with the DBCA, the pastoral tenement holder for the Karara Pastoral Station, and the land's co-manager the Yamatji Nations governing body. The DBCA is the land management agency for the Karara Rangeland Park, which encompasses a significant portion of the tenements related to this Proposal. KML maintains regular consultation with the DBCA as the land manager of the Karara Rangeland Park to ensure that the development of the Proposal is within agreed parameters.

**Table 3.2 Stakeholder Consultation for the Proposal**

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
|---|---|---|---|---|
| **DCCEEW and EPA** | 01/05/2025<br>26/05/2025 | • Discussion on geotechnical testing and sampling proposed to be undertaken as preliminary works within the dry-stack TSF expansion area.<br>• Brief on the proposed extension of the dry-stack TSF (Sweeps 13 and 14).<br>• Updates on the studies and assessment for the Proposal and the ERD submission. | • DCCEEW suggested avoiding drilling and access track in the western spiny-tailed skink prospective habitat and avoid disturbance to other conservation significant values in the area as much as practical to expedite the approval process for preliminary works.<br>• DCCEEW recommended KML to conduct a self-assessment of the proposed area to ensure due diligence, assess all impacts from drilling, and provide through documentation.<br>• DCCEEW noted that the proposed dry-stack TSF extension for Sweeps 13 and 14 within the Proposal disturbance footprint would potentially breach the EPBC Act and the EP Act. There's no mechanism or more efficient approval pathway that could be utilised to assess and approve this portion of the area under Ministerial Statement 805. | • KML will work with the engineering consultants to potentially relocate or remove those proposed drilling and testing pads and associated access tracks to avoid any disturbance to conservation significant values in the area as much as practical.<br>• KML will amend the application for the preliminary geotechnical testing work to meet DCCEEW/EPA's requirements and resubmit the application, whilst discuss internally about alternatives for dry tailings deposition after completion of Sweeps 11 and 12. |
| **DBCA Midwest Regional Office** | 13/03/2025 | Discussion on the offsets strategy and potential cooperation with DBCA to conduct direct offset (e.g. on-ground management) for the Proposal. | • DBCA made some comments on the potential offset sites within the Karara Rangeland Park (e.g. offsets site for Malleefowl/Western Spiny-tailed Skink respectively) and did not recommend the offset site within the pastoral lease area.<br>• DBCA advised the on-ground management in vicinity of the Karara mine site would be discontinued due to lack of DBCA resources and funding.<br>• DBCA was happy to provide further recommendations on the potential offset sites in the area for the Proposal and share the recent survey data with KML if available. | • KML will be looking into other potential sites that could be used as offset sites for Malleefowl/Western Spiny-tailed Skink (and other MNES based on the impact assessment) in line with the DCCEEW and EPA requirements for offsets for the Proposal.<br>• KML will continue liaisons with DBCA for their advice on the offset strategies for the threatened species and priority ecological communities. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **YSRC** | 11/02/2025 | • Brief on the status of KIOP operations.<br>• Updates on the progress of the Proposal.<br>• Brief on KML's upcoming exploration campaign in the area. | • YSRC appreciated KML's ongoing updates on the KIOP and its Mine Life Extension Proposal. YSRC suggested KML's Aboriginal Heritage Management Plan to be updated to reflect the current and future KIOP operations.<br>• YSRC requested Aboriginal heritage site maps for the upcoming exploration activities for their review.<br>• YSRC raised potential cooperation with KML for produce supplies, water resources in the region. | • KML updated the Aboriginal Heritage Management Plan (CORP-EN-PLN-1032).<br>• The maps of Aboriginal heritage sites for the proposed exploration activities were provided to YSRC on 12 February 2025. |
| **DCCEEW and EPA** | 17/12/2024 | • Update the regulators with the progress of the studies and assessments for the Proposal.<br>• Discussion on the proposed offset strategies in line with DCCEEW and EPA requirements.<br>• Communicate with the regulators about KML's proposed assessment and approval timeline. KML asserted the Proposal needs to be approved by end of 2025 to meet operational requirements. | • EPA commented that KML's proposed timeframes are not consistent with EPA's published minimum target timeframes (with reference to Figure 18 from the EPA Procedures Manual). The quality of information provided to the EPA during the assessment stage (ERD and Response to Submissions), as well as the likely environmental effects, may also affect the expected minimum target timeframes. This timeframe is now within KML's control and KML is encouraged to submit the ERD to support its own timeframes.<br>• DCCEEW advised the following for the proposed offset strategies:<br>  ○ Need plans for management set out for each offset site.<br>  ○ Need recent baseline information to inform the 'starting quality' of the offset, and to give supporting information to other calculator input valves. DCCEEW can also discuss the previous survey information for the potential suitability of the offset sites. | • While KML is aware of EPA's published minimum target timeframes and it is understood that the timeframe is uncertain on the public comment and response process, KML appreciated EPA and DCCEEW could possibly accelerate the assessment process when the ERD is submitted. KML aims to submit the ERD in August 2025.<br>• KML will follow DCCEEW's advice on preparation of the offset strategies for the Proposal and discuss those further if needed. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| | | | ○ It is up to KML to demonstrate and provide evidence that the proposed offset sites and their management are suitable compensation for the impact. The matter of offset distance likely depends on species populations and ecology.<br>○ Direct offsets are those actions that provide a measurable conservation gain for an impacted protected matter – weed removal and feral animal control are often things that contribute to a direct offset. | |
| **YSRC** | 09/11/2024 | • Briefing and updates on the Proposal.<br>• Aboriginal cultural heritage surveys conducted for the original KIOP and the Proposal.<br>• Potential impacts on the Aboriginal cultural heritage sites and requirements of additional Aboriginal heritage surveys for the Proposal.<br>• Access to the Karara Homestead. | • YSRC understands that the majority of the proposed disturbance areas of the Proposal had been surveyed previously prior to the approval of the original KIOP in 2009 and an Aboriginal heritage survey was conducted in 2020 for the proposed expansion of the southern and northern KIOP areas.<br>• YSRC queried the current Aboriginal Heritage Management Plan in place and procedures followed to disturb Aboriginal heritage sites.<br>• YSRC suggested that Aboriginal monitors could be present on site when disturbance is undertaken around the area that has not been surveyed for the Proposal.<br>• YSRC asked if KML could provide any escape access from the Karara Homestead during emergency. | • KML has existing Approval Request / Ground Disturbance procedures in place and specifies Aboriginal heritage sites and conditions in the internal ground disturbance permit for any potential disturbance to sites.<br>• KML will forward the Proposal development envelope and disturbance maps and associated Aboriginal heritage survey maps to YSRC for their information.<br>• KML will work with YSRC closely in the future for any Aboriginal heritage sites, land access and other concerns in the area. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **EPA Services – DWER**<br><br>**DCCEEW** | 18/04/2024 | Follow-up meeting and advice on the proposed exclusion of portions of the proposed WRD and TSF expansion area from the current KIOP MLE Proposal section 38 disturbance footprint. | • Both EPA and DCCEEW suggested that splitting the Proposal (e.g. exclusion of the portions of the WRD and TSF expansion area) is unlikely to provide any benefit. DCCEEW advised that excluded areas seem to include MNES, which will trigger 'controlled action' and variation of the project is highly complicated and resubmission is time consuming. EPA indicated that the excluded area may not meet the published criteria for 'minor or preliminary works', which require the proposed works to be unlikely to have a significant impact on the environment.<br>• The appeals process in WA may influence the final decision timeframe on the Proposal.<br>• DCCEEW indicated that they require 6 weeks for a decision following WA decision (e.g. Oct 2025).<br>• Both EPA and DCCEEW understand the need for Proposal approval by the end of 2025 and offered to speed up the process by working closely with KML and provide dates to support a final decision on the Proposal by the end of 2025. | • KML appreciated EPA and DCCEEW consideration of proposed exclusion of portions of the WRD and TSF expansion areas and agreed splitting the Proposal would not provide any benefit for approval of the Proposal. KML will work closely with EPA and DCCEEW to work backwards from the required approval date by end of 2025 for interim steps.<br>• EPA Services offered to provide dates to support a decision by the end of 2025 and October 2025 (to support DCCEEW decision) and meetings will be held to further discuss and plan for offset requirements. |
| **DWER - EPA Services**<br><br>**DCCEEW** | 4/04/2024 | Potential exclusion of portions of the proposed WRD and TSF expansion area from the current KIOP MLE Proposal section 38 disturbance footprint due to operational constraints by mid-2026. | • EPA advised that those areas might be excluded and assessed as 'minor and preliminary works' if they meet relevant criteria. EPA and DCCEEW requested additional information of the proposed excluded areas for the WRD and TSF expansions for their internal review and suggested a follow-up meeting in two weeks. | • KML provided the detailed information as requested to EPA and DCCEEW on 9 April 2024. A follow-up meeting was booked on 18 April 2024 to discuss this further based on EPA and DCCEEW review of the information and internal consultation. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **DBCA Mid-West** | 7/03/2024 | Update DBCA on the Proposal and associated flora and fauna studies and assessments as required by EPA and DCCEEW and timeframe of EPA and DCCEEW assessment. | • DBCA indicated that they have no influence on the EPA assessment timeframe and it's likely that the EPA will contact them to provide feedback on the flora and fauna assessment when KML submit the additional information to EPA and DCCEEW. DBCA are happy for KML to also send them the flora and fauna impact assessment information for their review when KML provides this information to the EPA. | • KML keeps DBCA updated on the progress of the Proposal assessment and will forward them the flora and fauna survey and impact assessment information when it becomes available. |
| **YSRC** | 6/03/2024 | Potential impacts on the Aboriginal cultural heritage sites and requirements of additional Aboriginal heritage surveys for the Proposal. | • YSRC noted that majority of the proposed disturbance areas of the Proposal had been surveyed previously, prior to approval of the original KIOP in 2009. Horizon Heritage Management conducted an Aboriginal heritage survey in 2020 for the proposed expansion of the southern and northern KIOP areas.<br>• YSRC requested a copy of the 2020 Aboriginal Heritage Survey Report for their review, so they can advise if additional surveys would be required for the Proposal. | • KML forwarded a copy of the 2020 Aboriginal Heritage Survey Report prepared by the Horizon Heritage Management to YSRC on 8 March 2024.<br>• |
| **EPA Services – DWER**<br>**DCCEEW** | 5/12/2023 | DCCEEW requirements on the offset management for the Proposal. | • The DCCEEW advised the Offset Management Plan as required in their further information required for assessment notice for the Proposal should follow their Offset Assessment Guide to calculate potential impact on the EPBC protected matters and follow the offset calculator in the Guide to work out the details of the proposed offset measures. The DCCEEW also suggested to review a number of projects on their Offsets Register to have a good insight into the presentation of Offset Management Plan and its content when seeking approvals. | • KML reviewed the offset management information of the projects available on DCCEEW Offsets Register as suggested. Level of detail required for the Offset Management Plan for the Proposal will need to be further confirmed with the DCCEEW and EPA (e.g. what offset management details are required by the EPA) in the next meeting. |
| **EPA Services – DWER** | 27/10/2023 | DCCEEW decision to assess the Proposal as a 'controlled action' | • DCCEEW confirmed that only a desktop assessment would be required for the significant | • KML communicated those information requirements with the |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **DCCEEW** | | by accredited assessment under the EP Act issued 1 September 2023.<br>EPA Notice Requiring Information for Assessment issued on 16 October 2023.<br>Clarification on the EPA and DCCEEW additional information requirements to continue assessment of the Proposal. | flora and fauna species and communities within the 20 km buffer of the development envelope. The DCCEEW later confirmed via email on 6 November 2023 that a desktop assessment for a 10 km buffer of the development envelope is sufficient.<br>• EPA confirmed that the flora and fauna assessment will need to cover the entire development envelope, and the key requirement is to ensure the survey data is current and adequate for the assessment.<br>• EPA and DCCEEW suggested a follow-up meeting to discuss any further queries on information requirements and clarify DCCEEW offsets requirements. | flora and fauna consultants and will confirm the scope of the 2024 survey with them accordingly.<br>• A follow-up meeting with the EPA and DCCEEW has been booked on 5 December 2023. |
| **YSRC** | 26/09/2023 | Introduction to the new YSRC stakeholders.<br>Briefing on the 2023 exploration drilling activities and the Proposal. | • YSRC indicated that KML was the first mining company to approach them upon their commencement and appreciate the KML's briefing on the coming exploration activities and the Proposal.<br>• YSRC had no issue with the Proposal and supports KML's green energy initiatives (solar or wind-generated power). | • KML maintains regular communications with YSRC to inform the proposed activities on the Karara Rangeland Park, which is co-managed by the DBCA and YSRC in accordance with the Yamatji Proponent Standard Heritage Agreement. KML will also update YSRC on the status of the Proposal on an ongoing basis. |
| **MWDC** | 26/09/2023 | Briefing on the current KIOP operations including recent expansion of WRD and dry-stack TSF expansion and the Proposal. | • MWDC supports the current and future expansion of the KIOP operations and is happy to assist with any opportunities and/or challenges that KML may have for its current and future operations.<br>• MWDC is keen to maintain communications with KML, ideally involving other companies operating in the Midwest and Murchison region for any critical infrastructure or service requirements in the region. | • KML maintains regular communications with MWDC to update them on the status of the Proposal and associated infrastructure upgrades/development in the area. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **JTSI (now DEED)** | 4/08/2023 | The EPA and DCCEEW assessment of the KIOP MLE proposal following the EPA decision (21 June 2023) on the level of assessment for the Proposal. | • JTSI was updated with the EPA decision to assess the Proposal at a level of 'Assessment on the Proponent's Information (public comments required)' and key environmental factors that will need to be addressed in the assessment. KML discussed with JTSI the concerns on the potential additional flora and vegetation assessment (on the critical path), which may delay the entire approval timeframe and potential delay of the EPA issue of notice for additional information.<br>• JTSI indicated that they will discuss KML's concerns in their next meeting with the EPA and advise KML any outcomes of the meeting. | • KML keeps update the JTSI on the progress of the Proposal assessment. |
| **JTSI (now DEED)** | 16/06/2023 | Further updates on the EPA s38 assessment of the Proposal and KML's concern about the Proposal assessment timeframe. | • JTSI was updated with the EPA assessment of s38 referral application for the Proposal including the revised scope to include the MS806 footprint for the MIOP and previously Part V (clearing permit) approved areas. KML indicated concerns on the assessment timeframe and continuous delays of the EPA decision on the level of assessment for the Proposal.<br>• JTSI requested KML to provide a Gantt chart showing the expected timeframes for the approvals and forecast issues going forward and they will discuss those with the EPA in monthly meetings.<br>• JTSI suggested regular meetings with KML once the EPA decides the level of assessment for the Proposal. | • KML provided the Gantt chart showing the expected assessment and approvals timeframe for the Proposal to the JTSI on 5 July 2023.<br>• A follow-up meeting with the JTSI was booked on 4 August 2023. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **DCCEEW** | 27/04/2023 | Pre-referral meeting for the Proposal.<br>Briefing on the updates to the Proposal and discussed potential referral of the proposal to the DCCEEW under the EPBC Act. | • No issue/concern was raised by the DCCEEW. The DCCEEW advised that the Proposal could be referred to the DCCEEW and assessed under the bilateral agreement with the EPA. As the Proposal is expected to impact MNES, DCCEEW suggested it should be referred under the EPBC Act. | • KML prepared and submitted the referral package to the DCCEEW via their online business portal on 31 May 2023. |
| **EPA Services – DWER** | 23/08/2022 | Potential options to incorporate the MIOP area approved under MS806 in the proposed development envelope of the s38 Proposal for the KIOP MLE. | • EPA Services suggested that the s38 Proposal for KIOP MLE might be amended to incorporate the entire MIOP footprint approved under MS806, portions of which are required to support ongoing KIOP and those areas required for maintenance of existing infrastructure and access road, which were approved under Part V of the EP Act (clearing permits). An amended referral package is required to be submitted to EPA Services for assessment. | • A further amended s38 referral document incorporating the entire MS806 area (excluding the area no longer on the tenements currently held by KML) along with the revised forms and updated shapefiles for the KIOP MLE Proposal were submitted to EPA Services on 21 December 2022.<br>• EPA Services accepted the revised referral for the Proposal under the EP Act s38C on 7 March 2023. |
| **JTSI (now DEED)** | 27/06/2022 | Updates on the section 38 assessment for the KIOP MLE Proposal. | • JTSI indicated that they will work with other relevant departments to coordinate the Proposal approval and start consultation with other departments for this Proposal. JTSI requested KML to provide them with key timeframe of the Proposal and relevant contacts of EPAS and DMIRS for the Proposal.<br>• The JTSI encouraged KML to continue working closely with respective agencies to support the assessment of the Proposal proceeding smoothly. | • Key proposal assessment and approval timeframe and contacts of EPAS and DMIRS for assessment of the Proposal and associated mining proposal was provided to JTSI. |
| **DMIRS (now DMPE)** | 31/05/2022 | Mining Proposal submitted for the Karara Pit Mine Life Expansion (life of mine open pit). | • No major issues were raised by DMIRS. The main focus of DMIRS was on the compliance with the approved pit parameters in Ministerial Statement 805 and geotechnical stability of the safety/abandonment bund and waste rock dump located close to the pit edge. | • KML addressed those items in the Mining Proposal.<br>• The Mining Proposal was approved 19 October 2022. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **EPA Services – DWER** | 5/05/2022 | • The scope of the section 38 Proposal for KIOP MLE and discrepancies of land disturbance identified in the referral document.<br>• Potential option to consolidate existing Ministerial Statement 805 (KIOP) and 806 (MIOP). | • Linear infrastructure (e.g. Karara to Tilley Rail Line, Yandanooka water pipeline and Syncline Track haul road) proposed in the section 38 Proposal for KIOP MLE was previously assessed by the EPAS as 'Not Assessed' under Part IV of the EP Act and those areas will not be assessed by the EPAS again. Those areas need to be removed from the development envelope of the Proposal. All proposed disturbance currently approved under MS806 for the MIOP in the Proposal will also need to be taken out. MS805 and MS806 could potentially be consolidated following approval of section 38 under section 45C using section 45D.<br>• The proposed disturbance area in the Proposal will need to be reviewed and updated if required to be consistent with the area presented in relevant tables in the referral document and associated forms.<br>• A formal notice of request for further information under section 38F was issued to KML on 18 May 2022 and it requested that an amended section 38 referral package be submitted to the EPAS by 15 June 2022. | • As requested, an amended section 38 referral package including revised referral supporting document with forms and updated shapefiles for the Proposal were updated and re-submitted to EPAS on 13 June 2022. |
| **EPA Services – DWER** | 28/03/2022 | Referral submitted 21 February 2022 under section 38 of the EP Act. Advertised for public comment on the level of assessment 21–30 March 2022.<br>Follow up with the submission of the section 38 referral application for the Proposal and further process of the assessment. | • The DWER advised the application was still in early stage and a decision on the level of assessment would be made in a few weeks after public comments period. Based on their current understanding of the Proposal and given no public comments received, the Proposal is likely to be assessed on the Proponent's Information. They also suggested that consultation with the Commonwealth Department of Agriculture, Water and Environment (DAWE, now 'DCCEEW') may be required at early stage to understand if a referral of the Proposal is also required under EPBC Act. | • KML started consultation with DAWE (now 'DCCEEW') and awaited further feedback from EPAS for the s38 referral application for the KIOP MLE Proposal. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **DBCA – Geraldton and Environmental Management Branch** | 2/11/2021 | Updates on the proposed referral under s38 to the EPA for the Mine Life Extension Proposal, Mining Proposal application for the WRD expansion and proposed Wet TSF2B, and ongoing support to DBCA's management of the Karara Rangeland Park. | • The DBCA has no issues with the referral to the EPA for the Proposal.<br>• The DBCA appreciated KML's ongoing support and assistance with management of the 'Karara Block'. The DBCA is currently finalising the Karara Rangeland Park Management Plan and recruiting rangers/staff to manage the 'Karara Block'. The DBCA looks to continue collaborative work with Karara in the region. | • Karara is happy to work collaboratively with the DBCA to manage the Karara Rangeland Park and will inform the DBCA of the outcome of the s38 application and the EPA's assessment of the Proposal. |
| **DBCA – Environmental Management Branch** | 12/11/2020 | Briefing on the proposed Mine Life Extension including summary of assessment studies completed and planned state approvals pathway. Request the DBCA feedback. | • DBCA was interested in Priority 1 species that will be impacted and requested copies of the flora and fauna survey reports when finalised. | • KML will provide the DBCA with the flora and fauna survey reports when finalised. |
| **DAWE (Commonwealth) (now DCCEEW)** | 26/10/2020 | Briefing on the proposed Mine Life Extension including summary of assessment studies completed and planned state approvals pathway (not to be referred by KML for the EPBC matters). Request DAWE feedback. | • No specific advice unless proposal referred, but no major concerns raised. Potential referral pathways will depend on the State actions. The DAWE will provide information on bilateral assessment processes. | • Continue with the Proposal submission and follow up with referral pathway dependent on State actions (e.g. accept section 45C, refer under section 38) |
| **EPA Services – DWER** | 24/09/2020 | Briefing update on the proposed Mine Life Extension including preliminary assessment results and planned state approvals pathway (section 45C application). Request EPA feedback. | • Assess the proposed Mine Life Extension impacts for change from original KIOP proposal (2009), not against most recent amendment to MS 805. EPAS was interested in individual PEC plant losses and advised KML to consult with the DAWE re EPBC Act applicability. | • KML ensured the six-step assessment submitted with the s45C request assessed the proposed change against the original proposal (rather than the current approved proposal). |
| **DMIRS (now DMPE)** | 3/09/2020 | Update on Karara operations, including the Mine Life Extension Proposal. | • No major concerns with the mine life extension, Mining Proposals required for new/changed aspects. | • KML noted the DMIRS feedback and will prepare and submit the Mining Proposals as required. |

| Stakeholder | Date | Topic / Purpose | Stakeholder Feedback / Issues | Proponent Response / Outcome |
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| **DWER – Regulatory Services** | 20/08/2020 | Update on Karara environmental licensing issues, including the Mine Life Extension Proposal. | • No major concerns with the mine life extension, amendments to L8721/2013/1 will be required for new/changed aspects. | • KML will keep the DWER up to date and will submit a licence amendment request as approvals progress. |
| **Widi Mob** | 25/05/2020 – 4/06/2020 | Members of the Widi Mob, Horizon Heritage and KML conducted an Aboriginal heritage survey of the proposed KIOP expansion areas. | • Results of the heritage survey were formally reported (Horizon Heritage Management, 2020 – discussed above).<br>• The Widi Mob discussed the significance of the identified heritage sites and expressed their desire for protection of a number of these sites and management of other less significant sites (discussed above). | • KML modified the KIOP MLE Proposal to avoid heritage sites, as requested by the Widi Mob. KML also agreed to salvage and relocate a scar tree located in the proposed southern expansion area. |
| **DMIRS (now DMPE)** | 27/02/2020 | Briefing on planned WRD and TSF expansions (as part of Mine Life Extension). Request DMIRS feedback and advice on approval process. | • Part IV approvals required before a Mining Proposal can be approved; however, assessment can occur in parallel. Successive MP's can be approved for overlapping areas, e.g. wet TSF2B could be superseded by another MP for dry stack over TSF2B. | • KML noted the DMIRS feedback, which aligns with the KML's approval strategy. |
| **DBCA - Geraldton and Environmental Management Branch** | 11/02/2020 | Briefing on the proposed Mine Life Extension planning activities. | • The DBCA acknowledged that Woodman Environmental Consulting and Bamford Consulting Ecologists were knowledgeable and competent resources for undertaking the flora and fauna surveys and offered to let KML know of any useful data sets that may assist in understanding the regional distribution of priority species which could be present in the area.<br>• No specific concerns were raised in the meeting in relation to the effects of the proposed expansion on conservation values within the Karara Rangeland Park. | • KML agreed to keep the DBCA updated on the project and contacted individuals referred to by the DBCA in relation to new available regional information. |

# 4.0 Object and Principles of the EP Act

The object of the EP Act is to protect the environment of the state, having regard to the principles in section 4A of the EP Act. KML has considered the object and principles of the EP Act in relation to the Proposal, as detailed in **Table 4.1** below.

**Table 4.1 Principles of the Act**

| Principle | Consideration |
|---|---|
| **1. The precautionary principle**<br>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.<br>In the application of the precautionary principle, decisions should be guided by:<br>• careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and<br>• as assessment of the risk-weighted consequences of various options. | Baseline studies have been undertaken to understand the receiving environment, with more detailed studies undertaken for environmental factors that might be at higher risk of impact or irreversible damage. This includes surface water assessment (Stantec, 2024), groundwater modelling (Rockwater, 2024), dewatering modelling (Rockwater, 2024), flora and vegetation surveys (Umwelt, 2025a) and fauna surveys (Bamford Consulting Ecologists, 2025).<br>The proposed amendment has sought to avoid, minimise, rehabilitate and offset environmental impacts.<br>The environmental impact assessment presented in this ERD is based on a comprehensive review of available information and technical studies undertaken by competent specialists in accordance with published guidelines (where applicable), to minimise the risk of incorrect or incomplete information leading to lack of scientific certainty.<br>Where scientific uncertainty has been encountered, a precautionary approach has been taken in the environmental impact assessment and the mitigation hierarchy has been applied to avoid, minimise, rehabilitate and manage impacts.<br>In addition, KML has maintained ongoing monitoring to inform the impact of operations on the surrounding environment.<br>KML has committed to the development, implementation and monitoring of measures to prevent significant environmental harm or pollution associated with implementation of the Proposal. |
| **2. The principle of intergenerational equity**<br>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. | KML commits to managing those environmental factors within its control such that future adverse impacts are minimised and that, wherever possible, the quality of the environment is maintained or enhanced.<br>KML has engaged with the underlying landholders to consider the long-term planning of the region.<br>The Mine Closure Plan will be amended for the Proposal in consultation with the regulatory, local and Traditional Owner stakeholders to ensure that post mining land use is consistent with agreed stakeholder objectives. |

| Principle | Consideration |
|---|---|
| **3. The principle of the conservation of biological diversity and ecological integrity**<br>Conservation of biological diversity and ecological integrity should be a fundamental consideration. | KML has taken into consideration the biological diversity of the area when designing the Proposal, through:<br>• Obtaining specialist input to guide the engineering design process to optimise the layout of the WRD and TSF expansion, to minimise additional vegetation clearing where possible.<br>• Designing the WRD and TSF expansion to extend away from the BIF landform, to avoid the areas of potentially significant biological diversity.<br>• Engaging ecological consultants with substantial local and regional experience to undertake additional detailed and targeted flora, vegetation and fauna surveys to ensure ecological values are well understood to inform the environmental impact assessment. |
| **4. Principles relating to improved valuation, pricing and incentive mechanisms**<br>a. Environmental factors should be included in the valuation of assets and services.<br>b. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.<br>c. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.<br>d. Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems. | KML has worked closely with other industry in the Midwest region to minimise the overall disturbance footprint and utilise existing infrastructure where possible.<br>KML maintains an Environmental Management System (EMS) aligned to ISO14001, outlined in the Environmental Management Plan (CORP-EN-PLN-1020). The EMS establishes documented objectives to minimise environmental impact, including procurement and contracting services.<br>Discharges to the environment will be recorded and reported through mechanisms such as the National Greenhouse and Energy Reporting Scheme, National Pollutant Inventory and Prescribed Premises Licence (EP Act Part V), where applicable. Prescribed Premises Licence fees are charged based on reported discharges to the environment, which incentivises abating volumes of pollutants discharged.<br>Areas of vegetation clearing will be reported under the *Mining Rehabilitation Fund Act 2012* and a levy is charged based on reported areas and categories of land disturbance. This serves to incentivise progressive clearing and progressive rehabilitation.<br>The full cost to close and rehabilitate the mine following closure of operations has been estimated and will be updated with the Mine Closure Plan. |

| Principle | Consideration |
|---|---|
| **5. The principle of waste minimisation**<br>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment. | Pit dewater is used in operations where possible and otherwise is stored in Blue Hills North or Terapod West open pits. This prevents discharge of dewater into the environment.<br>KML adopted the waste management hierarchy listed below to minimise waste generation and its discharge into the environment:<br>• avoid the use of certain materials if they are difficult to manage<br>• reduce the amount of waste produced<br>• replace the use of difficult to dispose materials with more environmentally acceptable ones<br>• segregate waste for easier management<br>• recover or reuse waste where feasible<br>• recycle waste by processing where possible<br>• dispose of waste in an environmentally responsible manner, where no other options are available. |
| **Description of how the object of the EP Act has been considered.**<br>The object of the Act is to protect the environment of the State, having regard to the above principles. | KML has considered the object of the Act, which is to protect the environment of the state, by having regard to the principles of the EP Act as discussed above. |

# 5.0 Flora and Vegetation

## 5.1 Flora and Vegetation Section Summary

Detailed and targeted flora and vegetation surveys were conducted in 2023 and 2024 (Umwelt, 2025a). Flora and vegetation values in the regional area have been characterised using the Umwelt (2025a) report as well as numerous flora and vegetation assessments that were completed within and in the vicinity of KIOP over the past 20 years. The survey results were assessed originally in the *Flora and Vegetation Impact Assessment – Karara Iron Ore Project – Mine Life Extension September 2025* (Umwelt, 2025b).

Comments received from state and federal regulators on the KIOP ERD submitted in September 2025 recommended that further mitigations should be investigated to avoid and minimise impacts to ecological values. Further mitigations have therefore been applied under the KIOP MLE Mitigated Proposal, to avoid and minimise impacts to significant environmental values, which of relevance to flora and vegetation include the Blue Hills Priority Ecological Community (PEC) and *Lepidosperma* sp. Blue Hills. Potential impacts to these values have been mitigated by removing areas from the KIOP MLE Mitigated Proposal that are not required for new activities and reducing areas for new activities where possible.

An updated impact assessment for potential flora impacts associated with the KIOP MLE Mitigated Proposal has been prepared and is detailed in *Karara Iron Ore Project – Mine Life Extension Environmental Values Updated Impact Assessment* (Umwelt, 2026b). An assessment of the KIOP MLE Mitigated Proposal's survey adequacy and potential residual impacts to flora values is detailed in *Karara Iron Ore Project Mine Life Extension - Review Significance of Residual Impacts* (Umwelt, 2026c). Findings from both these reports are detailed in the below sections, and supersede findings of *Flora and Vegetation Impact Assessment – Karara Iron Ore Project – Mine Life Extension September 2025* (Umwelt, 2025b).

Direct impacts on flora and vegetation, including significant taxa and communities are from clearing. Indirect impacts would be from dust, water or sediment runoff, fragmentation and weeds.

The KIOP MLE Mitigated Proposal has the potential to directly and indirectly impact 13 significant flora taxa, including 12 Priority species and one potentially undescribed entity. The assessment against the residual impact significance model found that residual impacts to three species are potentially significant and may require offsets as proposed impacts would increase to a level that would trigger listing under the International Union for Conservation of Nature (IUCN) criteria:

- *Persoonia pentasticha* (P3)
- *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- *Crassula* sp. nov (undescribed species).

The KIOP MLE Mitigated Proposal has the potential to impact Vegetation Type (VT) of significance (VT O) due to the high cumulative impact to this community at a regional scale. The Proposal would also impact the 'Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)' community (89 ha directly and 17 ha indirectly), however the residual impact to this priority ecological community (PEC) is not significant.

KML will continue to implement the avoidance and minimisation measures for the approved proposals as required under implementation conditions for MS 805 and MS 806. The disturbance footprint would not directly impact any known locations of threatened flora species, as all threatened flora within the Combined Proposal DE will be avoided. Potential impacts to flora and vegetation will be minimised and rehabilitated in accordance with existing KML management system documents. The KIOP MLE Offset Strategy will be updated to consider offsets for residual impacts.

## 5.2 EPA Objective

The EPA objective of the factor Flora and Vegetation is *'To protect flora and vegetation so that biological diversity and ecological integrity are maintained'* (EPA, 2016b).

In the context of this objective, ecological integrity is the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements (EPA, 2016b).

## 5.3 Policy and Guidance

**Table 5.1** lists how the policy and guidance relevant to flora and vegetation has been considered in the assessment of this factor.

**Table 5.1 Policy and Guidance Relevant to Flora and Vegetation**

| Policy and Guidance | How the Policy and Guidance has been Considered |
|---|---|
| *Environmental Factor Guideline: Flora and Vegetation* (EPA, 2016a) | • Applied the relevant considerations for environmental impact assessment.<br>• Identified the values of flora and vegetation and their significance.<br>• Identified activities that could impact flora and vegetation. |
| *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016g) | Supporting studies were undertaken in accordance with this guidance. |
| *WA Environmental Offsets Policy* (Government of Western Australia, 2011)<br>*WA Environmental Offsets Guidelines* (Government of Western Australia, 2014) | • Applied mitigation measures to avoid, minimise and rehabilitate impacts from the KIOP MLE Mitigated Proposal.<br>• Identified and quantified significant residual impacts to values.<br>• Assessed the significant residual impacts to determine whether offsets are required. |
| *Matters of National Environmental Significant - Significant impact guidelines 1.1* (DoE, 2013) | • Assessed whether the KIOP MLE Mitigated Proposal would have a significant impact on flora and vegetation MNES. |
| *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)* (EPA, 2021) | Biodiversity survey data used for this environmental impact assessment, specifically Umwelt (2025a), has been packaged for KML to submit to the IBSA portal. |

## 5.4 Supporting Studies

### 5.4.1 Project-Specific Studies

In 2023 and 2024, Umwelt conducted detailed and targeted surveys to inform the environmental impact assessment for flora and vegetation, with the findings presented in *2023 and 2024 Detailed and Targeted Flora and Vegetation Assessment – Karara Iron Ore Project Mine Life Extension August 2025* (Umwelt, 2025a) (**Appendix 5-1**).

The surveys were completed as 'detailed' and 'targeted' surveys, as the Survey Area is likely to support a high diversity of flora and vegetation, may comprise restricted landforms or vegetation types, and is known to support significant flora and vegetation.

The survey results were assessed originally in the *Flora and Vegetation Impact Assessment – Karara Iron Ore Project – Mine Life Extension September 2025* (Umwelt, 2025b) (**Appendix 5-2**). An updated impact assessment for potential flora impacts associated with the KIOP MLE Mitigated Proposal is provided in *Karara Iron Ore Project – Mine Life Extension Environmental Values Updated Impact Assessment* (Umwelt, 2026b) (**Appendix 5-3**). An assessment of the KIOP MLE Mitigated Proposal's survey adequacy and significance of residual impacts to flora values is detailed in *Karara Iron Ore Project Mine Life Extension - Review Significance of Residual Impacts* (Umwelt, 2026c) (**Appendix 5- 4**).

Details of the surveys are provided in section 2.1 of (Umwelt, 2025a) and summarised in **Table 5.2**. The Survey Area covered the Combined Proposal Development Envelope. As the disturbance footprint has been reduced to include disturbance only at the Mine Area,

**Figure 5.1** focuses on the survey effort at the Mine Area, including historic survey sites. Full details of the survey effort across the Survey Area are provided in (Umwelt, 2025a).

**Table 5.2 Summary of Umwelt Surveys**

| Reference | Study Timing | Study Area | Study Methods and Effort | Survey Description |
|---|---|---|---|---|
| *2023 and 2024 Detailed and Targeted Flora and Vegetation Assessment* (Umwelt, 2025a) (**Appendix 5-1**) | **Detailed survey:**<br>• 2–7 Oct 2023<br>• 6–12 Aug 2024<br>• 21–27 Aug 2024<br>• 16–22 Sep 2024<br>**Targeted survey:**<br>• 21–28 Aug 2024<br>• 16–20 Sep 2024 | Covered 13,557 ha, comprising four major areas:<br>• Karara Area<br>• Yandanooka Pipeline<br>• Tilley Siding<br>• Borefield Corridor. | • Literature review and database searches<br>• Field survey over 60 team days<br>• 259 quadrats (20 m x 20 m)<br>• 349 relevé sites. | Detailed survey across the development envelope, focussing on previously unsurveyed or under-surveyed areas.<br>Targeted survey over the full extent of the KIOP MLE new disturbance footprint. |

The Survey Area covered 13,557 ha, with 259 quadrats established by the current survey or relevant previous assessments. Where possible, quadrats were established in all preliminary vegetation patterns, both to adequately sample variation in vegetation throughout the study area, and to ensure adequacy of sampling for vascular plant taxa.

The number of quadrats established in the Survey Area was 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 vegetation types (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 Survey Area was well sampled (Umwelt, 2025a).

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MUNGADA RD

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Minor Road
- Detailed Survey Track Logs – 2023
- Detailed Survey Track Logs – 2024
- Targeted Survey Track Logs – 2024

**Observations – 2023/2024**

- Quadrat
- Relevé
- Vegetation Mapping Note

**Observations – 2020**

- Quadrat
- Vegetation Mapping Note

**Observations – Historic**

- Quadrat
- Relevé

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

# FIGURE 5.1
Flora and Vegetation Survey Effort – Mine Area

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0 1.6 3.2 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

### 5.4.2 Other Relevant Surveys

The assessment of flora and vegetation values in the regional area was supported by numerous flora and vegetation assessments that have been completed within and in the vicinity of KIOP over the past 20 years. The assessments included reconnaissance, detailed and targeted surveys conducted wholly or partially within the Survey Area and in the surrounding area. A list of these surveys is provided in Tables 2.1 and 2.2 of Umwelt (2025b).

These surveys and datasets contributed to a consolidated dataset that was used to calculate potential impacts of the Proposal to environmental values. The cumulative impact assessment (see **Section 5.10.3**) considered the results from these relevant surveys.

## 5.5 Impact Assessment Areas

Multiple areas have been defined to conduct this impact assessment to determine potential direct, indirect and cumulative impacts to vascular flora and vegetation. These areas are described in detail in Section 1.3 of Umwelt(2026b) and are summarised below.

Note that all area calculations have been updated using geodesic methodology (rather than planar) to produce accurate and constant data, which means some of the original areas are not the same calculated area as the previous Proposal Content Document.

**Survey Area –** an area demarcated by the Combined Proposal DE (September 2025).

**Combined Proposal mitigated DE -** supersedes the Combined Proposal DE and includes the mitigation strategies described in Section 2.0 of *Environmental Values Updated Impact Assessment - Karara Iron Ore Project – Mine Life Extension February 2026* (Umwelt, 2026b).

**Currently Cleared or Approved to be Cleared (CCAC) -** areas of current or approved ground disturbance to the extent of the CAA 1 boundary.

KIOP MLE mitigated disturbance footprint – see **Section 1.2**.

Combined Proposal mitigated DF - see **Section 1.2**.

**mitigated indirect impact zone -** supersedes the indirect impact zone and includes the mitigation strategies described in Section 2.0 of - *Karara Iron Ore Project Mine Life Extension – Environmental Values Updated Impact Assessment* (Umwelt, 2026b).

**Cumulative Assessment Area 1 (CAA 1) -** Defined for the Terrestrial Fauna Impact Assessment (Umwelt, 2025d) cumulative impact assessment of the Mine Area and represents a 15 km buffer on the Mine Area (Section 1.2 [BCE, 2025]). CAA 1 was the area defined for regional assessment of terrestrial fauna for the Mine Area. In this report, the portion of CAA 1 used for regional assessment is smaller and does not take into account the buffer previously applied around Syncline Turner haul road (**Figure 6.3**).

## 5.6 Receiving Environment – Vegetation

### 5.6.1 Regional Vegetation

The mining area of the Survey Area (Umwelt, 2025a) is located within the IBRA Tallering subregion of the Yalgoo bioregion.

The Survey Area also traverses the Merredin and Lesueur Sandplain IBRA subregions located within the Avon Wheatbelt and Geraldton Sandplains IBRA bioregions, respectively, although no disturbance is proposed in these areas.

The Survey Area intersects 27 pre-European vegetation system associations (PEVSAs) of the broad vegetation mapping prepared by Beard et al. (2013). Table 3.5 of Umwelt 2025 identifies the current extents of the PEVSAs and the extents within the Combined Proposal DE.

### 5.6.2 Vegetation Condition and Type

The condition of the vegetation within the Survey Area was mapped by Umwelt (2025a) in accordance with 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 2016g). 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.

Vegetation in the study area was mostly in Excellent condition. The condition of the vegetation within the study area is shown in **Table 5.3**.

**Table 5.3 Condition of Vegetation within the Survey Area**

| 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 (2025a).

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

A total of 38 VTs were mapped within the Survey Area (**Figure 5.2**). These are described in further detail in Table 3.6 of Umwelt 2025.

Of the 38 VTs of the Survey Area, 16 were considered by Umwelt (2025a) to be potentially significant as per the EPA guidance (2016a, 2016g) definitions of 'significant vegetation' (**Table 5.4**).
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 5.4 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** | - | - | - | - | VT as a whole is not considered significant |
| **B** | Yes | Yes | Yes | Yes (2) | Significant for reasons other than formal listing |
| **C** | - | - | - | - | Not considered significant |
| **D** | - | - | - | - | Not considered significant |
| **E** | - | - | - | - | Not considered significant |
| **F** | - | - | - | - | Not considered significant |
| **G** | - | - | - | - | VT as a whole is not considered significant |
| **H** | - | - | - | - | Not considered significant |
| **I** | - | - | - | - | Not considered significant |
| **J** | Yes | Yes | Yes | - | Significant for reasons other than formal listing |
| **K** | - | - | - | - | Not considered significant |
| **L** | - | - | - | - | Not considered significant |
| **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** | - | - | - | - | VT as a whole is not considered significant |
| **S** | - | - | - | - | Not considered significant |
| **T** | - | - | - | - | Not considered significant |
| **U** | Yes | Yes | Yes | - | Significant for reasons other than formal listing |
| **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 |

| VT | Restricted Distribution or Habitat | Plays a Role as a Refuge or Refugium | Provides Important Ecological Function | Other Reasons | Overall Outcome |
|---|---|---|---|---|---|
| **Z** | Yes | Yes | - | - | Significant for reasons other than formal listing |
| **AA** | Yes | Yes | - | - | Significant for reasons other than formal listing |
| **HMVT A** | Yes | - | Unlikely | - | Mapped across a limited extent, but the condition of the vegetation is too poor for it to be considered significant |
| **HMVT B** | Yes | - | - | - | Mapped across a limited extent, but the condition of the vegetation is too poor for it to be considered significant |
| **HMVT C** | Yes | - | - | - | Mapped across a limited extent, but the condition of the vegetation is too poor for it to be considered significant |
| **HMVT D** | Yes | Yes | - | - | Significant for reasons other than formal listing |
| **HMVT E** | Yes | - | - | - | Mapped across a limited extent, but the condition of the vegetation is too poor for it to be considered significant |
| **HMVT F** | Yes | - | - | - | Mapped across a limited extent, but the condition of the vegetation is too poor for it to be considered significant |
| **HMVT G** | Yes | - | - | - | Mapped across a limited extent, but the condition of the vegetation is too poor for it to be considered significant |
| **CP** | Yes | Unlikely | Yes | - | Significant for reasons other than formal listing |

Source: Umwelt (2025a).

### 5.6.3 Significant Vegetation

Four listed vegetation communities have been recorded within the Survey Area:

- 'Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)' community – listed as a P1 PEC under the BC Act. This community is referred to as the Blue Hills PEC in this ERD.
- 'Eucalypt woodlands of the Western Australian Wheatbelt' community – listed as a P3 PEC under the BC Act and as a Critically Endangered TEC under the EPBC Act.
- 'Koolanooka System as originally described in Beard (1976)' community – listed as a Critically Endangered TEC under the BC Act.

- ‘Plant assemblages of the Billeranga System as originally described in Beard (1976)’ community – listed as a Critically Endangered TEC under the BC Act.

These four communities are described in section 3.3.3 of Umwelt 2025 and summarised in **Table 5.5** and **Figure 5.3** of this ERD. The figure shows both the Blue Hills PEC boundary as applied in the regional impact assessment for Mungada East Expansion Project (Maia Environmental Consultancy, 2017) and the Blue Hills PEC boundary as mapped by DBCA (excluding 500 m buffer).

### 5.6.4 Surface Water Dependent Vegetation

A total of 16 VTs were identified by Umwelt (2025a) 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, 2025a).

### 5.6.5 Groundwater Dependent Vegetation

Three VTs were identified by Umwelt (2025a) 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, 2025a).

**Table 5.5 Summary of Listed Vegetation Communities of the Survey Area**

| Community | Status WA | Status EPBC | DBCA Description | Extent in Survey Area (ha) | Condition | Location | 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 |

| Community | Status WA | Status EPBC | DBCA Description | Extent in Survey Area (ha) | Condition | Location | Mine Area | Wheatbelt Area |
|---|---|---|---|---|---|---|---|---|
| **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 (2025a).

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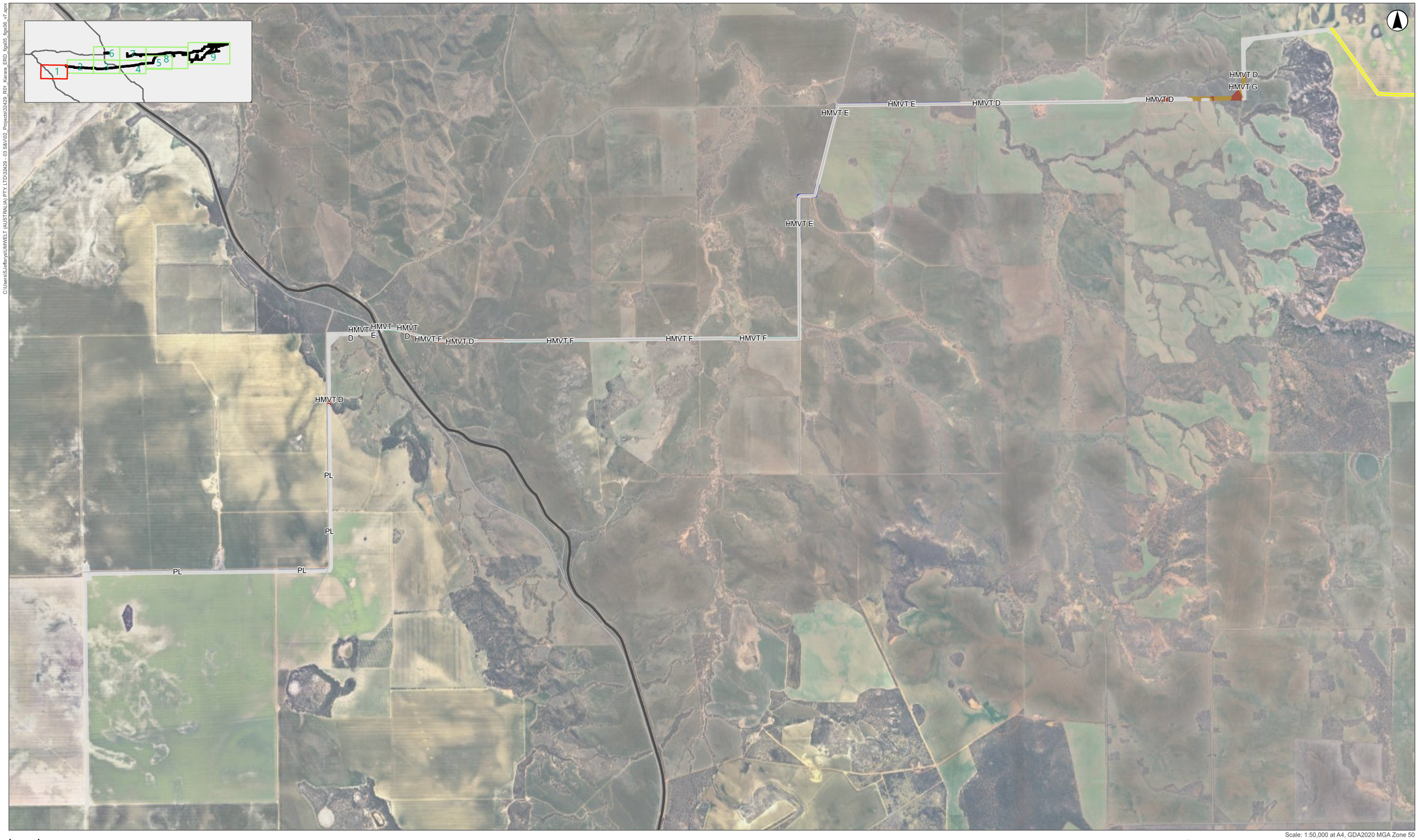


**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Vegetation Type**

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

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

**FIGURE 5.2**
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 1

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0 1 2 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

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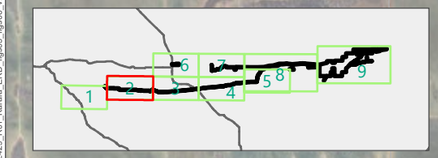


AA

HMVT G

N L

N L

N L

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Major Watercourse

**Vegetation Type**

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

# FIGURE 5.2
## Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 2

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0 1 2 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

umwelt

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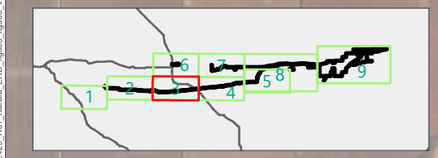


MULLEWA-WUBIN RD

HMVT B

HMVT A

PL

HMVT C

N L I L N L N L N L L N L I G I G L

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Vegetation Type**

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

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

## FIGURE 5.2
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 3

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0 1 2 km

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Vegetation Type**

- G
- HMVT A
- PL
- CL

**FIGURE 5.2**
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 4

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0 1 2 km

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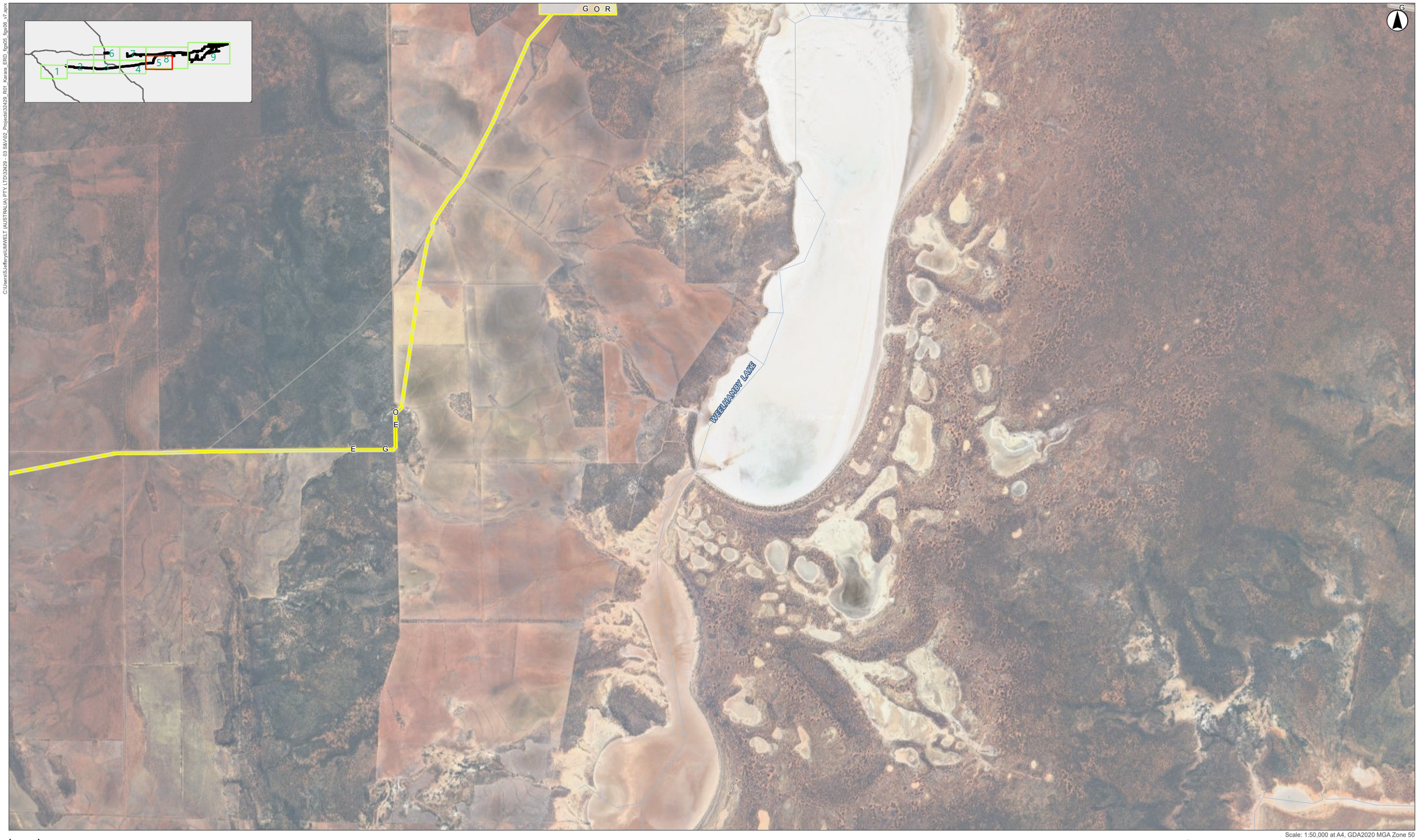


**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Major Watercourse

**Vegetation Type**

- E
- G
- O
- R
- CL

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

**FIGURE 5.2**
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 5

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0 1 2 km

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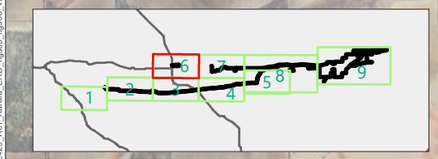


L
L
L
Q
L
L
G
L
G
L

MORAWA

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Vegetation Type**

- G
- L
- Q
- CL

# FIGURE 5.2
## Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 6

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0 1 2 km

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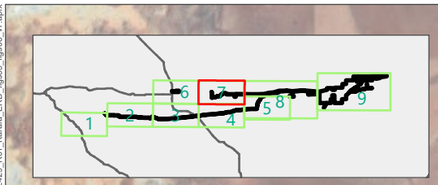




**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Major Watercourse

**Vegetation Type**

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

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

# FIGURE 5.2

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

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0 1 2 km

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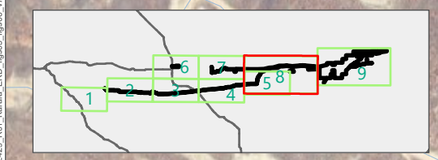


MUNGADA RD

WEELHAMBY LAKE

Water

## Legend

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Major Watercourse

**Vegetation Type**

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

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

# FIGURE 5.2

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

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0 1.6 3.2 km

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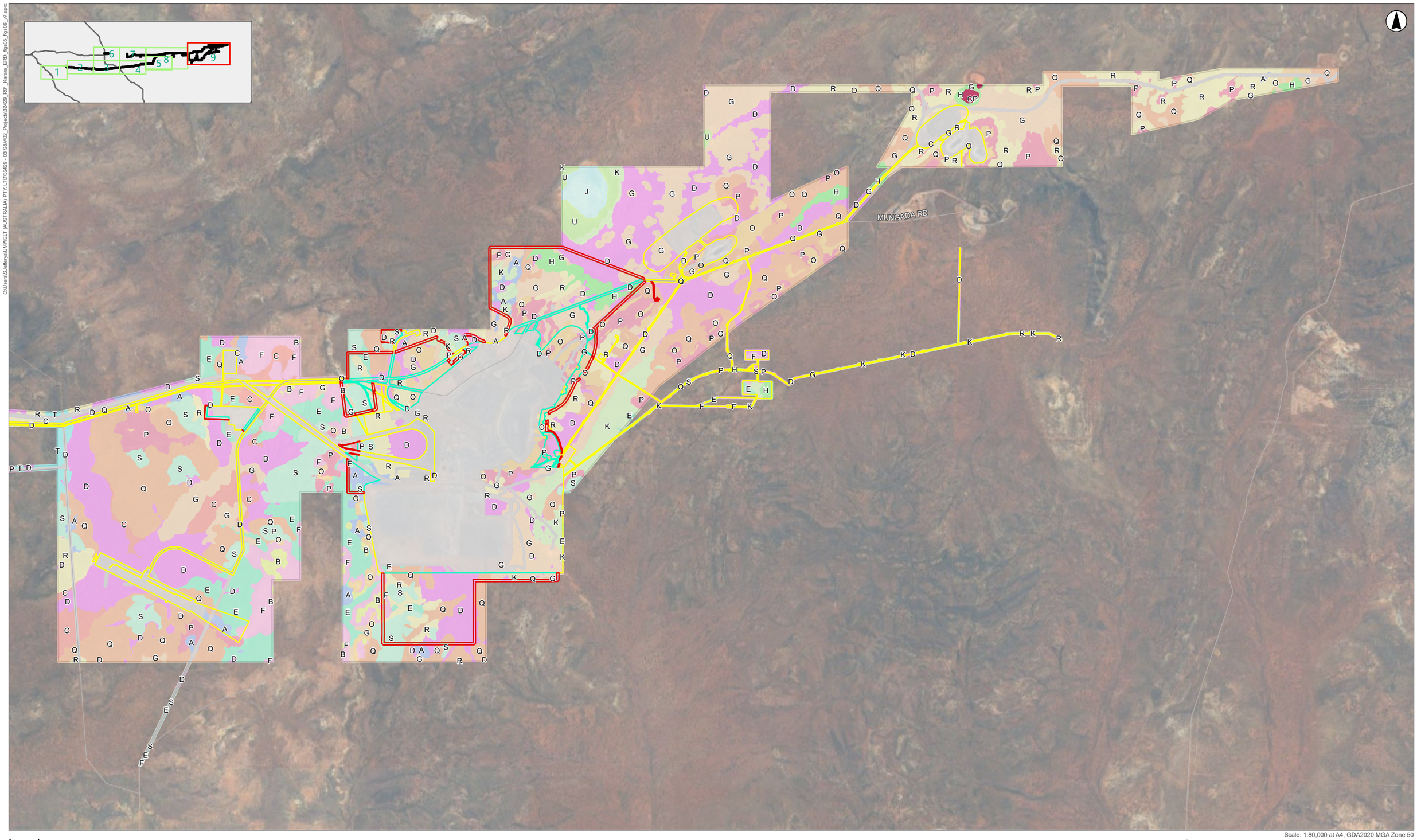


**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road

**Vegetation Type**

A, B, C, D, E, F, G, H, J, K, O, P, Q, R, S, T, U, CP, CL

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

**FIGURE 5.2**
Overview of Vegetation Types of the Combined Proposal Development Envelope – Sheet 9

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0 1.6 3.2 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

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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 5.2**
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 5.2**
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 5.2**
LEGEND: Overview of Vegetation Types of the Combined Proposal Development Envelope

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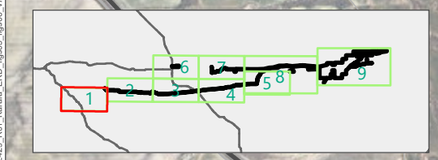


**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Significant Vegetation**

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

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

# FIGURE 5.3
Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 1

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Major Watercourse

**Significant Vegetation**

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

# FIGURE 5.3
## Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 2

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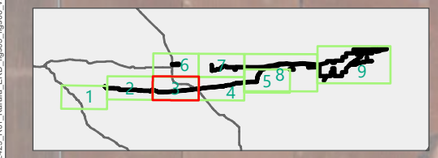


MULLEWA-WUBIN RD

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

# FIGURE 5.3

Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 3

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

# FIGURE 5.3
Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 4

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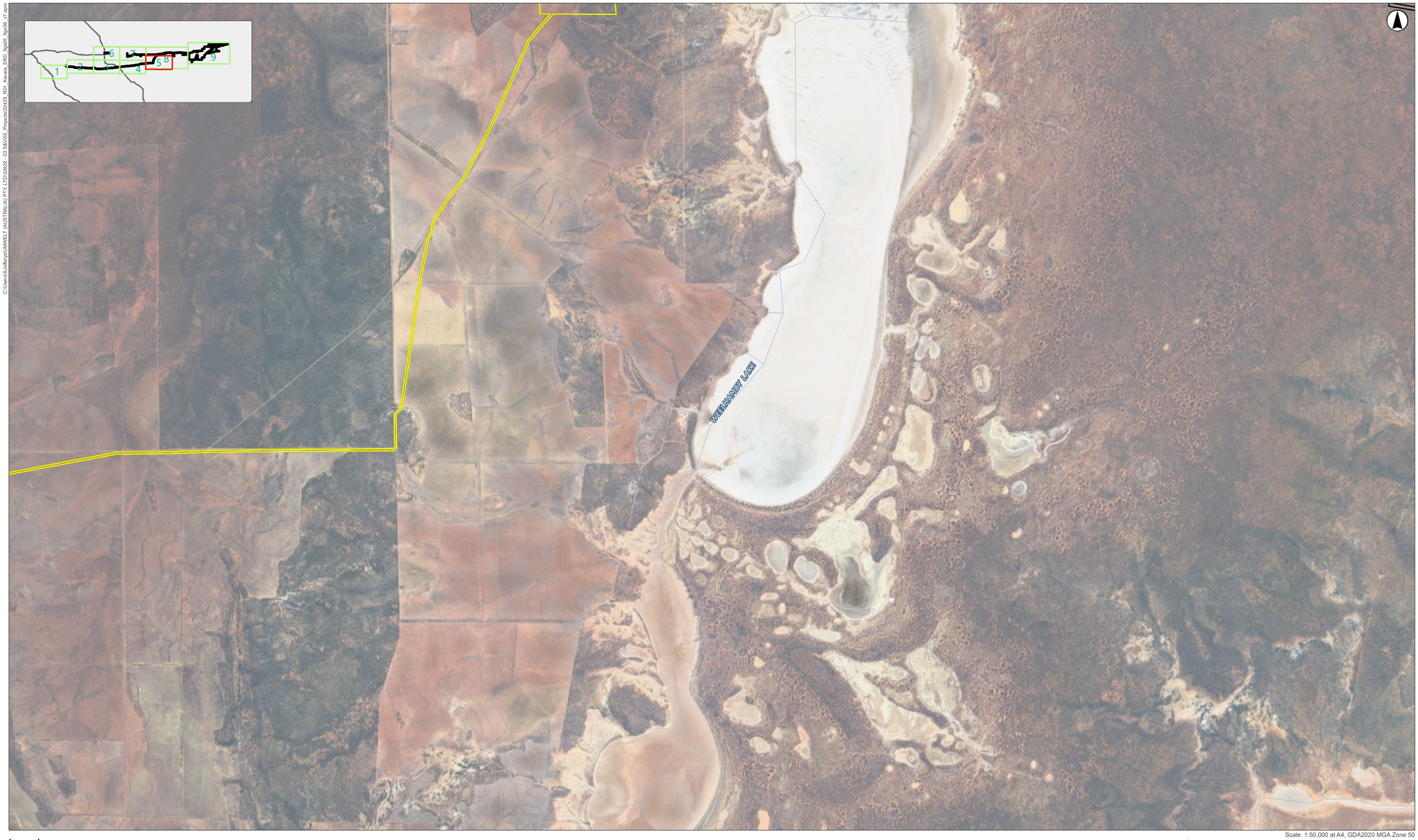


Scale: 1:50,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Major Watercourse

## FIGURE 5.3

Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 5

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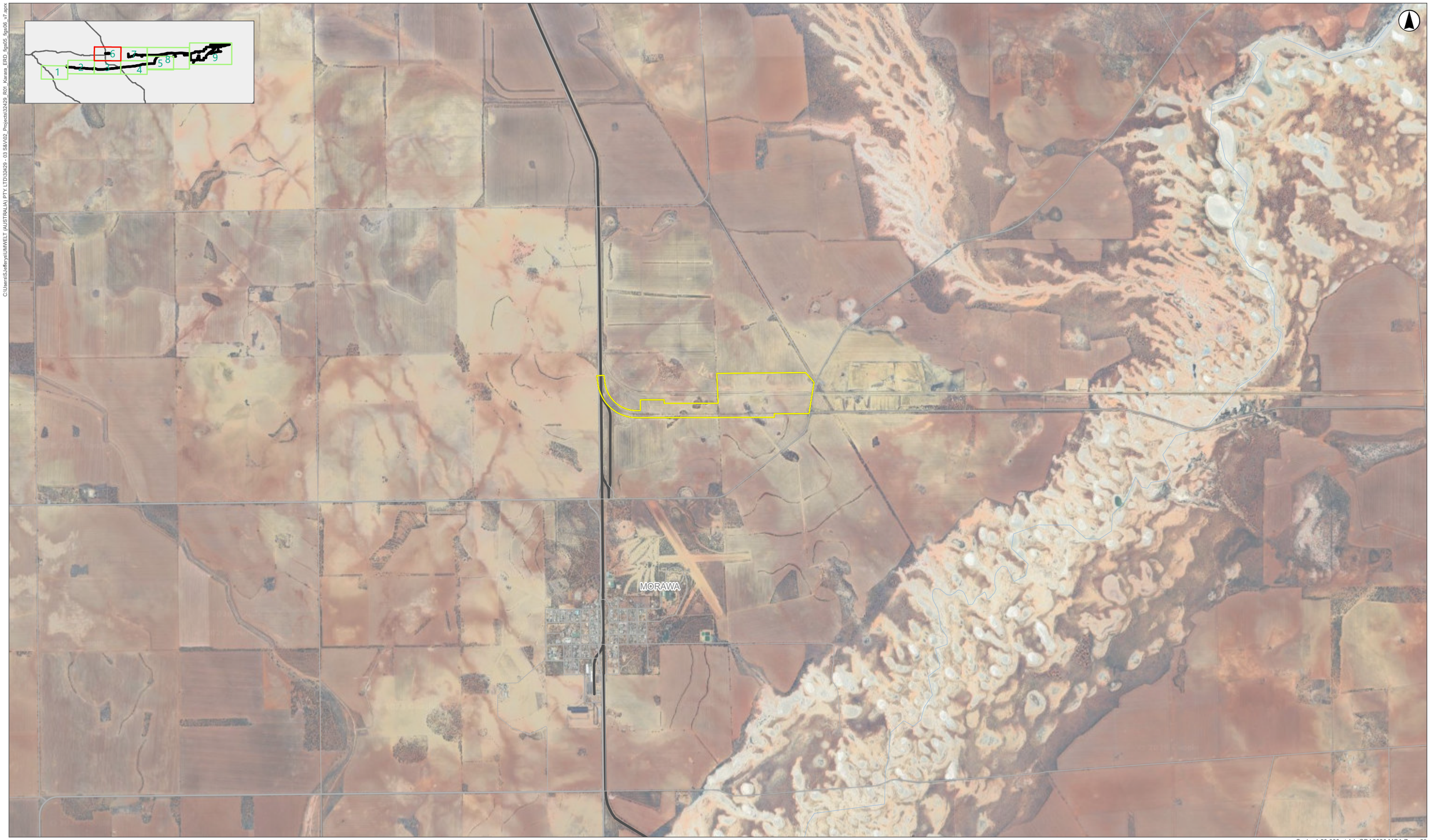


Scale: 1:50,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

## FIGURE 5.3

Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 6

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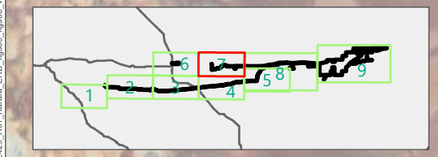


**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Major Watercourse

**Significant Vegetation**

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

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

# FIGURE 5.3
## Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 7

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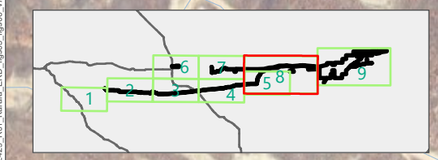


MUNGADA RD

WEELHAMBY LAKE

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Major Watercourse

## FIGURE 5.3

Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 8

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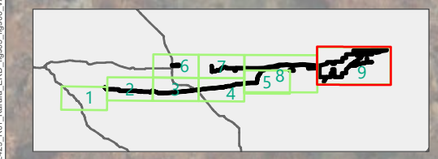


MUNGADA RD

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Blue Hills Banded Iron Formation PEC (P1) (DBCA mapped minus 500m buffer)

**Significant Vegetation**

- Blue Hills PEC boundary as applied in the regional impact assessment for Mungada East Expansion Project (Maia Environmental Consultancy, 2017) (WA – P1)

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

**FIGURE 5.3**

Listed Significant Vegetation of the Combined Proposal Development Envelope – Sheet 9

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**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

## 5.7 Receiving Environment – Flora

### 5.7.1 Flora Census

A total of 497 vascular plant taxa have been recorded within the Survey Area, representing 75 families and 286 genera (Umwelt, 2025a). 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.

### 5.7.2 Significant Flora

A discussion of the potential conservation significance of the flora recorded in the Survey Area was conducted as part of the flora and vegetation assessment (Umwelt, 2025a). EPA (2016a) outlines reasons for considering certain flora as significant. The following types of significant flora were recorded:

- listed protected flora, i.e. identified as Threatened species under the BC Act and/or EPBC Act
- Priority flora listed by DBCA
- new species or those with anomalous features that indicate a potential new species.

A total of 41 significant flora taxa have been recorded within the Survey Area (Umwelt, 2025a). The locations of significant flora recorded in the Survey Area are shown in **Figure 5.4** (Threatened, Priority 1 and Priority 2 flora) and **Figure 5.5** (Priority 3, Priority 4 and potentially undescribed flora).

A summary of abundance information for the 41 significant flora taxa of the Survey Area is presented in **Table 5.6**. 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.

#### 5.7.2.1 Threatened Flora

The Umwelt (2025a) survey and previous flora and vegetation surveys have recorded four threatened taxa listed under the BC Act and/or EPBC Act within the Survey Area (**Table 5.6**):

- *Acacia woodmaniorum* (BC Act: Endangered; EPBC: Endangered)
- *Eucalyptus synandra* (BC Act: Vulnerable; EPBC: Vulnerable)
- *Seringia exastia* (EPBC: Critically Endangered)
- *Stylidium scintillans* (BC Act: Vulnerable).

#### 5.7.2.2 Priority Flora

The Umwelt (2025a) assessment and previous flora and vegetation assessments have recorded 33 DBCA-classified Priority flora taxa within the Survey Area (**Table 5.6**).

#### 5.7.2.3 Potentially Undescribed Taxa

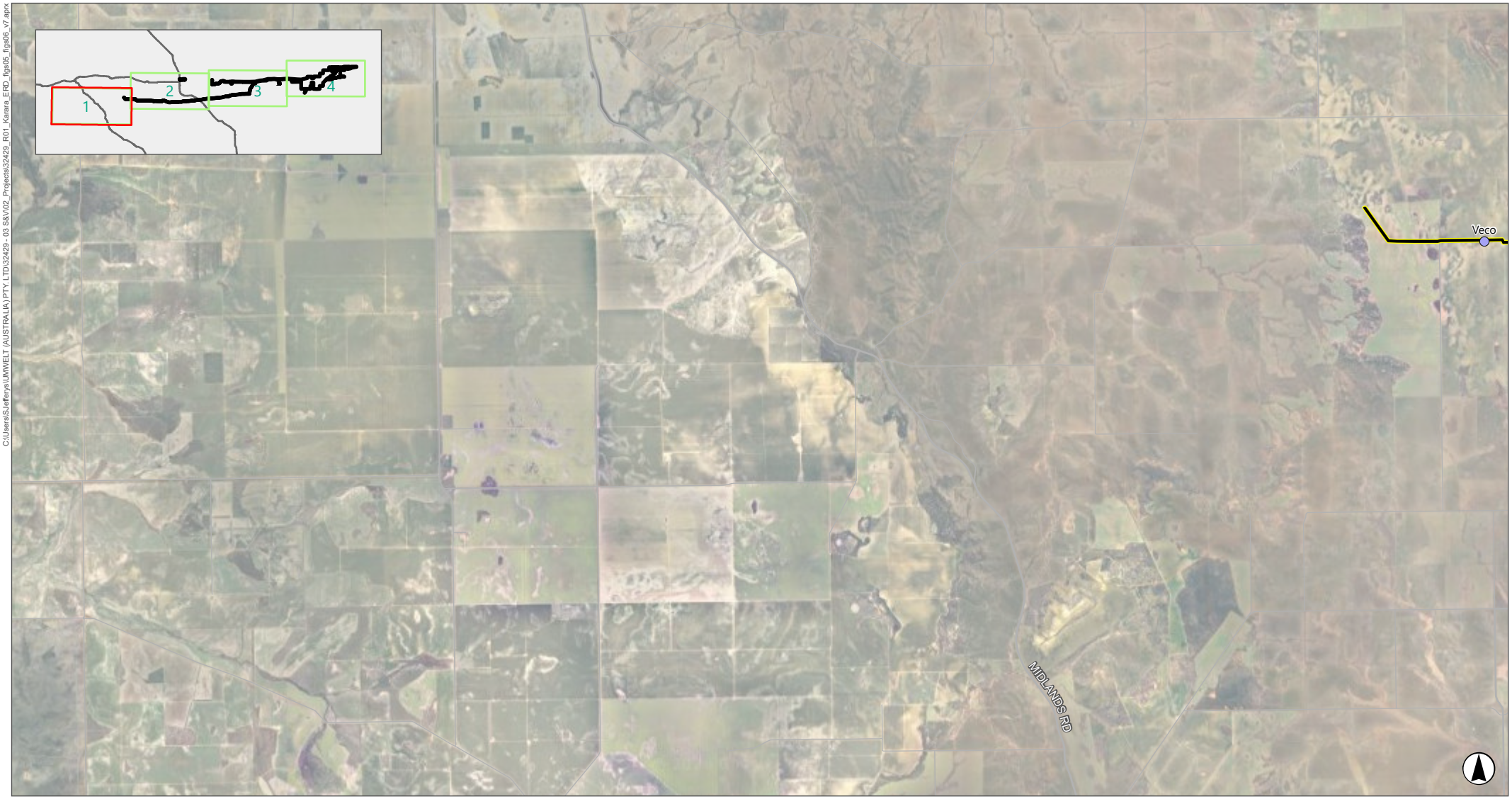
The Umwelt (2025a) assessment and previous flora and vegetation assessments have recorded four potentially undescribed entities in the Survey Area (**Table 5.6**). Given a lack of data for these entities, the total distribution and abundance of the potential new taxa in the region are not known:

- *Crassula* sp. nov.
- *Hemigenia* sp. aff. *botryphylla*
- *Tecticornia* sp. 'Karara 1'
- *Tecticornia* sp. 'Karara 2'.

### 5.7.3 Introduced Flora

The Umwelt 2025a assessment and previous flora and vegetation assessments have recorded a total of 64 introduced flora taxa within the Survey Area (**Table 5.6**). No introduced flora taxa listed as weeds of national significance have been recorded, but two taxa are listed as declared pests under the WA *Biosecurity and Agriculture Management Act 2007:*

- Paterson's Curse (*Echium plantagineum*)
- Goosegrass (*Galium aparine*).




Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Main Road
- Minor Road

**Significant Flora Taxa**

- Veco *Verticordia comosa* (P1)

# FIGURE 5.4

Significant Flora Taxa of the Survey Area (T, P1, P2) – Sheet 1

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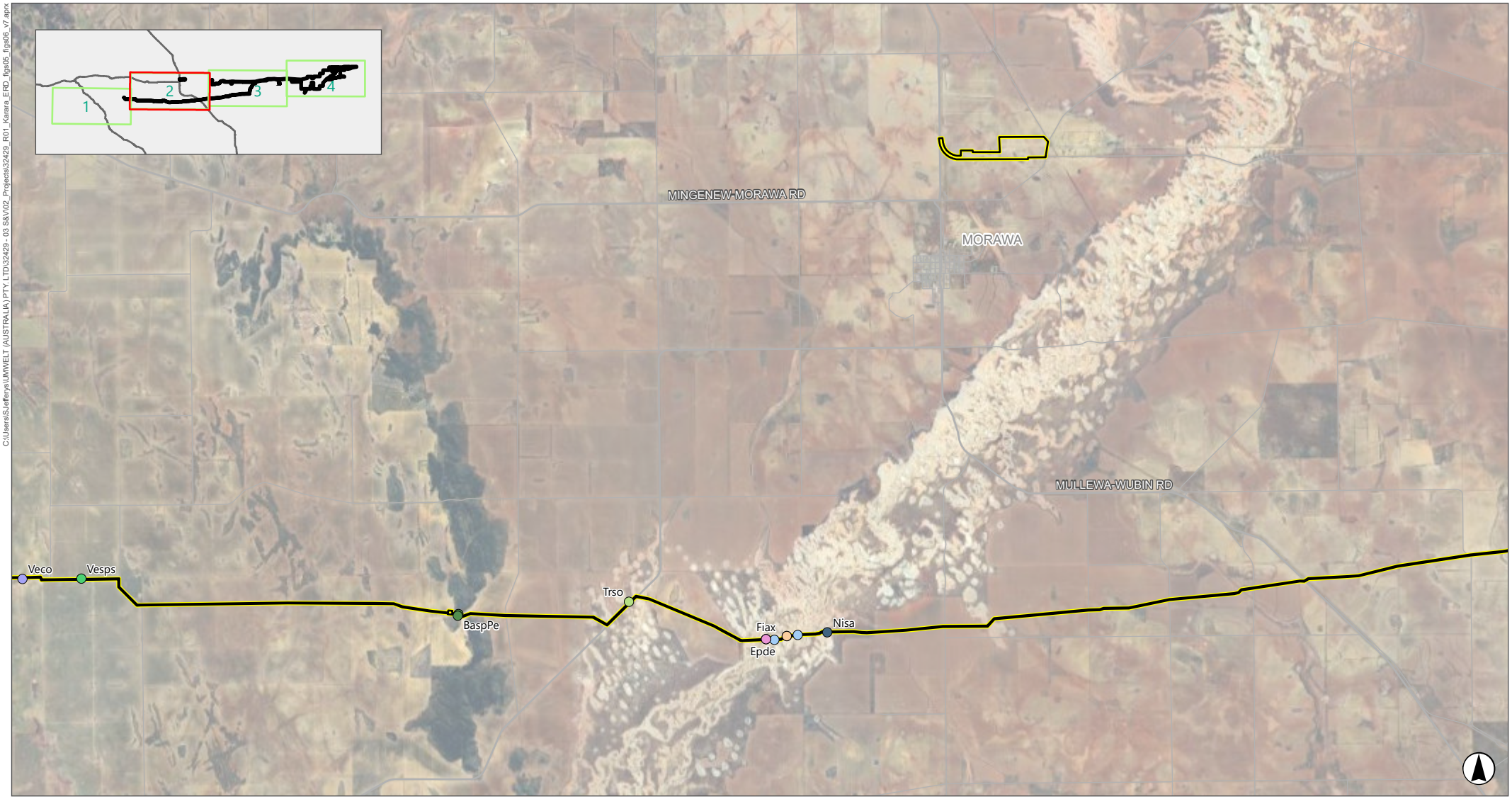


Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Main Road
- Minor Road

**Significant Flora Taxa**

- BaspPe *Baeckea* sp. Perenjori (J.W. Green 1516) (P2)
- Epde *Epitriche demissus* (P2)
- Fiax *Fitzwillia axilliflora* (P2)
- Gnse *Gnephosis setifera* (P1)
- Nisa *Nicotiana salina* (P1)
- Trso *Tricoryne soullierae* (P1)
- Veco *Verticordia comosa* (P1)
- Vesps *Verticordia spicata* subsp. *squamosa* (T)

## FIGURE 5.4

Significant Flora Taxa of the Survey Area (T, P1, P2) – Sheet 2

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Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Minor Road

**Significant Flora Taxa**

- BaspPe *Baeckea* sp. Perenjori (J.W. Green 1516) (P2)
- CaspKH *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- Gnse *Gnephosis setifera* (P1)
- LespBH *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)
- Swpi *Swainsona picta* (P1)

# FIGURE 5.4

## Significant Flora Taxa of the Survey Area (T, P1, P2) – Sheet 3

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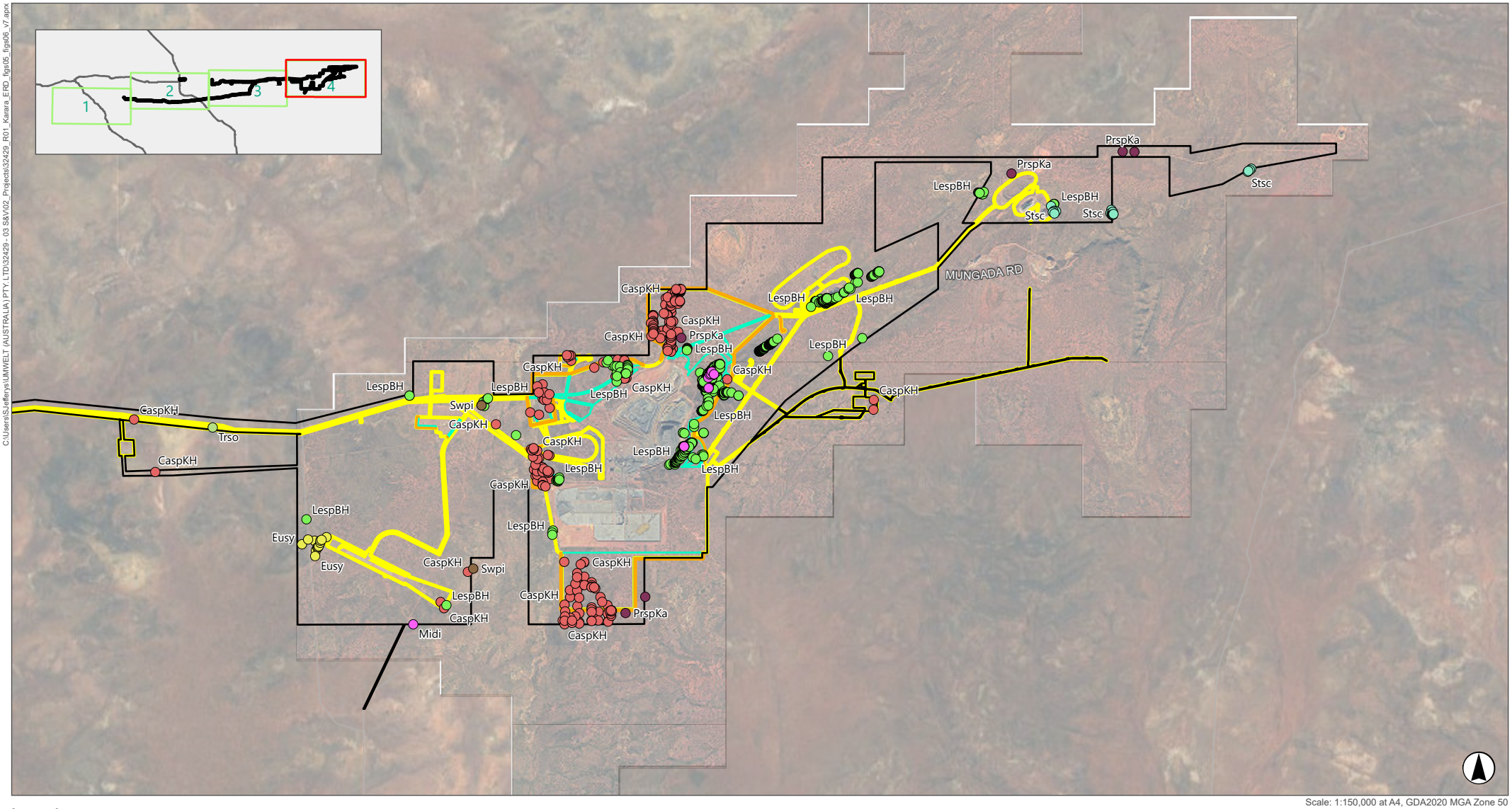


Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- 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)
- Trso *Tricoryne soulliereae* (P1)

# FIGURE 5.4
## Significant Flora Taxa of the Survey Area (T, P1, P2) – Sheet 4

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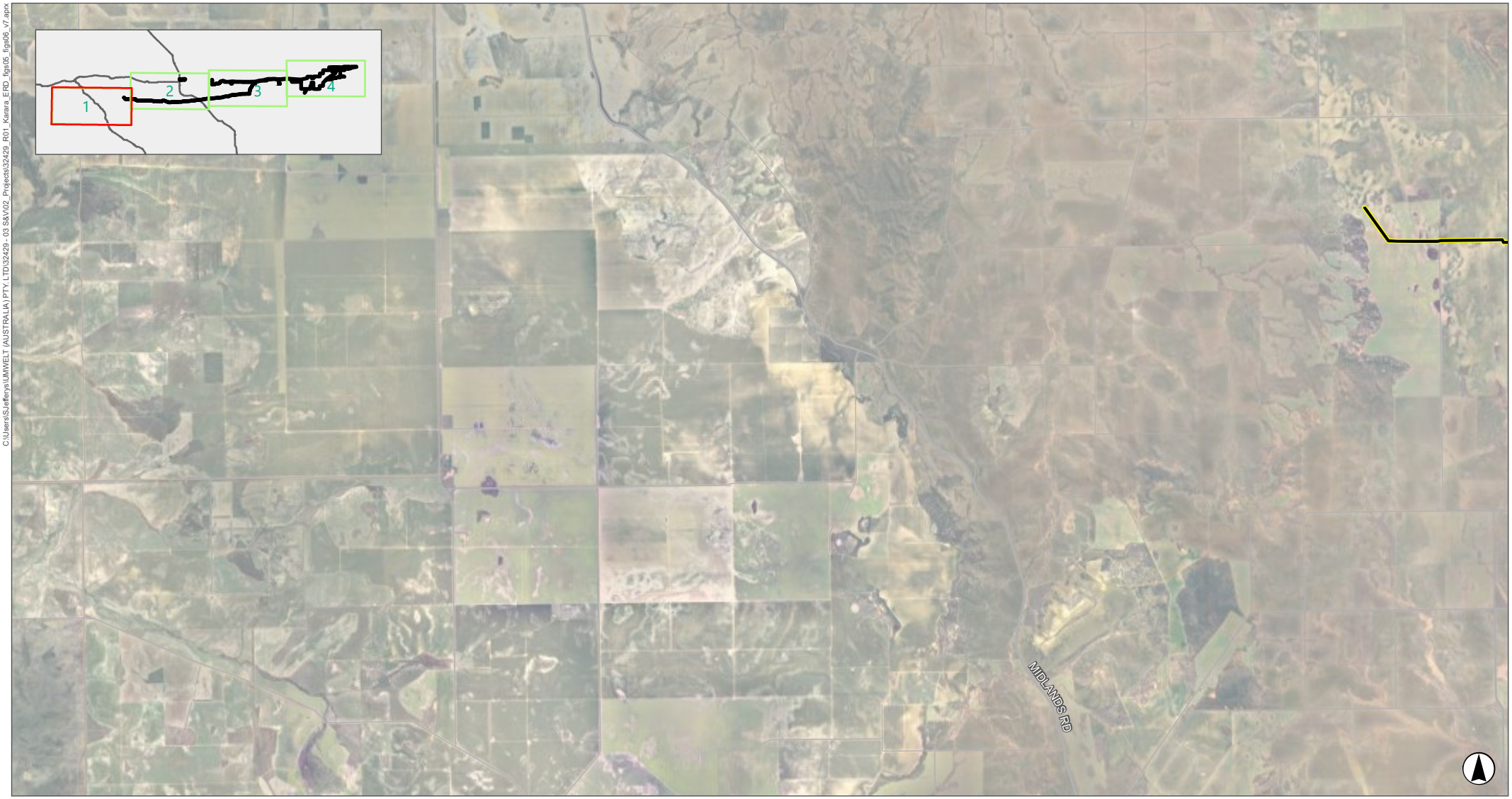


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Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Main Road
- Minor Road

# FIGURE 5.5

Significant Flora Taxa of the Survey Area (P3, P4, PU, CR) – Sheet 1

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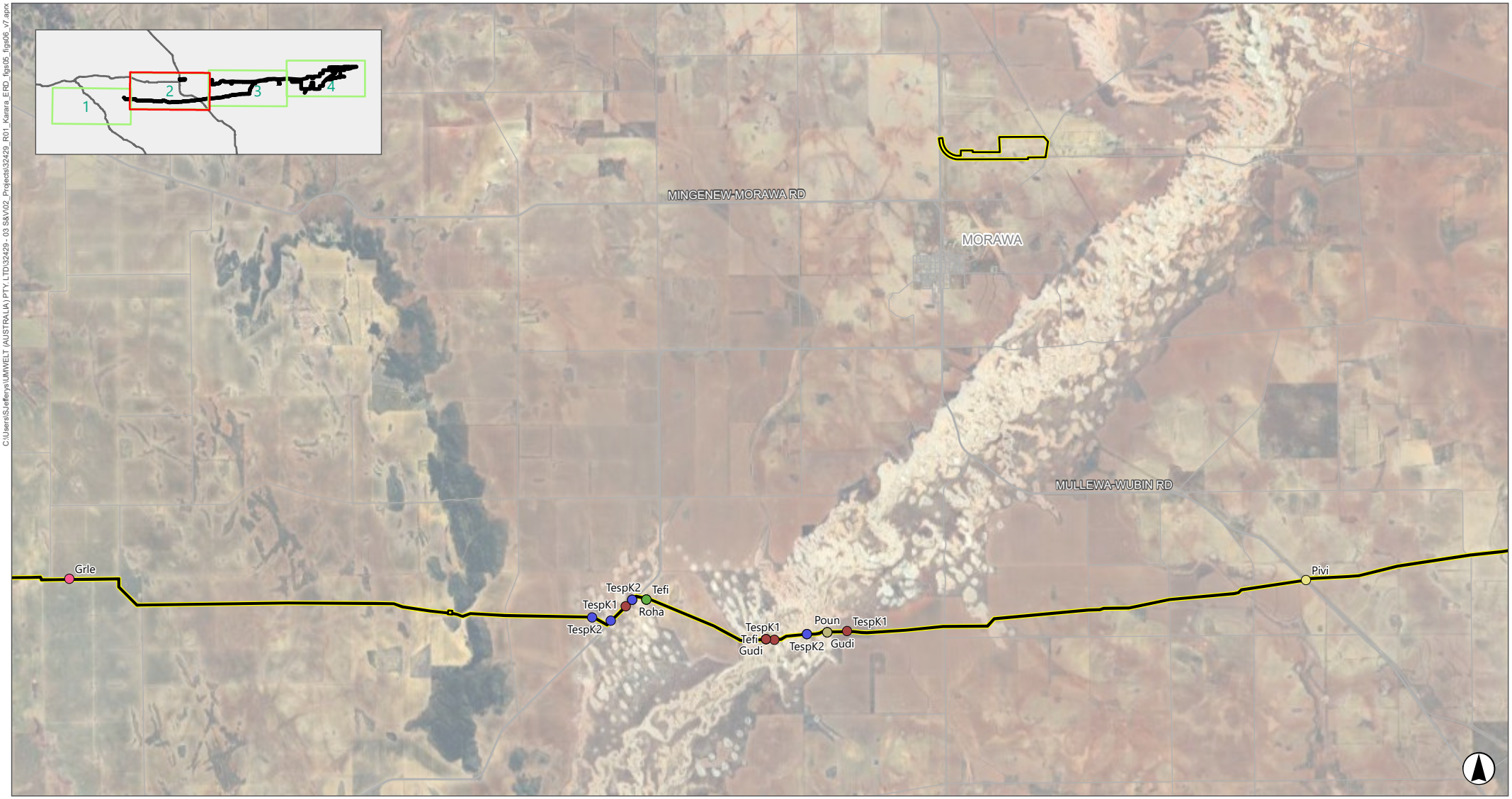


Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Main Road
- Minor Road

**Significant Flora Taxa**

- Grle *Grevillea leptopoda* (P3)
- Gudi *Gunniopsis divisa* (P3)
- Pivi *Pityrodia viscida* (P4)
- Poun *Podotheca uniseta* (P3)
- Roha *Roebuckiella halophila* (P3)
- Tefi *Tecticornia fimbriata* (P3)
- TespK1 *Tecticornia* sp. 'Karara 1' (PU)
- TespK2 *Tecticornia* sp. 'Karara 2' (PU)

# FIGURE 5.5

## Significant Flora Taxa of the Survey Area (P3, P4, PU, CR) – Sheet 2

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Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Minor Road

**Significant Flora Taxa**

- Grgr *Grevillea granulosa* (P3)
- Hebo *Hemigenia* sp. aff. *botryphylla* (Pot)
- Meba *Melaleuca barlowii* (P3)
- Medr *Menkea draboides* (P3)
- Pepe *Persoonia pentasticha* (P3)
- Roha *Roebuckiella halophila* (P3)
- TespK2 *Tecticornia* sp. 'Karara 2' (PU)

**FIGURE 5.5**

Significant Flora Taxa of the Survey Area (P3, P4, PU, CR) – Sheet 3

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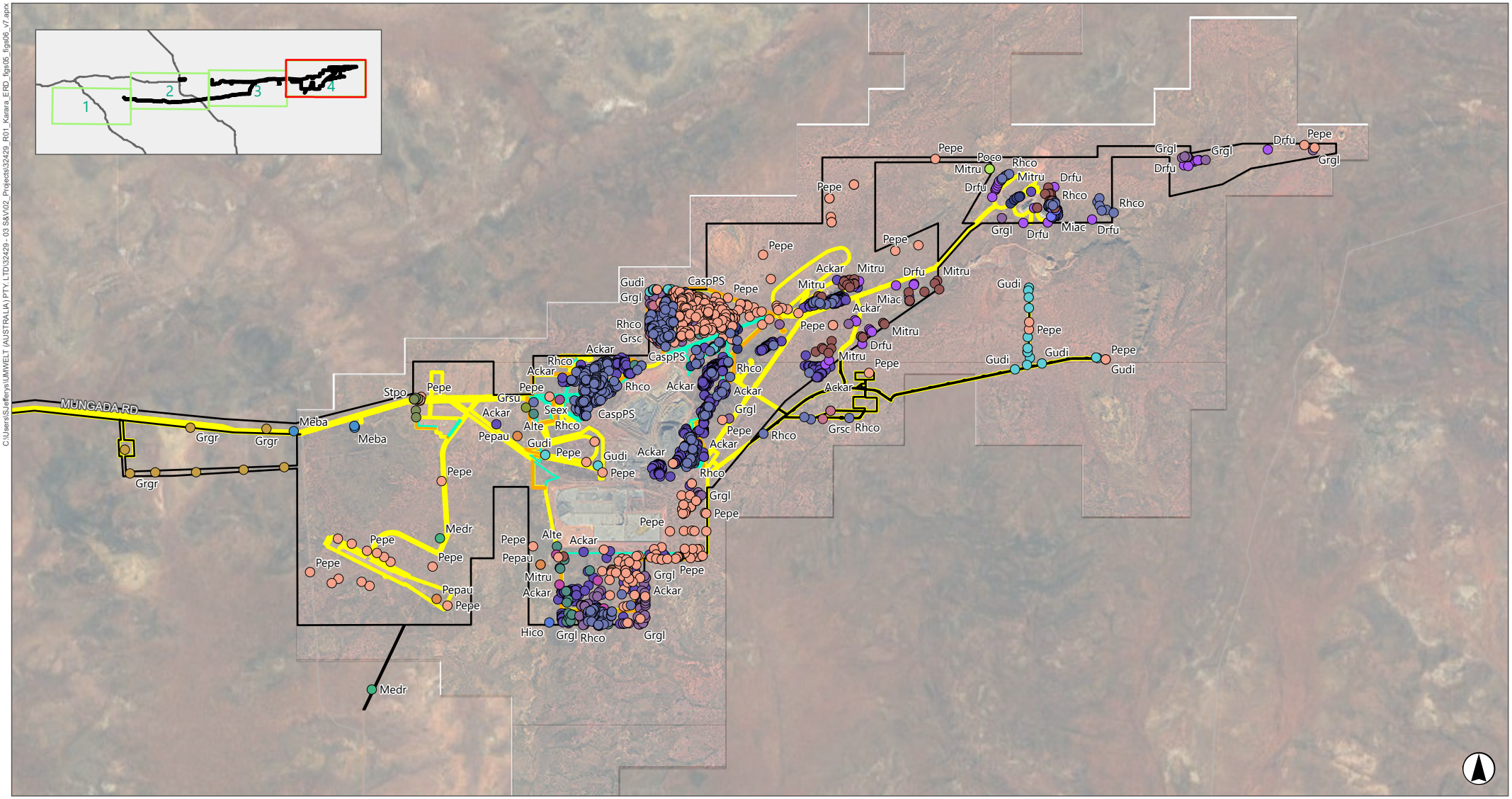


Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- 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.* (PU)
- Drfu *Drummondita fulva* (P3)
- Grgl *Grevillea globosa* (P3)
- Grgr *Grevillea granulosa* (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)
- Poco *Polianthion collinum* (P3)
- Rhco *Rhodanthe collina* (P3)
- Seex *Seringia exastia* (EPBC – CR)
- Stpo *Stenanthemum poicilum* (P3)

# FIGURE 5.5
## Significant Flora Taxa of the Survey Area (P3, P4, PU, CR) – Sheet 4

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**Table 5.6 Significant Flora Recorded in the Survey Area**

| 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 | 42,143 | - | O and P |
| *Melaleuca barlowii* | P3 | - | Perennial | 9 | - | P and T |
| *Menkea draboides* | P3 | - | Annual | - | 2 | A, E and S |

| Taxon | Status (WA) | Status (EPBC) | Longevity | Individuals (Perennials) | Locations (Annuals & Ephemerals) | Preferred Habitat (VTs^) |
|---|---|---|---|---|---|---|
| *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 |
| *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 (2025a).

^ VTs described in **Section 3.3.2** of Umwelt (2025b).

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

## 5.8 Potential Impacts

### 5.8.1 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.

The KIOP MLE Mitigated Proposal disturbance footprint is 1,186.3 ha and contains approximately 1,184.8 ha of vegetation (excluding CCAC areas). The KIOP MLE Mitigated Proposal will directly or indirectly impact 12 significant flora taxa (and 1 potentially undescribed species), as well as suitable habitat for an additional taxon.

No new activities are proposed within the Wheatbelt Area and proposed disturbance to vegetation at this area has been removed from the KIOP MLE Mitigated Proposal.

### 5.8.2 Indirect Impacts

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

- 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 undertaken by Stantec (2024) 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 potential indirect impact assessment.

A potential indirect impact zone was spatially defined as described in **Section 5.5** and is presented in figures above. This boundary has been prepared to account for any potential indirect impacts as a result of the KIOP MLE Mitigated Proposal.

## 5.9 Mitigation

Comments received from state and federal regulators on the KIOP ERD that was submitted in September 2025 recommended that further mitigations should be investigated to avoid and minimise impacts to ecological values. Potential impacts from the KIOP MLE Mitigated Proposal have been mitigated by removing the areas that are not required for new activities and reducing areas for new activities where possible. The western section of the Yandanooka water pipeline, the rail loop and Syncline Turner Haul Road (demarcated by Native Vegetation Clearing Permits [NVCPs] 3867/1, 3399/4 and 5605/1, respectively) were removed from the Proposal, concentrating all proposed new disturbance to the Mine Area. The removal of the Yandanooka water pipeline from the Proposal has resulted in the avoidance of several significant ecological values in the Wheatbelt area (as defined by the Avon Wheatbelt and Geraldton Sandplains IBRA Regions).

Further mitigation applied to the Proposal included reductions or relocation of proposed disturbance associated with the WRD, TSF and abandonment bund where practicable to avoid direct impacts to significant environmental values. The *Karara Iron Ore Project – Mine Life Extension Environmental Values Updated Impact Assessment* (Umwelt, 2026b) provides further information on mitigation applied, as well as constraints at the WRD and TSF that have resulted in the current proposed layout for the Proposal.

**Table 5.7** and **Table 5.8** summarise the reduced Proposal areas following the mitigation process.

**Table 5.7 Change in Combined Proposal**

| Item | Combined Proposal (as per PCD V2 Sept 2025) | Changes to Proposal | Combined Mitigated Proposal |
|---|---|---|---|
| **Disturbance Footprint (ha)** | 5,040 | Reduction by approximately 342 ha | 4,698 |
| **Development Envelope (ha)** | 13,557 | Reduction by approximately 76 ha | 13,481 |

**Table 5.8 Change in Proposed Disturbance per IBRA Region**

| Item | Approved disturbance area from MS 805 & 806 | Proposed Disturbance Footprint (Sept 2025) | Changes to Proposed Disturbance Footprint | Proposed Mitigated Disturbance Footprint (Feb 2026) | Approved Development Envelope from MS 805 & 806 | Combined Development Envelope (Sept 2025) | Changes to Proposed Development Envelope | Combined Mitigated Development Envelope (Feb 2026) |
|---|---|---|---|---|---|---|---|---|
| **Yalgoo IBRA Region (ha)** | 2,948 | 1,447 | Reduction of 261 ha | 1,186 | 7,571 | 12,559 | 0 | 12,559 |
| **Avon Wheatbelt and Geraldton Sandplains IBRA Regions (ha)** | 674 | 76 | Reduction of 76 ha | 0 | N/A | 1,008 | Reduction of 76 ha | 932 * |

* In the Avon Wheatbelt and Geraldton Sandplains regions the Combined mitigated development envelope includes an area to encompass the rail siding alongside Mungada Road at the far eastern end of these IBRA regions (near the Mine Area).

KML will continue to implement the avoidance and minimisation measures for the approved proposals as required under implementation conditions for MS 805 and MS 806.

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

- Flora and Vegetation Management Plan (CORP-EN-PLN-1011) (**Appendix 5-5**)
- Flora and Vegetation Health Monitoring Plan (CORP-EN-PLN-1012) **(Appendix 5-6)**
- Approvals Request and Ground Disturbance Procedure (CORP-EN-PRO-1004) (**Appendix 5-7**)
- Flora, Weeds and Plant Pathogens (CORP-EN-PRO-1009) (**Appendix 5-8**).

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 including flora conditions of avoiding disturbance to priority or threatened species and minimising spread of weeds, which will be tracked to completion.
- Areas required to be cleared are surveyed and clearly demarcated and clearing activities supervised to prevent over-clearing.
- Ground Disturbance activities must be subject to assessments and inspections (both pre and post clearing).

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 KML environmental system documents:

- 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 MS 805, MS 806 and MS 968.

According to analyses and annual reporting by KML, there is 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. However, analyses undertaken by Umwelt (2025c) found that rehabilitation quadrats at KIOP and MIOP met the 70% species composition (taxon richness) target.

Seven significant flora taxa have been recorded within rehabilitation at KIOP as presented in **Table 5.9**.

**Table 5.9 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** | | |

Flora and vegetation monitoring at KIOP and MIOP is conducted by an external consultant annually in September. This includes monitoring of the Blue Hills PEC. Monitoring includes an assessment against threats and impacts including weed coverage, dust, saline water, feral grazing, erosion, drought stress and fire. The results are reported in MS 805, MS 806 and MS 968 Annual Compliance Assessment Report and DMPE Annual Environmental Report. 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 KML operations.

Monitoring results of impacts to flora and vegetation from existing operations are provided in KML's *DWER Ministerial Statements 805, 806 & 968 Annual Compliance Assessment Report 2024* (CORP-EN-REP-1191) (**Appendix 5-9**).

## 5.10 Assessment of Residual Impacts

KML has considered the significance of the impacts to flora and vegetation following the application of the mitigation hierarchy.

### 5.10.1 Significant Flora

The KIOP MLE Mitigated Proposal's potential for residual impacts to flora values has been assessed in the *Karara Iron Ore Project Mine Life Extension - Review Significance of Residual Impacts* (Umwelt, 2026c). This report included a review of survey adequacy as well as and likelihood of occurrence assessment for significant flora previously considered likely or possible to occur in the mine area (*2023 and 2024 Detailed and Targeted Flora and Vegetation Assessment* (Umwelt, 2025a)). Findings of the *Review Significance of Residual Impacts* (Umwelt, 2026c) concluded that:

- *Persoonia kararae* is unlikely to be present in the region and no impacts are expected – the survey was adequate to detect occurrences and there are no known records in the Karara region since 1974 despite numerous flora surveys in the bioregion since that time.
- *Eucalyptus synandra*, *Stylidium scintillans* and *Swainsona picta* individuals are unlikely to be present in the proposed disturbance footprint as the survey was adequate. However, suitable habitat is present – impacts to habitat need to be assessed. These species are either listed as MNES or would meet IUCN criteria for Endangered or Critically Endangered.
- *Calandrinia kalanniensis, Calandrinia* sp. Warriedar and *Millotia dimorpha* individuals could occur in the proposed disturbance footprint that have not been recorded, due to the small size of plants and specific flowering seasons. Habitat is also present - impacts to habitat need to be assessed. These species are priority flora and don't meet the IUCN criteria for listing.

**Table 5.10** details the direct and indirect impacts to significant flora habitat. **Table 5.11** presents the assessment against the significant impact criteria for species as detailed in the *Matters of National Environmental Significance – Significant impact guidelines 1.1 EPBC Act* (Department of the Environment, 2013) for:

- *Eucalyptus synandra* – Vulnerable, EPBC Act & Threatened, BC Act & meets IUCN criteria for Endangered (Fensham, R.J., Laffineur, B., Collingwood, T.D., Beech, E., Bell, S., Hopper, S.D., Phillips, G., Rivers, M.C., Walsh, N., White, M., 2020)
- *Stylidium scintillans* – Threatened, BC Act & meets IUCN criteria for Endangered
- *Swainsona picta* – P1 BC Act & may meet IUCN criteria for Critically Endangered.

The assessment concluded that there will not be a significant residual impact for any these species.

The significance of residual impacts for flora species that are not MNES and do not meet IUCN criteria for listing considered the residual impact significance model in the *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014). The residual impacts to *Calandrinia kalanniensis, Calandrinia* sp. Warriedar and *Millotia dimorpha* are not considered significant as:

- The proposed mitigated disturbance footprint would impact 12.9–15.9% of habitat within the Combined Proposal mitigated development envelope. This is not a substantial increase in impact.
- The cumulative impact to habitat from the Combined Proposal mitigated disturbance footprint is 29.5-42.5% of habitat within the development envelope. All three species have a range of 100 km or more. Therefore, the Combined Proposal impact within the development envelope is only a portion of the known range and suitable habitat for these species.

- Although the review of survey adequacy identified that there are possible occurrences of these species that were not recorded, these species have been detected in comparable regional surveys completed by Umwelt (or previously Woodman). This ameliorates the likelihood of undetected occurrences.

Based on the above assessment, the impacts from the Proposal would not trigger an increase in conservation status for these species or increase the cumulative impact to a critical level. Therefore, there will not be a significant residual impact for any these species.

**Table 5.10 Direct and Indirect Impacts to Habitat for Significant Flora Taxa**

| Species | Status (WA) | Status (EPBC) | Habitat VTs | Habitat VTs Extent in Combined Proposal mitigated DE including CCAC (ha) | Approved impact from MS 805 & 806 (ha) | Approved impact from MS 805 & 806 (% of DE) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of DE) | Combined Impact – Combined Proposal mitigated DF (ha) | Combined Impact – Combined Proposal mitigated DF (% of DE) | Proposed indirect impact - Extent in mitigated indirect impact zone (ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Acacia karinae* | P3 | - | A, O, P and S | 1,910.4 | 274.3 | 14.4 | 281.2 | 14.7 | 555.5 | 29.1 | 35.6 |
| *Allocasuarina tessellata* | P3 | - | A and S | 744.4 | 65.0 | 8.7 | 146.6 | 19.7 | 211.6 | 28.4 | 18.3 |
| *Baeckea* sp. Perenjori (J.W. Green 1516) | P2 | - | AA and E | 670.9 | 49.7 | 7.4 | 28.3 | 4.2 | 78.0 | 11.6 | 5.0 |
| *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) | P1 | - | A and S | 744.4 | 65.0 | 8.7 | 146.6 | 19.7 | 211.6 | 28.4 | 18.3 |
| *Calandrinia kalanniensis* | P2 | - | A, B, F and O | 1,317.0 | 218.4 | 16.6 | 169.9 | 12.9 | 388.3 | 29.5 | 27.1 |
| Calandrinia *sp. Warriedar* | P3 | - | O | 546.2 | 145.1 | 26.6 | 86.9 | 15.9 | 232.1 | 42.5 | 11.1 |
| *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) | P3 | - | D and G | 4,018.9 | 498.4 | 12.4 | 552.0 | 13.7 | 1,050.4 | 26.1 | 48.9 |
| *Crassula* sp. nov. | PU | - | B and O | 658.5 | 146.8 | 22.3 | 90.8 | 13.8 | 237.6 | 36.1 | 16.5 |
| *Drummondita fulva* | P3 | - | O, P and R | 1,951.4 | 341.3 | 17.5 | 238.9 | 12.2 | 579.5 | 29.7 | 24.9 |
| *Epitriche demissus* | P2 | - | N | 10.7 | 8.9 | 82.6 | - | - | 8.9 | 82.6 | - |
| *Eucalyptus synandra* | VU | VU | R | 785.4 | 131.9 | 16.8 | 104.4 | 13.3 | 235.5 | 30.0 | 7.6 |
| *Fitzwillia axilliflora* | P2 | - | N | 10.7 | 8.9 | 82.6 | - | - | 8.9 | 82.6 | - |
| *Gnephosis setifera* | P1 | - | M and N | 28.9 | 10.0 | 34.4 | - | - | 10.0 | 34.4 | - |
| *Grevillea globosa* | P3 | - | P, Q and R | 3,093.4 | 250.2 | 8.1 | 253.5 | 8.2 | 502.9 | 16.3 | 23.6 |
| *Grevillea granulosa* | P3 | - | T | 187.3 | 12.5 | 6.7 | - | - | 12.5 | 6.7 | - |
| *Grevillea scabrida* | P3 | - | A, D and K | 3,049.0 | 370.8 | 12.2 | 437.8 | 14.4 | 808.6 | 26.5 | 46.3 |
| *Grevillea subtiliflora* | P3 | - | F | 366.8 | 26.3 | 7.2 | 13.2 | 3.6 | 39.5 | 10.8 | 4.4 |
| *Gunniopsis divisa* | P3 | - | G and K | 1,888.8 | 362.0 | 19.2 | 239.1 | 12.7 | 601.1 | 31.8 | 24.2 |
| *Hemigenia* sp. aff. *botryphylla* | PU | - | A | 291.7 | 45.2 | 15.5 | 65.9 | 22.6 | 111.2 | 38.1 | 6.2 |
| *Hibbertia cockertoniana* | P3 | - | Q | 1,688.2 | 54.0 | 3.2 | 101.5 | 6.0 | 155.5 | 9.2 | 9.7 |
| *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) | P1 | - | O and P | 1,166.0 | 209.4 | 18.0 | 134.6 | 11.5 | 344.0 | 29.5 | 17.3 |
| *Melaleuca barlowii* | P3 | - | P and T | 807.1 | 76.8 | 9.5 | 47.6 | 5.9 | 124.4 | 15.4 | 6.2 |
| *Menkea draboides* | P3 | - | A, E and S | 1,415.0 | 114.5 | 8.1 | 174.9 | 12.4 | 289.3 | 20.4 | 23.3 |
| *Micromyrtus acuta* | P3 | - | O | 546.2 | 145.1 | 26.6 | 86.9 | 15.9 | 232.1 | 42.5 | 11.1 |
| *Micromyrtus trudgenii* | P3 | - | O | 546.2 | 145.1 | 26.6 | 86.9 | 15.9 | 232.1 | 42.5 | 11.1 |

| Species | Status (WA) | Status (EPBC) | Habitat VTs | Habitat VTs Extent in Combined Proposal mitigated DE including CCAC (ha) | Approved impact from MS 805 & 806 (ha) | Approved impact from MS 805 & 806 (% of DE) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of DE) | Combined Impact – Combined Proposal mitigated DF (ha) | Combined Impact – Combined Proposal mitigated DF (% of DE) | Proposed indirect impact - Extent in mitigated indirect impact zone (ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Millotia dimorpha* | P1 | - | O | 546.2 | 145.1 | 26.6 | 86.9 | 15.9 | 232.1 | 42.5 | 11.1 |
| *Nicotiana salina* | P1 | - | L | 50.9 | 20.4 | 40.0 | - | - | 20.4 | 40.0 | - |
| *Persoonia kararae* | P2 | - | T | 187.3 | 12.5 | 6.7 | - | - | 12.5 | 6.7 | - |
| *Persoonia pentasticha* | P3 | - | D, G, H and K | 4,472.3 | 604.2 | 13.5 | 651.7 | 14.6 | 1,255.9 | 28.1 | 59.5 |
| *Petrophile pauciflora* | P3 | - | O | 546.2 | 145.1 | 26.6 | 86.9 | 15.9 | 232.1 | 42.5 | 11.1 |
| *Pityrodia viscida* | P4 | - | HMVT B | 0.2 | 0.2 | 100.0 | - | - | 0.2 | 100.0 | - |
| *Podotheca uniseta* | P3 | - | L | 50.9 | 20.4 | 40.0 | - | - | 20.4 | 40.0 | - |
| *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) | P1 | - | Q | 1,688.2 | 54.0 | 3.2 | 101.5 | 6.0 | 155.5 | 9.2 | 9.7 |
| *Rhodanthe collina* | P3 | - | A, K and O | 1,151.6 | 285.0 | 24.7 | 182.4 | 15.8 | 467.3 | 40.6 | 25.0 |
| *Roebuckiella halophila* | P3 | - | E, G and R | 3,031.3 | 448.8 | 14.8 | 342.2 | 11.3 | 790.3 | 26.1 | 29.1 |
| *Stenanthemum poicilum* | P3 | - | E | 670.7 | 49.5 | 7.4 | 28.3 | 4.2 | 77.8 | 11.6 | 5.0 |
| *Stylidium scintillans* | VU | - | O | 546.2 | 145.1 | 26.6 | 86.9 | 15.9 | 232.1 | 42.5 | 11.1 |
| *Swainsona picta* | P1 | - | B | 112.3 | 1.7 | 1.5 | 3.8 | 3.4 | 5.5 | 4.9 | 5.4 |
| *Tecticornia fimbriata* | P3 | - | L, N | 61.7 | 29.2 | 47.4 | - | - | 29.2 | 47.4 | - |
| *Tecticornia* sp. 'Karara 1' | PU | - | N | 10.7 | 8.9 | 82.6 | - | - | 8.9 | 82.6 | - |
| *Tecticornia* sp. 'Karara 2' | PU | - | N | 10.7 | 8.9 | 82.6 | - | - | 8.9 | 82.6 | - |
| *Tricoryne soullierae* | P3 | - | I and T | 197.7 | 14.5 | 7.3 | - | - | 14.5 | 7.3 | - |

**Table 5.11 MNES Significant Impact Guidelines 1.1 Assessment for Flora**

| MNES Significant Impact Guidelines 1.1 – Endangered or Critically Endangered Species [adjustments for Vulnerable in brackets] | *Eucalyptus synandra*<br>Vulnerable, EPBC Act & Threatened – BC Act<br>Has been identified as meeting criteria for Endangered | *Stylidium scintillans*<br>Threatened – BC Act<br>Consider as Endangered based on IUCN criteria | *Swainsona picta*<br>P1 – BC Act<br>Consider as Critically Endangered based on IUCN criteria |
|---|---|---|---|
| **Conservation advice** | Approved Conservation Advice for *Eucalyptus synandra*, dated 16 December 2008.<br>Most populations are undisturbed and healthy. No definitions of critical habitat or important populations.<br>*A review of Australian eucalypts against IUCN Red List criteria* (Fensham, R.J., Laffineur, B., Collingwood, T.D., Beech, E., Bell, S., Hopper, S.D., Phillips, G., Rivers, M.C., Walsh, N., White, M., 2020) identified *Eucalyptus synandra* as meeting criteria for listing as Endangered due to having small total population and sub-populations with ongoing decline. On this basis, all populations are likely to be important. | No published conservation advice | No published conservation advice |
| **Recovery plan** | No published recovery plan. | No published recovery plan | No published recovery plan |
| **Lead to a long-term decrease in the size of a population of a species**<br>**[important population for Vulnerable species]** | No - the size of the local population won't reduce as there are no individuals within proposed disturbance footprint and survey was adequate to detect individuals. | No - the size of the population won't reduce as there are no individuals within proposed disturbance footprint and survey was adequate to detect individuals. | No - the size of the population won't reduce as there are no individuals within proposed disturbance footprint and survey was adequate to detect individuals. |
| **Reduce the area of occupancy of [an important population] the species** | No - the Proposal will not reduce the area of occupancy of the local population or species as there are no individuals within proposed disturbance footprint. | No - the Proposal will not reduce the area of occupancy of the local population or species as there are no individuals within proposed disturbance footprint. | No - the Proposal will not reduce the area of occupancy of the local population or species as there are no individuals within proposed disturbance footprint. |
| **Fragment an existing population [important population] into two or more populations** | No – the Proposal will not fragment the local population; the proposed disturbance footprint is approximately 3.5 km from recorded individuals. | No - the Proposal will not fragment the local population. The proposed disturbance footprint is approximately 14 km from recorded individuals. | No - the Proposal will not fragment the local population. The proposed disturbance footprint is approximately 700 m from recorded individuals. |
| **Adversely affect habitat critical to the survival of a species** | No – the habitat to be cleared is not considered habitat critical to the survival of the species as no individuals were recorded in the area to be cleared. Therefore, this habitat is not considered critical to maintain genetic diversity or maintain species survival. Although the proposed disturbance footprint will impact habitat that is potentially suitable for the species, no individuals were recorded in the habitat to be removed, and unrecorded occurrences were rated as unlikely. | No – the habitat to be cleared is not considered habitat critical to the survival of the species as no individuals were recorded in the area to be cleared and unrecorded occurrences were rated as unlikely. Therefore, this habitat is not considered critical to maintain genetic diversity or maintain species survival. | No – the habitat to be cleared is not considered habitat critical to the survival of the species as no individuals were recorded in the area to be cleared and unrecorded occurrences were rated as unlikely. Therefore, this habitat is not considered critical to maintain genetic diversity or maintain species survival. |
| **Disrupt the breeding cycling of a population [important population]** | No – the Proposal is not expected to disrupt the breeding cycle. There are no individuals in habitat proposed to be cleared. | No - no direct impact to individuals | No - no direct impact to individuals |

| MNES Significant Impact Guidelines 1.1 – Endangered or Critically Endangered Species [adjustments for Vulnerable in brackets] | *Eucalyptus synandra*<br>Vulnerable, EPBC Act & Threatened – BC Act<br>Has been identified as meeting criteria for Endangered | *Stylidium scintillans*<br>Threatened – BC Act<br>Consider as Endangered based on IUCN criteria | *Swainsona picta*<br>P1 – BC Act<br>Consider as Critically Endangered based on IUCN criteria |
|---|---|---|---|
| **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** | No – the Proposal is not expected to impact habitat to the extent that it would cause the species to decline. Although potential habitat will be impacted, no individuals were recorded in the proposed expansion area, and it is unlikely unrecorded individuals would be present. The proposed mitigated disturbance footprint will impact 104.3 ha (13.3%) of mapped habitat for this species in the Combined Proposal mitigated Development Envelope. | No – the Proposal is not expected to impact habitat to the extent that it would cause the species to decline. Although potential habitat will be impacted, no individuals were recorded in the proposed expansion area, and it is unlikely unrecorded individuals would be present. The proposed mitigated disturbance footprint will impact 86.9 ha (15.9%) of mapped habitat for this species in the Combined Proposal mitigated Development Envelope. | No – the Proposal is not expected to impact habitat to the extent that it would cause the species to decline. Although potential habitat will be impacted, no individuals were recorded in the proposed expansion area, and it is unlikely unrecorded individuals would be present. The proposed mitigated disturbance footprint will impact 3.8 ha (3.4%) of mapped habitat for this species in the Combined Proposal mitigated Development Envelope. |
| **Result in invasive species that are harmful to the species becoming established in the species' habitat** | No – the Proposal is not expected to result in invasive species becoming established, as it is an expansion of existing operations - this does not introduce a new risk. | No – the Proposal is not expected to result in invasive species becoming established, as it is an expansion of existing operations - this does not introduce a new risk. | No – the Proposal is not expected to result in invasive species becoming established, as it is an expansion of existing operations - this does not introduce a new risk. |
| **Introduce disease that may cause the species to decline** | No – the Proposal is not expected to result in introduction of disease, as it is an expansion of existing operations - this does not introduce a new risk. | No – the Proposal is not expected to result in introduction of disease, as it is an expansion of existing operations - this does not introduce a new risk. | No – the Proposal is not expected to result in introduction of disease, as it is an expansion of existing operations - this does not introduce a new risk. |
| **Interfere with the recovery of the species** | No – no approved recovery plan. | No – no approved recovery plan. | No – no approved recovery plan. |
| **Outcome** | **No significant impact as no impact to population, no change to area of occupancy, no impact to habitat critical to the survival of the species.** | **No significant impact as no impact to population, no change to area of occupancy, no impact to habitat critical to the survival of the species.** | **No significant impact as no impact to population, no change to area of occupancy, no impact to habitat critical to the survival of the species.** |

The direct and indirect local impact to significant flora taxa locations is presented quantitatively to:

- individuals of perennial taxa (i.e. those with a life span extending over more than two growing seasons (WA Herbarium, 1998) – presented in **Table 5.12**
- 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)) – presented in **Table 5.13**

A total of 12 of the 41 significant flora taxa identified within the Survey Area (plus one potentially undescribed species) have records within the KIOP MLE mitigated disturbance footprint and indirect impact zone, comprising:

- 3 Priority 1 taxa
- 9 Priority 3 taxa
- 1 potentially undescribed taxon
- no records of EPBC or BC Act listed flora taxa.

When assessed against the total number of individuals identified within the Survey Area and records within 20 km of the Proposal, only four annual and ephemeral species are anticipated to experience impacts to over 30% of the population identified within a 20 km buffer of the Proposal:

- *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78)
- *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096)
- *Crassula* sp. nov.
- *Rhodanthe collina*.

Of these species, the Proposal is predicted to impact more than 30% of taxon habitat within the KIOP MLE mitigated DE for only two species: *Crassula* sp. nov. (237.6 ha representing 36.1% of habitat) and *Rhodanthe collina* (467.3 ha representing 40.6% of habitat). The significance of the Proposal's cumulative impacts to the total known population of these species and other flora taxa identified at the Proposal is detailed in **Section 5.10.3** below.

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 (i.e. via dust emissions and weed infestation). Indirect impacts are expected to affect four perennial and four annual and ephemeral taxa.

**Table 5.12 Direct and Indirect Impacts to Individuals of Perennial Significant Flora Taxa**

| Taxon | Status (WA) | Status (EPBC) | Individuals in Survey Area + 20 km buffer (records) | Individuals in Combined Proposal mitigated DE including those in CCAC (#) | Approved impact from MS 805 & 806 (#) | Approved impact from MS 805 & 806 (% of records) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (#) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of records) | Combined Impact – Combined Proposal mitigated DF (#) | Combined Impact – Combined Proposal mitigated DF (% of records) | Proposed indirect impact – mitigated indirect impact zone (#) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Acacia karinae* | P3 | - | 46,724 | 9,081 | 5,286 | 11.3 | 1,347 | 2.9 | 6,633 | 14.2 | 334 |
| *Allocasuarina tessellata* | P3 | - | 28,612 | 726 | 7 | 0.0 | 583 | 2.0 | 590 | 2.1 | 71 |
| *Baeckea* sp. Perenjori (J.W. Green 1516) | P2 | - | 95 | 29 | 29 | 30.5 | - | - | 29 | 30.5 | - |
| *Drummondita fulva* | P3 | - | 3,019 | 516 | 38 | 1.3 | - | - | 38 | 1.3 | - |
| *Eucalyptus synandra* | VU | VU | 1,162 | 46 | - | - | - | - | - | - | - |
| *Grevillea globosa* | P3 | - | 996 | 704 | 125 | 12.6 | 175 | 17.6 | 300 | 30.1 | - |
| *Grevillea granulosa* | P3 | - | 14 | 11 | 1 | 7.1 | - | - | 1 | 7.1 | - |
| *Grevillea scabrida* | P3 | - | 12,700 | 976 | 1 | 0.0 | 944 | 7.4 | 945 | 7.4 | 31 |
| *Grevillea subtiliflora* | P3 | - | 1,338 | 1 | - | - | - | - | - | - | - |
| *Hemigenia* sp. aff. *botryphylla* | PU | - | 2 | 2 | - | - | - | - | - | - | - |
| *Hibbertia cockertoniana* | P3 | - | 2 | 1 | - | - | - | - | - | - | - |
| *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) | P1 | - | 78,528 | 42,130 | 38,087 | 48.5 | 223 | 0.3 | 38,310 | 48.8 | - |
| *Melaleuca barlowii* | P3 | - | 26 | 9 | 5 | 19.2 | - | - | 5 | 19.2 | - |
| *Micromyrtus acuta* | P3 | - | 35,540 | 4,751 | 2,828 | 8.0 | - | - | 2,828 | 8.0 | - |
| *Micromyrtus trudgenii* | P3 | - | 12,155 | 1,292 | 672 | 5.5 | 28 | 0.2 | 699 | 5.8 | - |
| *Persoonia pentasticha* | P3 | - | 1,329 | 525 | 96 | 7.2 | 363 | 27.4 | 458 | 34.5 | 14 |
| *Petrophile pauciflora* | P3 | - | 167 | 22 | 20 | 12.0 | - | - | 20 | 12.0 | - |
| *Pityrodia viscida* | P4 | - | 54 | 1 | 1 | 1.9 | - | - | 1 | 1.9 | - |
| *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) | P1 | - | 312 | 9 | - | - | 1 | 0.3 | 1 | 0.3 | - |
| *Stenanthemum poicilum* | P3 | - | 443 | 25 | 3 | 0.7 | - | - | 3 | 0.7 | - |
| *Tecticornia fimbriata* | P3 | - | 7 | 2 | 2 | 28.6 | - | - | 2 | 28.6 | - |
| *Tecticornia* sp. 'Karara 1' | PU | - | 5 | 4 | 4 | 80.0 | - | - | 4 | 80.0 | - |
| *Tecticornia* sp. 'Karara 2' | PU | - | 5 | 5 | 5 | 100.0 | - | - | 5 | 100.0 | - |

**Table 5.13 Direct and Indirect Impacts to Locations of Annual and Ephemeral Significant Flora Taxa**

| Taxon | Status (WA) | Status (EPBC) | Locations in Survey Area + 20 km buffer (records) | Locations in Combined Proposal mitigated DE including those in CCAC (#) | Approved impact from MS 805 & 806 (#) | Approved impact from MS 805 & 806 (% of records) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (#) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of records) | Combined Impact – Combined Proposal mitigated DF (#) | Combined Impact – Combined Proposal mitigated DF (% of records) | Proposed indirect impact - Extent in mitigated indirect impact zone (#) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) | P1 | - | 269 | 235 | 7 | 2.6 | 172 | 63.9 | 179 | 66.5 | 11 |
| *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) | P3 | - | 69 | 41 | 2 | 2.9 | 28 | 40.6 | 30 | 43.5 | 1 |
| *Crassula* sp. nov. | PU | - | 5 | 4 | - | - | 2 | 40.0 | 2 | 40.0 | - |
| *Epitriche demissus* | P2 | - | 9 | 4 | 4 | 44.4 | - | - | 4 | 44.4 | - |
| *Fitzwillia axilliflora* | P2 | - | 3 | 1 | 1 | 33.3 | - | - | 1 | 33.3 | - |
| *Gnephosis setifera* | P1 | - | 10 | 2 | 1 | 10.0 | - | - | 1 | 10.0 | - |
| *Gunniopsis divisa* | P3 | - | 133 | 25 | 2 | 1.5 | 21 | 15.8 | 23 | 17.3 | 4 |
| *Menkea draboides* | P3 | - | 6 | 2 | 2 | 33.3 | - | - | - | - | - |
| *Millotia dimorpha* | P1 | - | 538 | 55 | 54 | 10.0 | - | - | 54 | 10.0 | - |
| *Nicotiana salina* | P1 | - | 3 | 1 | 1 | 33.3 | - | - | 1 | 33.3 | - |
| *Podotheca uniseta* | P3 | - | 2 | 1 | 1 | 50.0 | - | - | 1 | 50.0 | - |
| *Rhodanthe collina* | P3 | - | 841 | 499 | 60 | 7.1 | 347 | 41.3 | 407 | 48.4 | 9 |
| *Roebuckiella halophila* | P3 | - | 19 | 13 | 3 | 15.8 | - | - | 3 | 15.8 | - |
| *Stylidium scintillans* | VU | - | 211 | 17 | 2 | 0.9 | - | - | 2 | 0.9 | - |
| *Swainsona picta* | P1 | - | 9 | 2 | - | - | - | - | - | - | - |

### 5.10.2 Significant Vegetation

The potential local direct and indirect impact to VTs is presented in **Table 5.14** and to listed vegetation communities is presented in **Table 5.15**.

An assessment was undertaken against the residual impact significance model (see section 8.2 and section 8.3 of Umwelt 2025). Of the 16 VTs considered potentially significant (**Table 5.4**), substantial combined impacts are expected to VT O.

The already approved impact to VT O from MS 805 & 806 impacts 145.1 ha (26.5%) of the mapped extent of the VT in the Development Envelope. The proposed direct impact from KIOP MLE mitigated disturbance footprint will add 86.9 ha (15.9%) of impact, resulting in Combined Proposal direct impact to 232.1 ha (42.4%). This VT provides preferred habitat for 10 significant flora taxa and forms a major component of the Blue Hills PEC.

The KIOP MLE Mitigated Proposal will result in local direct and indirect impact to the Blue Hills PEC: 106 ha impact (89 ha directly and 17 ha indirectly), or 14% of the total PEC extent within the Combined Proposal mitigated DE. The direct and indirect impact area encompasses PEC vegetation in Excellent condition. The direct impact of the KIOP MLE Mitigated Proposal to the PEC (89 ha) represents 1.2% of the remaining original extent of the PEC in the region.

Assessment of the KIOP MLE Mitigated Proposal's potential residual impacts to the Blue Hills PEC (and by extension, VT O) is detailed in (Umwelt, 2026c), and was applied to both the Blue Hills PEC boundary as applied in the regional impact assessment for Mungada East Expansion Project (Maia Environmental Consultancy, 2017) and the Blue Hills PEC boundary as mapped by DBCA (excluding 500 m buffer).

The assessment demonstrates that the Proposal will not change the threat level for Blue Hills PEC compared to the current threat level. While the Blue Hills PEC would be classified as Endangered based on limited geographic distribution, the cumulative impact to Blue Hills PEC including the proposed disturbance would not increase the threat level to the community (Umwelt, 2026c).

As the Proposal will not change the threat level for Blue Hills PEC compared to the current threat level, the residual impact to Blue Hills PEC from the KIOP MLE Mitigated Proposal is not significant.

**Table 5.14 Direct and Indirect Impacts to Vegetation Types**

| VT | Extent in Survey Area (ha) | Extent in Combined Proposal mitigated DE including CCAC (ha) | Approved impact from MS 805 & 806 (ha) | Approved impact from MS 805 & 806 (% of DE extent) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of DE extent) | Combined impact – Combined Proposal mitigated DF (ha) | Combined impact – Combined Proposal mitigated DF (% of DE extent) | Proposed indirect impact – Extent in mitigated indirect impact zone (ha) |
|---|---|---|---|---|---|---|---|---|---|
| **A** | 291.9 | 291.9 | 45.2 | 15.5 | 65.9 | 22.6 | 111.2 | 38.1 | 5.4 |
| **B** | 112.4 | 112.4 | 1.7 | 1.5 | 3.8 | 3.4 | 5.5 | 4.9 | 5.4 |
| **C** | 327.4 | 327.4 | 5.9 | 1.8 | 0.7 | 0.2 | 6.7 | 2.0 | - |
| **D** | 2,445.6 | 2,445.6 | 231.0 | 9.4 | 342.4 | 14.0 | 573.4 | 23.4 | 29.3 |
| **E** | 671.2 | 671.2 | 49.5 | 7.4 | 28.3 | 4.2 | 77.8 | 11.6 | 5.0 |
| **F** | 367.1 | 367.1 | 26.3 | 7.2 | 13.2 | 3.6 | 39.5 | 10.8 | 4.1 |
| **G** | 1,576.5 | 1,576.5 | 267.4 | 17.0 | 209.6 | 13.3 | 477.0 | 30.3 | 5.7 |
| **H** | 139.9 | 139.9 | 11.2 | 8.0 | 70.2 | 50.2 | 81.5 | 58.2 | 1.7 |
| **I** | 10.4 | 10.4 | 2.0 | 19.4 | - | - | 2.0 | 19.4 | - |
| **J** | 99.4 | 99.4 | - | - | - | - | - | - | - |
| **K** | 313.8 | 313.8 | 94.6 | 30.1 | 29.5 | 9.4 | 124.1 | 39.5 | 3.1 |
| **L** | 51.0 | 51.0 | 20.4 | 40.0 | - | - | 20.4 | 40.0 | - |
| **M** | 18.2 | 18.2 | 1.1 | 6.0 | - | - | 1.1 | 6.0 | - |
| **N** | 10.7 | 10.7 | 8.9 | 82.6 | - | - | 8.9 | 82.6 | - |
| **O** | 546.7 | 546.7 | 145.1 | 26.5 | 86.9 | 15.9 | 232.1 | 42.4 | 11.1 |
| **P** | 620.3 | 620.3 | 64.3 | 10.4 | 47.6 | 7.7 | 111.9 | 18.0 | 5.8 |
| **Q** | 1,689.5 | 1,689.5 | 54.0 | 3.2 | 101.5 | 6.0 | 155.5 | 9.2 | 6.4 |
| **R** | 786.0 | 785.7 | 131.9 | 16.8 | 104.4 | 13.3 | 235.3 | 39.9 | 7.5 |
| **S** | 453.0 | 453.0 | 19.7 | 4.4 | 80.7 | 17.8 | 100.4 | 22.2 | 9.5 |
| **T** | 187.5 | 187.4 | 12.5 | 6.7 | - | - | 12.5 | 6.7 | - |
| **U** | 64.3 | 64.3 | - | - | - | - | - | - | - |
| **V** | 0.4 | 0.4 | 0.4 | 100.0 | - | - | 0.4 | 100.0 | - |
| **W** | 0.6 | 0.6 | 0.6 | 100.0 | - | - | 0.6 | 100.0 | - |
| **X** | 0.2 | 0.2 | 0.2 | 100.0 | - | - | 0.2 | 100.0 | - |
| **Y** | 1.8 | 1.8 | 1.8 | 100.0 | - | - | 1.8 | 100.0 | - |
| **Z** | 0.7 | 0.7 | 0.7 | 100.0 | - | - | 0.7 | 100.0 | - |
| **AA** | 0.2 | 0.2 | 0.2 | 100.0 | - | - | 0.2 | 100.0 | - |
| **AB*** | - | - | - | - | - | - | - | - | - |
| **HMVT A** | 0.1 | 0.1 | 0.1 | 100.0 | - | - | 0.1 | 100.0 | - |
| **HMVT B** | 0.2 | 0.2 | 0.2 | 100.0 | - | - | 0.2 | 100.0 | - |
| **HMVT C** | 0.1 | 0.1 | 0.1 | 100.0 | - | - | 0.1 | 100.0 | - |
| **HMVT D** | 4.7 | - | - | - | - | - | - | | - |
| **HMVT E** | 1.7 | - | - | - | - | - | - | | - |
| **HMVT F** | 2.0 | - | - | - | - | - | - | | - |
| **HMVT G** | 3.3 | 1.0 | 1.0 | 100.0 | - | - | 1.0 | 100.0 | - |
| **CP** | 6.7 | 6.7 | - | - | - | - | - | | - |
| **PL** | 3.9 | 0.3 | 0.3 | 100.0 | - | - | 0.3 | 100.0 | - |
| **Water** | 1.6 | 1.6 | 0.0 | 1.1 | - | - | 0.0 | 1.1 | - |
| **CL** | 2,756.4 | 2,694.7 | 2,321.2 | 86.1 | 1.5 | 0.1 | 2,319.1 | 86.1 | 0.1 |

*VT AB was only calculated as part of the indirect impact zone for the Flora and Vegetation Impact Assessment (Umwelt, 2025b), this area has since been removed from the assessed area.

**Table 5.15 Direct and Indirect Impacts to Listed Significant Vegetation**

| Community | Original Extent in Region (ha) | Extent in Combined Proposal mitigated DE including CCAC (ha) | Historical Impact in Region* (ha original extent) | Historical Impact in Region (% of original extent) | Approved impact from MS 805 & 806 (ha of original extent) | Approved impact from MS 805 & 806 (% of original extent) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha of original extent) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of original extent) | Combined impact – Combined Proposal mitigated DF (ha of original extent) | Combined impact – Combined Proposal mitigated DF (% of original extent) | Total Cumulative Impact – Historical + Proposal mitigated DF (ha of original extent) | Total Cumulative Impact – Historical + Proposal mitigated DF (% of original extent) | Proposed indirect impact – Extent in mitigated indirect impact zone (ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation) | 7,098^ | 771 | 953† | 13 | 171 | 2 | 89 | 1 | 260 | 4 | 1,041 | 15 | 17 |
| DBCA blue hills PEC (minus 500 m buffer zone) | 8,732 | 2,606 | 1,376 | 16 | 1,064 | 12 | 391 | 4 | 1,453 | 17 | 1,767 | 20 | 45 |

* Includes impacts from Karara Mining Limited.

^ 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).

### 5.10.3 Cumulative Impacts

The assessment of potential cumulative impacts for flora and vegetation values is presented in the following tables:

- For perennial flora taxa in **Table 5.16**
- For ephemeral and annual flora taxa in **Table 5.17**
- For vegetation types in **Table 5.18.**

The cumulative impact assessment for flora taxa focussed on the species with potentially significant impacts from the Proposal. Further data for these species was obtained from DBCA to estimate the total known population of each species as described in *Karara Iron Ore Project – Mine Life Extension Environmental Values Updated Impact Assessment* (Umwelt, 2026b).

Cumulative impacts for total known population flora taxa were assessed for the KIOP MLE Mitigated Proposal with reference to the *Guidelines for assessing the conservation status of native species according to the EPBC Act* (Threatened Species Scientific Committee (TSSC), 2024a) ("IUCN Guidelines" or "IUCN criteria"). The assessment sought to determine if impacted species would already meet IUCN criteria for listing, or if the proposed MLE impact would increase the impact to an extent that the species would meet IUCN criteria for listing (Umwelt, 2026c). Where the impacts of the proposed MLE would cause the species to meet IUCN criteria for listing, the impact of the Proposal would be potentially significant (as per the residual impact significance model in the *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014)).

#### 5.10.3.1 Priority Flora

The KIOP MLE Mitigated Proposal is expected to result in significant cumulative impacts to two Priority flora species:

- *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (Priority 1) (ephemeral and annual)
- *Persoonia pentasticha* (Priority 3) (perennial).

The Priority 1 species *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) and the Priority 3 species *Persoonia pentasticha* are the only listed flora taxa assessed to have a potential significant cumulative residual impact under the residual impact significance model in the *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014), given these taxa meet IUCN Criteria for Species Listing based on total population and projected population size reduction (<2,500 and >20% decline in 5 years). The KIOP MLE Mitigated Proposal footprint is predicted to impact 172 *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) individuals, representing a 63.9% decline in the total known number of locations of this species throughout its distribution, while 364 individuals of *Persoonia pentasticha* will similarly be impacted by the Proposal, representing a 27.4% decline in the total known population of this species throughout its distribution.

The predicted impact to *Crassula* sp. nov. (undescribed species) of removing 2 out of 4 known locations (50%) is also potentially significant, although this proportional impact is due to the small number of records of this undescribed species.

The KIOP MLE Offset Strategy will be updated to consider offsets for these species.

#### 5.10.3.2 Vegetation

A total of 17 Floristic Community Types (FCTs) (used to calculate cumulative impact to VTs) will be impacted by the KIOP MLE Mitigated Proposal disturbance footprint, representing 1,186 ha or 2% of the total FCT extent assessed to occur in the regional area (RAA 1). With the exception of FCT 27, of which 10.7% of the regional extent is predicted to be impacted by the KIOP MLE mitigated disturbance footprint, impacts to the remaining 16 FCTs are predicted to represent less than 10% of the respective total extents in RAA 1. Impacts to FCTs are therefore not cumulatively significant under the under the residual impact significance model in the *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014)).

As noted in **Section 5.10.2**, residual impacts to the Blue Hills PEC from the KIOP MLE Mitigated Proposal is not significant. An assessment of the Proposal's potential cumulative impacts to this PEC (Umwelt, 2026c) found cumulative impacts represent 1,041 ha or 15% the entire pre-European extent of the Blue Hills PEC (as assessed by Maia Environmental Consultancy, 2017) and 1,767 ha or 20% of the extent mapped by DBCA (excluding a 500 m buffer). This assessment determined that the Proposal's cumulative impact to the Blue Hills PEC would not result in the community requiring protection under statute or increase the Proposal's potential cumulative impact to a critical level, and cumulative impacts to Blue Hills PEC associated with the KIOP MLE Mitigated Proposal are therefore not significant.

**Table 5.16 Significance of Cumulative Impact to Total Known Population – Perennial Significant Flora Taxa Individuals**

| Taxon | Status (WA) | Status (EPBC) | Total known population (#) | Approved regional impact i.e. CCAC (#) | Approved regional impact (% of total population) [Proxy for observed population size reduction] | Meets IUCN Criteria for Species Listing based on population size approved (observed) reduction | Proposed direct impact – KIOP MLE mitigated disturbance footprint (#) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of total population) [Projected population size decline] | Meets IUCN Criteria for Species Listing based on total population and projected population size reduction |
|---|---|---|---|---|---|---|---|---|---|
| *Acacia karinae* | P3 | - | 46,724 | 6,936 | 14.8 | No | 1,347 | 2.9 | No |
| *Allocasuarina tessellata* | P3 | - | 28,612 | 7 | 0.0 | No | 583 | 2.0 | No |
| *Grevillea globosa* | P3 | - | 996 | 125 | 12.6 | No | 175 | 17.6 | No<br>Population <2,500 but <20% decline in<br>5 years. |
| *Grevillea scabrida* | P3 | - | 12,700 | 7 | 0.1 | No | 944 | 7.4 | No |
| *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) | P1 | - | 78,528 | 38,898 | 49.5 | Meets criteria for Vulnerable listing (>30% of population reduction observed, cause has not ceased) | 223 | 0.3 | No |
| *Persoonia pentasticha* | P3 | - | 1,329 | 150 | 11.3 | No | 364 | 27.4 | Meets criteria for Endangered Population <2,500 and >20% decline in<br>5 years. |

**Table 5.17 Significance of Cumulative Impact to Total Known Population – Annual and Ephemeral Significant Flora Taxa Locations**

| Taxon | Status (WA) | Status (EPBC) | Total known no. locations (estimated population) | Approved regional impact i.e. CCAC (#) | Approved regional impact (% of total population) [Proxy for observed population size reduction] | Meets IUCN Criteria for Species Listing based on population size approved (observed) reduction | Proposed direct impact – KIOP MLE mitigated disturbance footprint (#) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of total population) [Projected population size decline] | Meets IUCN Criteria for Species Listing based on total population and projected population size reduction |
|---|---|---|---|---|---|---|---|---|---|
| *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) | P1 | - | 269<br>(population ~800-1,000 individuals) | 7 | 2.6 | No | 172 | 63.9 | Meets criteria for Endangered Population <2,500 and >20% decline in<br>5 years. |
| *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) | P3 | - | 69<br>(population ~11,000-40,000 individuals) | 3 | 4.3 | No | 28 | 40.6 | No |
| *Gunniopsis divisa* | P3 | - | 133<br>(population ~3,000-30,000 individuals) | 3 | 2.3 | No | 21 | 15.8 | No |
| *Rhodanthe collina* | P3 | - | 841<br>(population ~7-24 million) | 67 | 8.0 | No | 347 | 41.3 | No |

**Table 5.18 Cumulative Direct Impact to Woodman Environmental (2012) FCTs within RAA 1**

| FCT | Equivalent VT(s) | Original Regional Extent in RAA 1 (ha) | Extent in All CCAC Areas in RAA 1 (ha) | Extent in All CCAC Areas in RAA 1 (% FCT in RAA 1) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% FCT extent in RAA 1) | Total Cumulative Impact – CCAC + Combined Proposal mitigated DF (ha) | Total Cumulative Impact – CCAC + Combined Proposal mitigated DF (% FCT in RAA 1) |
|---|---|---|---|---|---|---|---|---|
| 1 | O | 696.3 | 219.5 | 31.5 | 24.2 | 3.5 | 243.6 | 35.0 |
| 2 | O | 1,623.2 | 71.1 | 4.4 | 10.5 | 0.6 | 81.7 | 5.0 |
| 3 | O | 156.6 | - | - | - | - | - | - |
| 4 | O | 190.4 | 0.6 | 0.3 | 5.3 | 2.8 | 5.9 | 3.1 |
| 5 | - | 108.9 | - | - | - | - | - | - |
| 6 | P | 1,196.4 | 235.3 | 19.7 | 31.9 | 2.7 | 267.2 | 22.3 |
| 7 | Q | 8,063.4 | 672.5 | 8.3 | 195.8 | 2.4 | 868.0 | 10.8 |
| 8 | P | 312.0 | 0.9 | 0.3 | | - | 0.9 | 0.3 |
| 9 | Q | 3,144.2 | 92.0 | 2.9 | 4.8 | 0.2 | 96.8 | 3.1 |
| 10 | P | 2,259.5 | 240.2 | 10.6 | 50.6 | 2.2 | 290.7 | 12.9 |
| 11 | S | 1,234.1 | 23.4 | 1.9 | 63.1 | 5.1 | 86.5 | 7.0 |
| 12 | O | 160.6 | 10.3 | 6.4 | | - | 10.3 | 6.4 |
| 13 | Q | 1,463.8 | 70.8 | 4.8 | 37.8 | 2.6 | 108.6 | 7.4 |
| 14 | - | 125.9 | - | - | | - | - | - |
| 15 | G | 672.4 | 34.5 | 5.1 | | - | 34.5 | 5.1 |
| 16 | B | 12.1 | - | - | | - | - | - |
| 17 | - | 969.8 | 4.9 | 0.5 | | - | 4.9 | 0.5 |
| 18 | - | 626.0 | 33.9 | 5.4 | | - | 33.9 | 5.4 |
| 19a | G, K | 12,975.6 | 562.5 | 4.3 | 119.6 | 0.9 | 682.1 | 5.3 |
| 19b | J | 103.0 | - | - | | - | - | - |
| 19c | - | 54.5 | - | - | | - | - | - |
| 19d | U | 159.6 | - | - | | - | - | - |
| 20 | - | 782.3 | - | - | | - | - | - |
| 21a | K | 610.8 | - | - | | - | - | - |
| 21b | C | 4.4 | 1.5 | 34.4 | | - | 1.5 | 34.4 |
| 21c | - | 36.2 | - | - | | - | - | - |
| 22 | - | 730.2 | - | - | | - | - | - |
| 23 | E, F | 3,008.6 | 54.4 | 1.8 | 0.2 | 0.0 | 54.7 | 1.8 |
| 24 | C, H | 625.3 | 83.5 | 13.4 | 5.7 | 0.9 | 89.2 | 14.3 |
| 25 | D, H | 213.2 | 21.2 | 9.9 | | - | 21.2 | 9.9 |
| 26 | D, H | 4,696.9 | 207.5 | 4.4 | 96.8 | 2.1 | 304.3 | 6.5 |
| 27 | D, H | 4,211.1 | 685.0 | 16.3 | 448.8 | 10.7 | 1,133.8 | 26.9 |
| 28 | E | 879.7 | 16.8 | 1.9 | 1.3 | 0.1 | 18.1 | 2.1 |
| 29 | A | 599.9 | 6.9 | 1.1 | | - | 6.9 | 1.1 |
| 30 | - | 157.9 | - | - | | - | - | - |
| 31 | A | 1,815.8 | - | - | 24.6 | 1.4 | 24.6 | 1.4 |
| 32 | A, F | 3,523.2 | 157.3 | 4.5 | 65.5 | 1.9 | 222.7 | 6.3 |
| 33 | CP | 13.4 | - | - | | - | - | - |
| C | CL | 88.8 | 86.5 | 97.4 | | - | 86.5 | 97.4 |
| **Total** | | **58,306.0** | **3,593.0** | **6.2** | **1,186.3** | **2.0** | **4,778.9** | **8.2** |

## 5.11 Environmental Outcomes

**Table 5.19** summarises the environmental outcomes, proposed assurance and monitoring for flora and vegetation.

The KIOP MLE Mitigated Proposal incorporates activities approved under KIOP (MS 805) and MIOP (MS 806). When issued in 2009, both MS 805 and MS 806 contained condition 6 relating to the management and monitoring of impacts to the Blue Hills PEC. It is recommended that these conditions be retained and consolidated into a new MS.

Both statements also contained condition 7 relating to the management and monitoring of groundwater dependant vegetation. In 2012, this condition was removed via MS 895 and MS 896 respectively.

MS 805 contained condition 12 and MS 806 contained condition 11 relating to mine closure and rehabilitation. It is recommended that these conditions be updated to reflect the contemporary condition setting for rehabilitation and mine closure.

**Table 5.19 Proposed Outcome for Flora and Vegetation**

| Environmental Outcome | Proposed Regulation | Proposed Monitoring | Consistency with EPA Objective |
|---|---|---|---|
| Cumulative clearing of Excellent condition vegetation in the Yalgoo bioregion, including regionally significant vegetation (VTs and PEC) and significant flora species:<br>• *Persoonia pentasticha* (P3)<br>• *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)<br>• *Crassula* sp. nov (undescribed species). | Recommended condition A1 'Limitations and Extent of Proposal' limiting the maximum authorised extent to no more than 1,186 ha of additional disturbance, which includes 1,185 ha of native vegetation.<br><br>Recommended condition in relation to rehabilitation.<br><br>Recommended condition in relation to offsets. | Monitoring in accordance with Ministerial implementation conditions.<br><br>Adherence to KML environmental management system documents. | The potential significant residual impact of the proposed clearing to cumulative impacts can be counterbalanced by offsets so that the environmental outcome is consistent with the EPA objective. |
| No vegetation clearing in the Geraldton Sandplains or Avon Wheatbelt IBRA subregions. | No regulation proposed. | No monitoring proposed. | No proposed disturbance of native vegetation in these areas is consistent with the EPA objective. |
| No impacts to individuals of the following species:<br>• *Acacia woodmaniorum* – Endangered<br>• *Eucalyptus synandra* – Vulnerable<br>• *Schoenia filifolia* subsp. *subulifolia* – Endangered<br>• *Stylidium scintillans* – Vulnerable<br>• *Verticordia spicata* subsp. *squamosa* – Endangered<br>• *Wurmbea tubulasa* – Endangered<br>• *Persoonia kararae – P2*<br>• *Swainsona picta – P1* | | | No proposed disturbance of these threatened and priority flora species is consistent with the EPA objective. |
| No disturbance from the Proposal to Eucalyptus woodlands of the Western Australian Wheatbelt TEC | | | No proposed disturbance of Eucalyptus woodlands of the Western Australian Wheatbelt TEC is consistent with the EPA objective. |

# 6.0 Terrestrial Fauna

## 6.1 Terrestrial Fauna Section Summary

In 2024, Bamford Consulting Ecologists (BCE) conducted a targeted terrestrial fauna assessment across an area that includes the Proposal and compiled existing data for a broader area (which includes the Combined Proposal mitigated DE) (Bamford Consulting Ecologists, 2025).

This work was undertaken to update and enhance understanding of terrestrial fauna values to inform impact assessments for the KIOP. The impact assessment results were originally presented in *Terrestrial Fauna Impact Assessment – Karara Iron Ore Project – Mine Life Extension September 2025* (Umwelt, 2025d), with an addendum of updated results presented in *Environmental Values Updated Impact Assessment - Karara Iron Ore Project – Mine Life Extension February 2026* (Umwelt, 2026b). The latter report was produced to recalculate impacts within the mitigated Proposal areas, as well as conduct analysis for Malleefowl, Western Spiny-Tailed Skink and Trapdoor Spiders habitat values in more detail.

A separate report has also been prepared to assess significant residual impacts to conservation significant terrestrial fauna in accordance with state and federal regulator guidelines (Umwelt, 2026c). This report uses findings from both the BCE targeted terrestrial fauna assessment and Umwelt's impact assessment.

The KIOP MLE Mitigated Proposal demonstrates potential for direct impacts to terrestrial fauna from direct habitat loss and loss of terrestrial fauna (including significant fauna species) as a result of clearing of native vegetation. Potential indirect impacts associated with the KIOP MLE Mitigated Proposal include noise, vibration, light and dust emissions, inadvertent clearing, habitat fragmentation and reduced connectivity, fauna entrapment, vehicle strikes, weeds, predation, and hazardous interactions with infrastructure.

The KIOP MLE Mitigated Proposal has the potential to result in a local direct impact to 1,184.8 ha of vegetation and indirect impact to 127 ha of vegetation.  Nine species listed under EPBC Act, the BC Act or as Priority species by DBCA were expected to occur as either a Resident or Regular Visitor within the Mine Area or Wheatbelt Area.

Significant residual impacts will occur to three species listed under the EPBC Act and BC Act, requiring offsets:

- Western Spiny-tailed Skink (BC Act: Vulnerable; EPBC: Endangered)
- Malleefowl (BC Act: Vulnerable; EPBC: Vulnerable)
- Ornate Trapdoor Spider (BC Act: Endangered).

Potentially significant residual impacts will also occur to the Gilled Slender Blue-tongue (BC Act: Vulnerable), Aganippe (*Idiosoma*) sp.) (potential new species) and the Karara Millipede, which is locally significant.

KML will continue to implement avoidance and mitigation measures for the approved proposals as required under implementation conditions for MS 805 and MS 806 for the KIOP and MIOP respectively. Clearing of habitats for terrestrial fauna species experiencing significant residual impacts will be directly offset, and clearing limits are also proposed. Potential indirect impacts to terrestrial fauna will be minimised and rehabilitated in accordance with KML's internal environmental management system documents.

## 6.2 EPA Objective

The EPA objective of the factor Terrestrial Fauna is '*To protect terrestrial fauna so that biological diversity and ecological integrity are maintained*' (EPA, 2016e).

In the context of this objective, ecological integrity is the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements (EPA, 2016e).

## 6.3 Policy and Guidance

**Table 6.1** lists how the policy and guidance relevant to terrestrial fauna has been considered in the assessment of this factor.

**Table 6.1 Policy and Guidance Relevant to Terrestrial Fauna**

| Policy and Guidance | How the Policy and Guidance has been Considered |
|---|---|
| *Environmental Factor Guideline: Terrestrial Fauna* (EPA, 2016e) | • Applied the relevant considerations for environmental impact assessment.<br>• Identified the values of terrestrial fauna and their significance.<br>• Identified activities that could impact on terrestrial fauna. |
| *Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna* (EPA, 2016f) | • Supporting studies were undertaken in accordance with this guidance. |
| *Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA, 2020c) | |
| *WA Environmental Offsets Policy* (Government of Western Australia, 2011)<br>*WA Environmental Offsets Guidelines* (Government of Western Australia, 2014) | • Applied mitigation measures to avoid, minimise and rehabilitate impacts from the KIOP MLE Mitigated Proposal.<br>• Identified and quantified significant residual impacts to values.<br>• Assessed the significant residual impacts to determine whether offsets are required. |
| *Matters of National Environmental Significant - Significant impact guidelines 1.1* (DoE, 2013) | • Assessed whether the KIOP MLE Mitigated Proposal would have a significant impact on terrestrial fauna MNES. |
| *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)* (EPA, 2020b) | Biodiversity survey data used for this environmental impact assessment, specifically that collected for the BCE 2025 assessment, has been packaged for KML to submit to the IBSA portal. |

## 6.4 Supporting Studies

### 6.4.1 BCE 2025 Assessment

In 2024, BCE conducted a targeted terrestrial fauna assessment within an area equivalent to the September 2025 Combined Proposal DE (the Survey Area) and is 13,557 ha in size. This area is slightly larger than the Combined Proposal mitigated DE (13,481 ha).

The purpose of this assessment was to characterise the terrestrial fauna values of the Survey Area, and build on existing data, to provide adequate and updated information. This information has informed the fauna impact assessment for the KIOP MLE Mitigated Proposal. BCE's surveys included targeted assessments to gather information on significant fauna and/or habitats of the Survey Area and built on extensive previous surveys previously conducted for KIOP and within the immediate surrounding area (including data collected for the Proposal in 2020). The assessment is provided in *Karara Iron Ore Project Mine Life Extension: Fauna Assessment of Proposed Disturbance Areas, 2020 and 2024* (Bamford Consulting Ecologists, 2025) (**Appendix 6-1**) and has been referred to as the 'BCE 2025 assessment'. The findings of the BCE 2025 assessment were used for the assessment of direct impacts to terrestrial fauna within the Survey Area as presented in the *Terrestrial Fauna Impact Assessment – Karara Iron Ore Project – Mine Life Extension September 2025* (Umwelt, 2025d) (**Appendix 6-2**) with an addendum of updated results presented in *Environmental Values Updated Impact Assessment - Karara Iron Ore Project – Mine Life Extension February 2026* (Umwelt, 2026b) (**Appendix 5-3**). An assessment of the significance of residual impacts to terrestrial fauna is detailed in *Karara Iron Ore Project Mine Life Extension - Review Significance of Residual Impacts* (Umwelt, 2026c) (**Appendix 5-4**).

The BCE 2025 assessment included desktop reviews (**Figure 6.1**) to compile a list of terrestrial fauna species that may be present within a 40 km buffer of the Survey Area. The desktop component included extensive database searches and literature reviews of sources such as Birdata, Atlas of Living Australia and DBCA databases, and the DCCEEW Protected Matters Search Tool. Historical records from surveys and monitoring conducted by BCE for species such as Malleefowl and Western Spiny-tailed Skink were also incorporated into desktop reviews.

Field surveys were conducted across three site visits in 2020 and 2024, totalling 70 person days. Surveys aimed to identify significant fauna species at the KIOP MLE new disturbance footprint, as well as vertebrate assemblages, fauna habitats, biodiversity patterns and ecological processes. Field survey methods included walked transects spaced 400-500 m apart as well as vehicle-based and opportunistic observations of conservation significant and other fauna. Key habitat information was recorded including vegetation, soils, and landforms. Species-specific searches included systematic recording of Malleefowl mounds, targeted survey for Gilled Slender Blue-tongue and *Idiosoma* spiders, as well as searching and habitat assessments for the Western Spiny-tailed Skink.

Details of the field surveys undertaken in 2020 and 2024 are provided in Section 2 of the BCE 2025 report and are summarised in **Table 6.2 and Figure 6.2**.

**Table 6.2 Summary of BCE 2025 Assessment Fauna Surveys**

| Reference | Study Timing | Area of Study | Study Methods and Effort | Survey Description |
|---|---|---|---|---|
| Karara Iron Ore Project Mine Life Extension – Fauna Assessment of Proposed Development Envelopes 2020 and 2024 (Bamford Consulting Ecologists, 2025) **Appendix 6-1** | 19–28 June 2020<br>27 June–3 July 2024<br>7 Nov 2024 | Survey Area (13,557 ha), which includes the KIOP MLE Mitigated Proposal and Combined Proposal mitigated DE | • Database searches and desktop review.<br>• 10 survey personnel over 70 field days.<br>• 497 km of walked transects and vehicle-based observations. | Desktop review of a 40 km buffer around the Combined Proposal DE, assessing publicly available databases and previous survey reporting/monitoring.<br>Field surveys, including fauna habitat mapping, targeted and opportunistic searches for fauna such as Malleefowl, Western Spiny-tailed Skink, *Idiosoma* spiders, Gilled Slender Blue-tongue and other fauna species. |

### 6.4.2 Other Relevant Surveys

The assessment of terrestrial fauna values at and proximal to the Survey Area was supported by multiple terrestrial fauna studies that have historically been completed within the KIOP MLE Mitigated Proposal and Cumulative Assessment Areas, including those utilised for the BCE 2025 assessment. A list of these surveys is provided in Tables 2.1 and 2.2 of Umwelt (2025d).

Findings of these surveys contributed to a consolidated dataset that was used by Umwelt (2025d) to calculate the Proposal's potential for impacts to terrestrial fauna values. The Proposal's cumulative impact assessment (**Section 6.10.2**) considers the results from these surveys.

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MUNGADA RD

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Minor Road

**Significant Fauna**

- Western Spiny-tailed Skink (*Egernia stokesii badia*) (BC Act: VU; EPBC Act: EN)
- Northern Shield-backed Trapdoor Spider (*Idiosoma clypeatum*) (P3)
- Ornate Trapdoor Spider (*Idiosoma formosum*) (BC Act: EN)
- Malleefowl (*Leipoa ocellata*) (BC Act: VU; EPBC Act: VU)
- Southern Whiteface (*Aphelocaphala leucopsis*) (BC Act: VU; EPBC Act: VU)

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

# FIGURE 6.1
## Conservation Significant Fauna Expected to Occur from Desktop Search Records in Mine Area

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0 1.6 3.2 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), DBCA (2024), ALA (2026), Umwelt (2025)

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MUNGADA RD

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Minor Road
- 2020 Tracks
- July 2024 Tracks
- November 2024 Tracks
- 2020 Systemic Spider Transects

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

**FIGURE 6.2**
Fauna Survey Effort – Mine Area

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0 1.6 3.2 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Bamford (2020, 2024), Umwelt (2025)

## 6.5 Impact Assessment Areas

Multiple areas were defined to conduct the impact assessment to determine potential direct, indirect and cumulative impacts to terrestrial fauna. These areas are described in detail in Table 1.1 of Umwelt (Umwelt, 2026b) and summarised below.

Note that all area calculations have been updated using geodesic methodology (rather than planar) to produce accurate and constant data, which means some of the original areas are not the same calculated area as the previous Proposal Content Document.

**Survey Area –** an area demarcated by the Combined Proposal DE (September 2025).

**Combined Proposal mitigated DE -** supersedes the Combined Proposal DE and includes the mitigation strategies described in Section 2.0 of *Environmental Values Updated Impact Assessment - Karara Iron Ore Project – Mine Life Extension February 2026* (Umwelt, 2026b).

**Currently Cleared or Approved to be Cleared (CCAC) -** areas of current or approved ground disturbance to the extent of the CAA 1 boundary.

KIOP MLE mitigated disturbance footprint – see **Section 1.2**.

Combined Proposal mitigated DF - see **Section 1.2**.

**mitigated indirect impact zone -** supersedes the indirect impact zone and includes the mitigation strategies described in Section 2.0 of - *Karara Iron Ore Project Mine Life Extension – Environmental Values Updated Impact Assessment* (Umwelt, 2026b).

**Cumulative Assessment Area 1 (CAA 1) -** Defined for the Terrestrial Fauna Impact Assessment (Umwelt, 2025d) cumulative impact assessment of the Mine Area and represents a 15 km buffer on the Mine Area (Section 1.2 [BCE, 2025]). CAA 1 was the area defined for regional assessment of terrestrial fauna for the Mine Area. In this report, the portion of CAA 1 used for regional assessment is smaller and does not take into account the buffer previously applied around Syncline Turner haul road (**Figure 6.3**).

## 6.6 Receiving Environment – Fauna Habitat

A total of 12 vegetation and substrate associations (VSAs, **Figure 6.4**) representing fauna habitats have been defined and mapped within the Survey Area, of these VSAs, eight were mapped in the Mine Area and five in the Wheatbelt Area. Except for VSA 10 (i.e. cleared land), only VSAs 3 and 7 occur in both the Mine Area and the Wheatbelt Area.

The VSAs of the Survey Area generally correspond to VTs as mapped by Umwelt (2025a). The VSAs also have potentially equivalent pre-European vegetation system associations (PEVSAs). These were determined by Umwelt following review of PEVSA descriptions and mapped extents against those of VTs across the Survey Area and surrounds.

The VSAs of the Survey Area are defined in **Table 6.3**.

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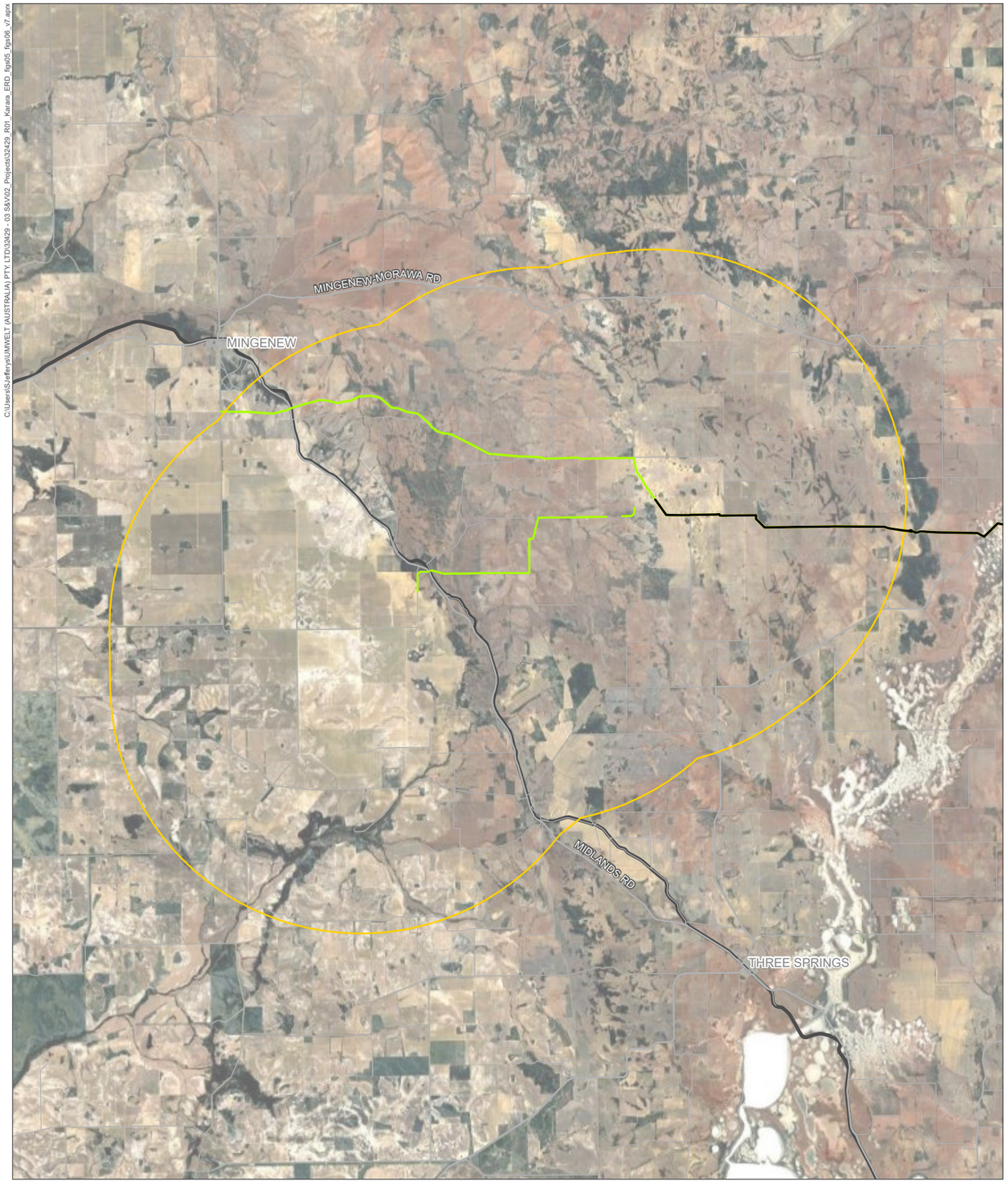


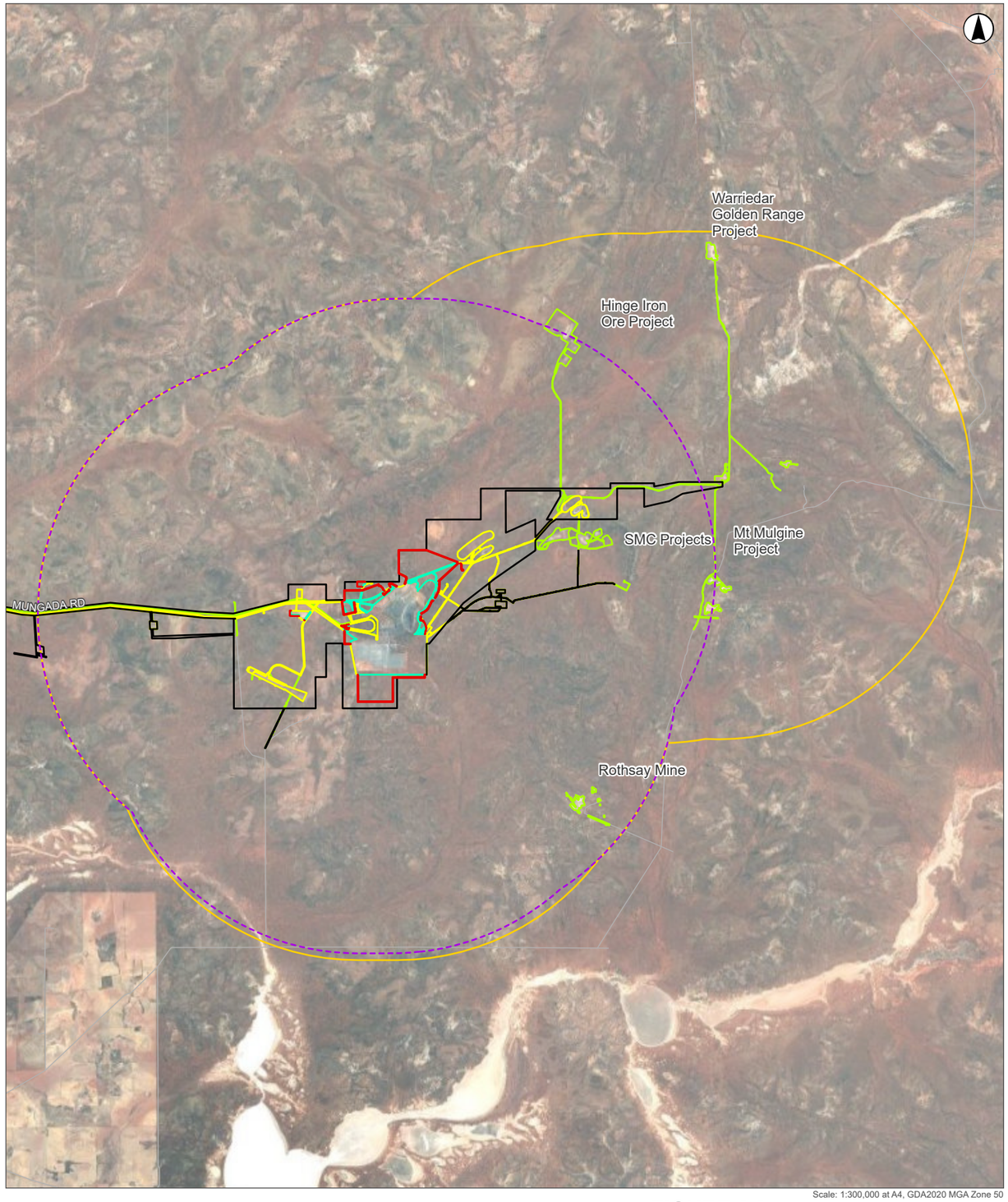


Scale: 1:300,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Currently Cleared or Approved Cleared (CCAC)
- Cumulative Assessment Area 1 (CAA1)
- KIOP MLE Mitigated Disturbance Footprint (15km buffer)
- Main Road
- Minor Road
- Railway

**FIGURE 6.3**
Cumulative Impact Assessment Areas

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0 6 12 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

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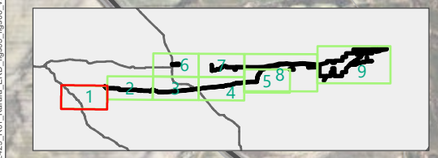


**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Fauna Habitat VSAs**

- 3 Acacia Tall Shrubland
- 7 York Gum Open Woodland
- 10 Cleared Land
- 11 Creeklines
- 12 Planted Eucalypts

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

# FIGURE 6.4

Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 1

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

0 1 2 km

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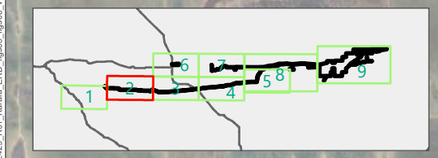


**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road

**Fauna Habitat VSAs**

- 3 Acacia Tall Shrubland
- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land

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

## FIGURE 6.4

Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 2

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0 1 2 km

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

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Fauna Habitat VSAs**

- 3 Acacia Tall Shrubland
- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land
- 12 Planted Eucalypts

# FIGURE 6.4
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 3

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0 1 2 km

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

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**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Fauna Habitat VSAs**

- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land
- 12 Planted Eucalypts

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

**FIGURE 6.4**
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 4

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0 1 2 km

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

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**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road

**Fauna Habitat VSAs**

- 1 Breakaways and Rocky Ridges
- 3 Acacia Tall Shrubland
- 7 York Gum Open Woodland
- 10 Cleared Land

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

**FIGURE 6.4**
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 5

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0 1 2 km

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

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MORAWA

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Main Road
- Minor Road
- Railway

**Fauna Habitat VSAs**

- 5 Mixed Acacia and Tall Thicket (Acacia and Melaleuca)
- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land

## FIGURE 6.4

Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 6

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0 1 2 km

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

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road

**Fauna Habitat VSAs**

- 3 Acacia Tall Shrubland
- 5 Mixed Acacia and Tall Thicket (Acacia and Melaleuca)
- 6 Acacia Low Shrubland on Gravelly Rises
- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land

## FIGURE 6.4
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 7

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0 1 2 km

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

umwelt

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MUNGADARD

WEELHAMBY LAKE

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

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Major Watercourse

**Fauna Habitat VSAs**

| | |
|---|---|
| 1 | Breakaways and Rocky Ridges |
| 3 | Acacia Tall Shrubland |
| 4 | Acacia Shrubland with Sand Pine |
| 5 | Mixed Acacia and Tall Thicket (Acacia and Melaleuca) |
| 6 | Acacia Low Shrubland on Gravelly Rises |
| 7 | York Gum Open Woodland |
| 9 | Chenopod Shrubland/Salt Lakes/Clay Pans |
| 10 | Cleared Land |
| Water | Water |

# FIGURE 6.4
## Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 8

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0 1.6 3.2 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

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MUNGADA RD

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road

**Fauna Habitat VSAs**

1. Breakaways and Rocky Ridges
2. Acacia Shrubland over Granite
3. Acacia Tall Shrubland
4. Acacia Shrubland with Sand Pine
5. Mixed Acacia and Tall Thicket (Acacia and Melaleuca)
6. Acacia Low Shrubland on Gravelly Rises
7. York Gum Open Woodland
8. *Eucalyptus clelandiorum* Woodland/Forest
9. Chenopod Shrubland/Salt Lakes/Clay Pans
10. Cleared Land

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

# FIGURE 6.4
## Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 9

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0 1.6 3.2 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

umwelt

**Table 6.3 VSAs of the Combined Proposal DE**

| VSA | VSA Name | Description | Mine Area | Wheatbelt Area | Associated VT (Umwelt, 2025a) | Equivalent PEVSA |
|---|---|---|---|---|---|---|
| **1** | Breakaways and rocky ridges | These are isolated and scattered and most appear to be laterite or with some ironstone. Breakaways and rocky ridges support scattered mostly low acacias forming a moderately dense to open shrubland. Occurs within the Mine Area and surrounding Survey Area, and in small, scattered areas to the west of the Karara Area. | ✓ | - | O<br>F | Yalgoo_202<br>Yalgoo_358<br>Yalgoo_363<br>Yalgoo_419<br>Yalgoo_420 |
| **2** | Acacia shrubland over granite, and granite outcrops | Acacia open shrubland often over a herbfield of Resurrection Plant (*Borya sphaerocephala*) on shallow sandy loam over granite, with some granite outcropping. The outcrops have a low profile with little actual exposed rock, and are scattered throughout the large area in the south, and just north of the accommodation village. Areas with Acacia shrubland occur in the west of the proposed TSF (around granite outcrops), and just to the north of the accommodation village. | ✓ | - | B | Yalgoo_358<br>Yalgoo_364<br>Yalgoo_419 |
| **3** | Acacia tall shrubland on moderately deep sandy loam, often with scattered small rock on surface | Acacia tall shrubland on moderately deep sandy loam, often with scattered small rocks on surface. Abundant annuals in winter and spring. Scattered York Gum (*Eucalyptus loxophleba*) and other eucalypts. Extensive and generally low in the landscape. Occurs within the Mine Area and surrounding the Survey Area, and in patches along the remainder of the Survey Area to the west of the Karara Area. In the Wheatbelt Area this VSA is confined to road verges and small remnants and is generally highly degraded due to weed invasion. | ✓ | ✓ | A<br>C<br>E<br>H<br>R<br>T<br>Z<br>AA<br>AB<br>HMVT B<br>HMVT C<br>HMVT G | Billeranga_692<br>Jibberding_419<br>Mingenew_354<br>Mingenew_380<br>Mingenew_420<br>Nanekine_354<br>Nanekine_551<br>Nanekine_684<br>Perenjori_684<br>Tathra_254<br>Tathra_354<br>Tathra_379<br>Yalgoo_40<br>Yalgoo_355<br>Yalgoo_419<br>Yalgoo_420<br>Yarra Yarra_380<br>Yarra Yarra_631 |

| VSA | VSA Name | Description | Mine Area | Wheatbelt Area | Associated VT (Umwelt, 2025a) | Equivalent PEVSA |
|---|---|---|---|---|---|---|
| | | | | | | Yuna_380<br>Yuna_551 |
| **4** | Acacia shrubland with scattered Sand Pine on sandy loam flats | Acacia shrubland with scattered Sand Pine (*Callitris columellaris*) on sandy loam flats. Occurs on broad flats mainly in the Mine Area and surrounding the Survey Area. Also occurs immediately to the west of the Karara Area. | ✓ | - | D | Jibberding_355<br>Jibberding_419<br>Yalgoo_40<br>Yalgoo_419<br>Yalgoo_420 |
| **5** | Mixed shrubland and tall thicket of *Acacia* and *Melaleuca* on clay-loam flats with little understorey | Is fairly extensive within the Mine Area (and surrounding the Survey Area) and is also present in the northern corridor west of the Karara Area, and at Tilley Siding. | ✓ | - | P<br>Q | Jibberding_419<br>Yalgoo_202<br>Yalgoo_40<br>Yalgoo_419<br>Yalgoo_420<br>Yalgoo_434 |
| **6** | Acacia low shrubland on gravelly-loam rises | Shrubs tend to be low (<1.5 m) and dense. This occurs scattered within the Mine Area and surrounding the Survey Area, and along Yandanooka Pipeline where the northern corridor passes through the Koolanooka Hills. | ✓ | - | S<br>V<br>W<br>X<br>Y | Yalgoo_358<br>Yalgoo_363<br>Yalgoo_364<br>Yalgoo_40<br>Yalgoo_419 |
| **7** | York Gum open woodland on clay-loam flats with little understorey | Extensive and low in the landscape. Soils may occasionally be waterlogged. Occurs scattered within the Mine Area and surrounding the Survey Area, as patches immediately west of the Karara Area, and in small and degraded (weed invaded) patches along road verges in the Wheatbelt Area. | ✓ | ✓ | G<br>I<br>K<br>HMVT E<br>HMVT F | Jibberding_355<br>Mingenew_352<br>Mingenew_354<br>Yalgoo_326<br>Yalgoo_355<br>Yalgoo_358<br>Yalgoo_363<br>Yalgoo_364<br>Yalgoo_419<br>Yalgoo_420<br>Yalgoo_936<br>Yarra Yarra_142<br>Yarra Yarra_631 |

| VSA | VSA Name | Description | Mine Area | Wheatbelt Area | Associated VT (Umwelt, 2025a) | Equivalent PEVSA |
|---|---|---|---|---|---|---|
| **8** | *Eucalyptus clelandiorum* woodland to forest on calcareous clay loam flats usually close to salt lake systems | Is present only within the Karara area, approximately 300 m north of the boundary of the Mine Area. | - | - | U | Yalgoo_125 |
| **9** | Chenopod shrublands and salt lakes, with a large system in the central north of the Mine Area. Also includes areas of clay pans | Occurs in the Survey Area surrounding the Mine Area, approximately 800 m north of the KIOP MLE mitigated disturbance footprint, but not within the footprint areas themselves. It also occurs where the Yandanooka Pipeline and Borefield Corridor cross salt lakes to the west of the Karara Area, such as Weelhamby Lake and the Salt River, and at Tilley Siding. | - | - | CP<br>J<br>L<br>M<br>N<br>HMVT A | Jibberding_1198<br>Yalgoo_41<br>Yalgoo_125<br>Yalgoo_364<br>Yarra Yarra_142<br>Yarra Yarra_631 |
| **10** | Cleared land | Depending upon the location within the Survey Area, this VSA consists of either land cleared for mining infrastructure and operations or cleared paddocks and road verge. Cleared land makes up the majority of the Survey Area to the west of the Karara Area, particular the very narrow corridors which tend to follow existing roads through cleared farmland. Within the Wheatbelt Area this VSA contains occasional isolated trees of York Gum or Jam (*Acacia acuminata*). Within the Karara Area (including the Mine Area) this VSA encompasses the mine itself as well as areas cleared for infrastructure such as buildings, roads/tracks and the air strip. | ✓ | ✓ | CL | N/A |
| **11** | Creeklines | Narrow and probably ephemeral drainage lines with *Eucalyptus camaldulensis* over sedge, *Hakea preissii, Acacia saligna*, annual herbs and introduced grasses on seasonally waterlogged and even wet clay-loam soils. Occurs only within the boundary of the Wheatbelt Area, in the far west of the Survey Area. | - | ✓ | HMVT D | Mingenew_352<br>Mingenew_354<br>Yalgoo_936<br>Yarra Yarra_142 |
| **12** | Planted Eucalypts | Occurs only in the far west of the Survey Area, along road verges within the Wheatbelt Area. | - | ✓ | PL | N/A |

## 6.7 Receiving Environment – Terrestrial Fauna

### 6.7.1 Vertebrate Fauna Assemblage

A desktop review undertaken for the Proposal by the BCE 2025 assessment identified 414 vertebrate fauna species that have the potential to be present within the Survey Area. Not all of these species have been identified during field surveys likely due to a number of factors, including timing of surveys or cryptic species being difficult to find (Bamford Consulting Ecologists, 2025).

To provide a more robust approach of predicting fauna assemblages (compared to relying on potentially incomplete occurrence records), expected occurrence categories were applied to all species returned by the desktop review, determined through a combination of survey results from the area (as discussed in **Section 6.4.2**) as well as the known biology and distribution of the species (from general literature and BCE's professional experience). The occurrence categories were defined as:

- **Residents:** Species with a population permanently present in the Survey Area.
- **Regular Visitors:** Species that regularly occur within the Survey Area in at least moderate numbers, such as part of an annual cycle.
- **Irregular Visitor:** Species that irregularly occur within the Survey Area footprint, such as nomadic and irruptive species. Periods of time between visitations may vary significantly, however when the species is present it uses the Survey Area the in at least moderate numbers and for some time.
- **Vagrant:** Species that occur within the Survey Area unpredictably, in small numbers and / or for very brief periods.
- **Locally Extinct:** Species that would have been present but have not been recorded in the local area for some time and are therefore almost certainly no longer present in the Survey Area.

Of the 414 species identified through the desktop assessment,150 species were considered Resident and 36 species Regular Visitor to the Mine Area. A total of 117 species were considered Resident, and 49 species considered Regular Visitor to the Wheatbelt Area (**Table 6.4**)

**Table 6.4 Composition of Expected Vertebrate Fauna Assemblage at the Survey Area**

| Taxon | Total Number of Species* | | Number of Species in Each Occurrence Category | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Resident | | Regular Visitor | | Irregular Visitor | | Vagrant | | Locally Extinct (unconfirmed) |
| | Mine Area | Wheatbelt Area | Mine Area | Wheatbelt Area | Mine Area | Wheatbelt Area | Mine Area | Wheatbelt Area | Mine Area | Wheatbelt Area | Mine Area & Wheatbelt Area |
| **Frogs** | 7 (including 1 introduced) | 6 | 7 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Reptiles** | 54 | 48 | 53 | 46 | 0 | 0 | 1 | 2 | 0 | 0 | 1 |
| **Birds** | 167 | 168 | 65 | 48 | 33 | 42 | 57 | 64 | 12 | 14 | 2 |
| **Native Mammals** | 24 | 25 | 21 | 9 | 2 | 8 | 1 | 8 | 0 | 0 | 16 |
| **Introduced Mammals** | 5 | 5 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| **Total** | **257** | **252** | **150** | **113** | **36** | **50** | **59** | **74** | **12** | **15** | **19** |

* Locally extinct species are not included in totals given the number of locally extinct species is uncertain.

## 6.7.2 Conservation Significant Fauna

A total of 27 terrestrial fauna species of conservation significance were identified as either a Resident or Regular Visitor at the Mine Area and 13 conservation significant fauna species as a Resident or Regular Visitor at the Wheatbelt Area (see **Table 6.5**). The levels of conservation significance applied by BCE were:

- conservation significance 1 (CS 1) – species listed under the BC Act and/or the EPBC Act
- conservation significance 2 (CS 2) – species listed as Priority species by DBCA
- conservation significance 3 (CS 3) – species with at least local significance due to their pattern of distribution.

The suite of significant fauna predicted to be present within the Mine and Wheatbelt Areas was found by BCE to be very similar, with almost all species expected in to occur at both areas. However, the distribution and occurrence of these species was expected to differ based on the environmental factors such as the extent of clearing, fragmentation, and the surrounding landscape.

### 6.7.2.1 Listed Species

Six species listed under the BC Act and/or the EPBC Act were expected to occur as either a Resident or Regular Visitor within the Mine Area or Wheatbelt Area:

- Western Spiny-tailed Skink (*Egernia stokesii badia*) (BC Act: Vulnerable; EPBC: Endangered)
- Ornate Trapdoor Spider (*Idiosoma formosum*) (BC Act: Endangered)
- Malleefowl (*Leipoa ocellata*) (BC Act: Vulnerable; EPBC: Vulnerable)
- Southern Whiteface (*Aphelocephala leucopsis*) (BC Act: Vulnerable; EPBC: Vulnerable)
- Gilled Slender Blue-tongue (*Cyclodomorphus branchialis*) (BC Act: Vulnerable)
- Peregrine Falcon (*Falco peregrinus*) (BC Act: Other Specially Protected).

### 6.7.2.2 Priority Species and Other Specially Protected Species

Three species listed as Priority by DBCA were expected to occur as either a Resident or Regular Visitor within the Mine Area or Wheatbelt Area:

- Long-tailed Dunnart (*Antechinomys* (*Sminthopsis*) *longicaudata*) (Priority 4)
- Central Long-eared Bat (*Nyctophilus major tor*) (Priority 3)
- Northern Shield-backed Trapdoor Spider (*Idiosoma clypeatum*, previously known as *Idiosoma nigrum*) (Priority 3).

### 6.7.2.3 Locally Significant Species

A total of 14 vertebrate fauna species expected to be Residents or Regular Visitors to the KIOP MLE Mine Area or Wheatbelt Area were considered to be of at least local significance due to their pattern of distribution:

- Desert Trilling Frog (*Neobatrachus centralis*)
- Mulga Dragon (*Caimanops (Diporiphora) amphiboluroides*)

- Reticulated Velvet Gecko (*Hesperoedura reticulata*)
- Bush Stone-curlew (*Burhinus grallarius*)
- Major Mitchell's Cockatoo (*Cacatua leadbeateri*)
- White-browed Treecreeper (*Climacteris affinis*)
- Rufous Treecreeper (*Climacteris rufus*)
- Crested Bellbird (*Oreoica gutturalis*)
- Redthroat (*Pyrrholaemus brunneus*)
- Western Yellow Robin (*Eopsaltria griseogularis*)
- White-browed Babbler (*Pomatostomus superciliosus*)
- Regent Parrot (*Polytelis anthopeplus*)
- Woolley's Pseudantechinus (*Pseudantechinus woolleyae*)
- Kultarr (*Antechinomys laniger*).

The BCE 2025 assessment also discussed four resident invertebrate species in the Mine Area that have no formal conservation listing but are considered locally significant. Given a lack of data for these entities, the total distribution and abundance of the potential new taxa in the region are not known:

- *Aganippe* (*Idiosoma*) sp. (Unidentified Trapdoor Spider)
- *Antichiropus* sp. nov. 'Karara' (Karara Millipede)
- *Millipede* sp. nov. 'PM1'. (Millipede PM1)
- *Urodacus* sp. nov. 'Mt Gairdner' (Mt Gairdner Scorpion).

Note that no recorded location has been reported for *Aganippe* (*Idiosoma*) sp. and as such it does not appear in any figures. In the instances where '*Idiosoma sp.'* does appear in a figure, this is a case where the reporting ecologist was not able to distinguish between *Idiosoma clypeatum* and *Idiosoma formosum* during time of recording.

### 6.7.3 Species Monitoring

This section provides a summary of monitoring efforts for Western Spiny-tailed Skink, Malleefowl and Trapdoor Spiders.

#### 6.7.3.1 Western Spiny-tailed Skink

Individuals and scats were recorded in the Survey area in 2020 and 2024 (**Figure 6.5**). Locations of key habitat values (suitable log piles for colony sites) were recorded along survey tracks and transects during the 2020 and 2024 survey (BCE, 2025). The survey tracks covered approximately half of the proposed MLE expansion footprint by area, with an estimate that approximately twice as many suitable log piles might be available compared to what was recorded (BCE, 2025).

KML has a register of known colony sites which are monitored annually to determine if the site is occupied. The number of occupied colony sites recorded per year has declined from 63 in 2018 to 49 in 2023, which is attributed to little crows and feral cats (possibly attracted by the site landfill) and colony sites providing little cover or food (possibly due to livestock grazing) (BCE, 2025).

Mapped habitat is VSA 7 York Gum open woodland (BCE, 2025).

KML's objective of undertaking annual monitoring for the presence or absence of Western Spiny-tailed Skink has been achieved in each successive year since the commencement of monitoring in spring 2011. Whilst presence/absence data varies between years, skink activity at impact and control sites are closely aligned.

One Western Spiny-tailed Skink mortality has been recorded since monitoring commenced (in 2018).

#### 6.7.3.2 Malleefowl

Malleefowl mounds and bird tracks were recorded in 2020 and 2024 surveys (**Figure 6.6**). The fauna survey estimated six breeding Malleefowl pairs used the southern portion of the survey area, which was the only part of the proposed disturbance where recently active mounds have been recorded (BCE, 2025).

Habitat suitable for Malleefowl nesting and foraging was mapped as VSAs 3, 4 and 6 (BCE, 2025). Locally in the Karara region, this species prefers the areas close to ridges where the soil is a gravely loam rather than the heavier soils of the plain, which are more likely to waterlog when used in mound construction (BCE, 2025).

Habitat suitable for Malleefowl foraging only (i.e. not suitable for nesting) was mapped as VSAs 7 and 11 (BCE, 2025).

Approximately 804 mounds of varying status (ancient through to fresh and actively used) have been identified and surveyed since 2008. Mounds were deemed to be 'active' if survey comments confirmed Malleefowl activity from 2020 onwards. All other records were categorised as 'historic'. Combined records from KML and BCE classified 15 of the 804 mound records as currently active.

A spatial analysis of monitoring data shows that Malleefowl have occupied various mounds within operational areas where impacts to Malleefowl activity may be anticipated, with many sites being used for multiple years over the reporting period. This may suggest that Malleefowl are relatively undisturbed by proximity to mining activity.

Recorded Malleefowl mortalities include:

- One Malleefowl mortality as a result of a dog attack in 2023.
- Six Malleefowl mortalities due to vehicle strike as a result of KMG operations on the shared Mungada Road (2023-2024).

#### 6.7.3.3 Trapdoor Spiders

The trapdoor spider species found at Karara Mine Area was initially classified as *Idiosoma nigrum* and subsequently listed as Vulnerable under the EPBC Act and Schedule 2 of the BC Act. The Conservation Advice for *Idiosoma nigrum* published in 2013 at the time of listing stated the species' extent of occurrence was 21,500 km$^2$ and area of occupancy was 1,700 km$^2$. However, since then a taxonomic review (Rix et al., 2018) confirmed that the "*nigrum* group" is multiple separate species. The trapdoor spider records from surveys at Karara Mine Area are now recognised as *Idiosoma clypeatum* and *Idiosoma formosum* (**Figure 6.7** and **Figure 6.8**), with one unidentified specimen.

None of the trapdoor spider specimens collected from the Karara Mine Area are currently recognised as *Idiosoma nigrum*. The distribution of the revised *Idiosoma nigrum* species extends from Cunderdin as far north as Moora, which lies more than 150 km south of the Karara Proposal. Nevertheless, DCCEEW has confirmed that *Idiosoma clypeatum* should be considered an important population of the listed *Idiosoma nigrum* species until the EPBC Act listing is updated. Therefore, for the purpose of DCCEEW assessment, *Idiosoma clypeatum* is considered as an important population of a Vulnerable species.

For the purposes of assessment under the BC Act, the species recorded at Karara have separate listings and will be considered separately. Both the Northern Shield-backed Trapdoor Spider (*Idiosoma clypeatum*) and the Ornate Trapdoor Spider (*Idiosoma formosum*) were found in the Mine Area in 2020 and 2024, along with an unidentified and possibly significant third species (*Idiosoma (Aganippe*) sp.).

*Idiosoma clypeatum* has been formally assessed and listed as Priority 3 with an extent of occurrence of over 120,000 km$^2$ (Rix et al, 2018) and does not meet criteria for listing as Vulnerable (Umwelt, 2026c). Mapped habitat is VSAs 1, 3, 5 and 6 (breakaway and rocky ridges and Acacia and mixed shrubland) (BCE, 2025).

*Idiosoma formosum* has been formally assessed and listed as Endangered under the BC Act with a known extent of occurrence of approximately 4,000 km$^2$ and area of occupancy of <500 km$^2$ (Rix et al., 2018) Mapped habitat is VSAs 4, 5, 6 and 7 (typically sandy loam and moderately heavy soils on plains, away from rocky ridges – includes Acacia and mixed shrubland and York Gum Woodland) (BCE, 2025).

Mapped habitat for *Idiosoma (Aganippe*) sp.) is VSA 2 (granite outcrop) based on the single record which was collected in the northwest corner of the southern survey area ((BCE, 2025). The coordinates of this record are not available, but VSA 2 in the southern survey area is almost entirely outside of the proposed disturbance footprint. Therefore, this location is not expected to be impacted.

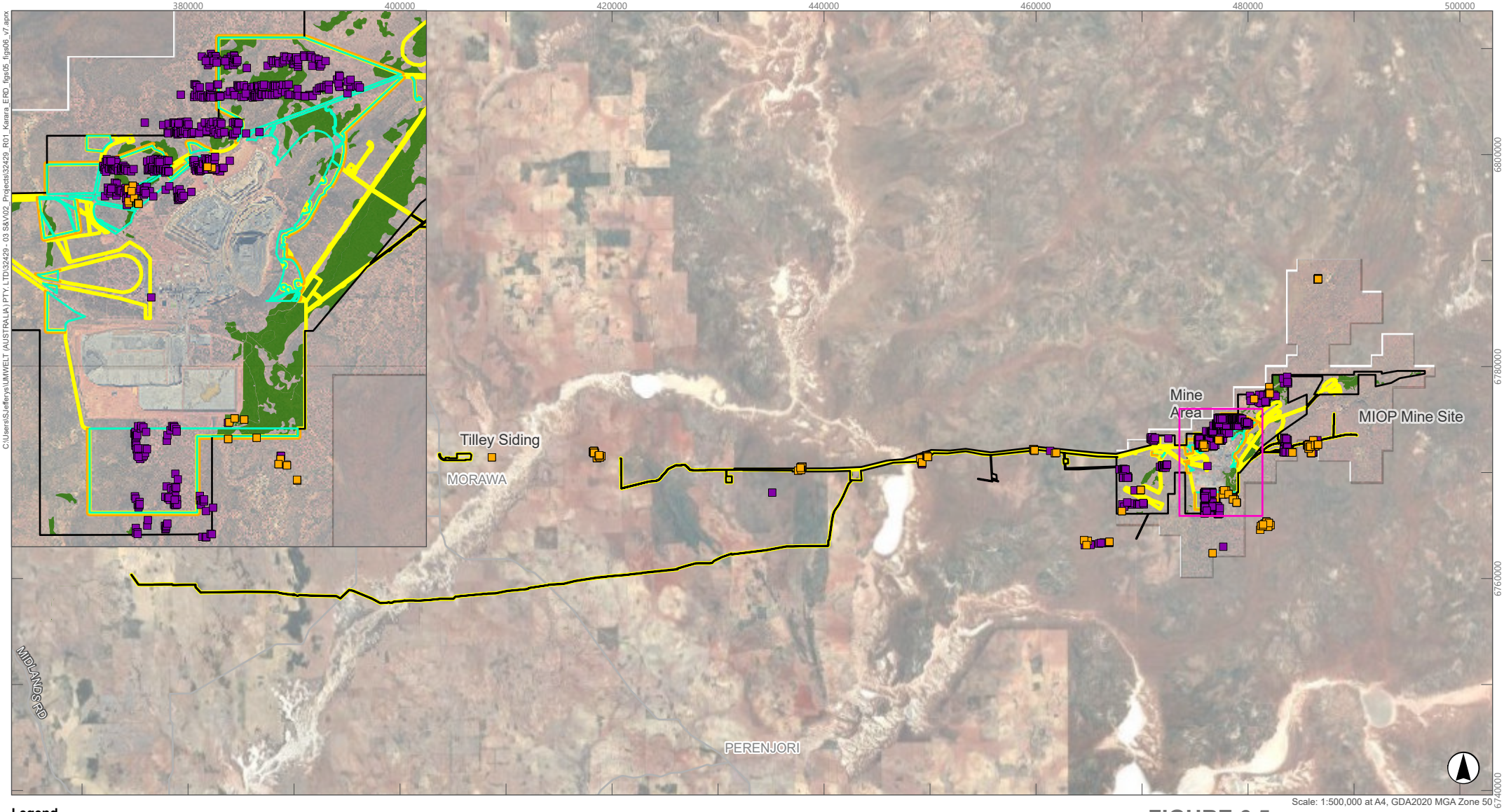
**Table 6.5 Conservation Significant Terrestrial Fauna Species and their Expected Occurrence Status in the Survey Area**

| Scientific Name | Common Name | BCE Conservation Significance | Status (WA) | Status (EPBC) | Mine Area | | Wheatbelt Area | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Expected Occurrence | VSA | Expected Occurrence | VSA |
| **Frogs** | | | | | | | | |
| *Neobatrachus centralis* | Desert Trilling Frog | CS3 | - | - | Resident | Throughout except 9 | Out of range | NA |
| **Reptiles** | | | | | | | | |
| *Caimanops (Diporiphora) amphiboluroides* | Mulga Dragon | CS3 | - | - | Resident | 3, 4, 5, 6 | Out of range | NA |
| *Morelia spilota* | Carpet Python | CS3 | - | - | Irregular Visitor | Mainly 1, 2 | Irregular Visitor | 3, 7, 11 |
| *Hesperoedura reticulata* | Reticulated Velvet Gecko | CS3 | - | - | Resident | 7 | Resident | 7 |
| *Cyclodomorphus branchialis* | Gilled Slender Blue-tongue | CS1 | VU | - | Resident | 1, 2 | Resident | 3, 7, 11 |
| *Egernia stokesii badia* | Western Spiny-tailed Skink | CS1 | VU | EN | Resident | Mostly 7 | Resident | Mostly 7 |
| **Birds** | | | | | | | | |
| *Apus pacificus* | Fork-tailed Swift | CS1 | MI | MI | Irregular Visitor | Throughout | Irregular Visitor | Throughout |
| *Burhinus grallarius* | Bush Stone-curlew | CS3 | - | - | Regular Visitor | 3, 4, 5, 6 | Irregular Visitor | Restricted to any remnant vegetation |
| *Cacatua leadbeateri* | Major Mitchell's Cockatoo | CS3 | - | - | Resident | Forage throughout except bare salt lakes; nesting 7 | Irregular Visitor | Forage throughout except bare salt lakes; nesting 7 |
| *Zanda latirostris* | Carnaby's Black-Cockatoo | CS1 | EN | EN | Out of range | NA | Irregular Visitor | Throughout |

| Scientific Name | Common Name | BCE Conservation Significance | Status (WA) | Status (EPBC) | Mine Area | | Wheatbelt Area | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Expected Occurrence | VSA | Expected Occurrence | VSA |
| *Thinornis cucullatus* | Hooded Plover | CS2 | P4 | - | Irregular Visitor | 9 | Irregular Visitor | 9 |
| *Climacteris affinis* | White-browed Treecreeper | CS3 | - | - | Resident | 6, 7 | Vagrant | NA |
| *Climacteris rufus* | Rufous Treecreeper | CS3 | - | - | Resident | 7, 8 | Irregular Visitor | 7 |
| *Falco peregrinus* | Peregrine Falcon | CS1 | OS | | Resident | Forage throughout; nest cliff ledges 1 | Regular Visitor | Forage throughout |
| *Leipoa ocellata* | Malleefowl | CS1 | VU | VU | Resident | Forage throughout; mounds mainly 3, 4, 6 | Regular Visitor | Foraging 3, 7, 11 |
| *Ardeotis australis* | Australian Bustard | CS3 | - | - | Irregular Visitor | Throughout | Irregular Visitor | Throughout, including paddocks |
| *Oreoica gutturalis* | Crested Bellbird | CS3 | - | - | Resident | 3, 4, 5, 6 | Resident | Any remnant vegetation |
| *Calamanthus montanellus* | Western Fieldwren | CS3 | - | - | Irregular Visitor | 3, 6, 9 | Irregular Visitor | 3, 9 |
| *Pyrrholaemus brunneus* | Redthroat | CS3 | - | - | Resident | 3, 4, 5, 6 | Resident | 3 |
| *Aphelocephala leucopsis* | Southern Whiteface | CS1 | VU | VU | Resident | Parts of 3, 4, 5, 6, 9 | Resident | Parts of 3, 9 |
| *Eopsaltria griseogularis* | Western Yellow Robin | CS3 | - | - | Resident | 3, 4, 5, 6 | Regular Visitor | 3 |
| *Pomatostomus superciliosus* | White-browed Babbler | CS3 | - | - | Resident | 3, 4, 5, 6 | Resident | 3 |
| *Polytelis anthopeplus* | Regent Parrot | CS3 | - | - | Regular visitor | Forage throughout; nesting 7 | Regular Visitor | Forage throughout; nesting 7 |

| Scientific Name | Common Name | BCE Conservation Significance | Status (WA) | Status (EPBC) | Mine Area | | Wheatbelt Area | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Expected Occurrence | VSA | Expected Occurrence | VSA |
| *Neophema splendida* | Scarlet-chested Parrot | CS3 | - | - | Vagrant | Throughout | Vagrant | Throughout |
| *Actitis hypoleucos* | Common Sandpiper | CS1 | MI | MI | Irregular Visitor | Salt lakes and margins; 9 | Irregular Visitor | Salt lakes and margins; 9 |
| *Calidris acuminata* | Sharp-tailed Sandpiper | CS1 | MI | VU & MI | Irregular Visitor | Salt lakes and margins; 9 | Irregular Visitor | Salt lakes and margins; 9 |
| *Calidris ferruginea* | Curlew Sandpiper | CS1 | CR | CR & MI | Irregular Visitor | Salt lakes and margins; 9 | Irregular Visitor | Salt lakes and margins; 9 |
| *Calidris ruficollis* | Red-necked Stint | CS1 | MI | MI | Irregular Visitor | Salt lakes and margins; 9 | Irregular Visitor | Salt lakes and margins; 9 |
| *Calidris subminuta* | Long-toed Stint | CS1 | MI | MI | Irregular Visitor | Salt lakes and margins; 9 | Irregular Visitor | Salt lakes and margins; 9 |
| *Tringa nebularia* | Common Greenshank | CS1 | MI | EN & MI | Irregular Visitor | Salt lakes and margins; 9 | Irregular Visitor | Salt lakes and margins; 9 |
| **Mammals** | | | | | | | | |
| *Antechinomys (Sminthopsis) longicaudata* | Long-tailed Dunnart | CS2 | P4 | - | Resident | 1, 2 | Irregular visitor | 3, 7, 11 |
| *Pseudantechinus woolleyae* | Woolley's Pseudantechinus | CS3 | - | - | Resident | 1, 2 | Irregular visitor | 3, 7, 11 |
| *Antechinomys laniger* | Kultarr | CS3 | - | - | Resident | 3, 4, 5, 6 | Irregular Visitor | 3 |
| *Trichosurus vulpecula* | Brush-tailed Possum | CS3 | - | - | Irregular Visitor | 1, 7 | Irregular Visitor | 7 |
| *Nyctophilus major tor* | Central Long-eared Bat | CS2 | P3 | - | Resident | Forage throughout; shelter 7, 8 | Irregular Visitor | Any with occasional large eucalypt |

| Scientific Name | Common Name | BCE Conservation Significance | Status (WA) | Status (EPBC) | Mine Area | | Wheatbelt Area | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Expected Occurrence | VSA | Expected Occurrence | VSA |
| **Invertebrates** | | | | | | | | |
| *Idiosoma clypeatum* (previously known as *Idiosoma nigrum*) | Northern Shield-backed Trapdoor Spider | CS2 | P3 | - | Resident | 1, 3, 5, 6 | Out of range/locally extinct | NA |
| *Idiosoma formosum* | Ornate Trapdoor Spider | CS1 | EN | - | Resident | 4 and 6; also possibly 5 and 7 | Out of range/locally extinct | NA |
| *Aganippe* (*Idiosoma*) sp. | Unidentified Trapdoor Spider | CS3 | - | - | Resident | 2 | Out of range | NA |
| *Antichiropus* sp. nov. 'Karara' | Karara Millipede | CS3 | - | - | Resident | 1, 3 | Out of range | NA |
| *Millipede* sp. nov. 'PM1' | Millipede PM1 | CS3 | - | - | Resident | 1, 3 | Out of range | NA |
| *Urodacus* sp. nov. 'Mt Gairdner' | Mt Gairdner Scorpion | CS3 | - | - | Resident | 1, 3 | Out of range | NA |




Scale: 1:500,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Combined Proposal Mitigated Disturbance Footprint
- Main Road

**Western Spiny-tailed Skink**

- Active Colony
- Potential Colony
- Mapped Habitat for Western Spiny-tailed Skink

**FIGURE 6.5**

Predicted Impacts to Western Spiny-tailed Skink from KIOP MLE Proposal

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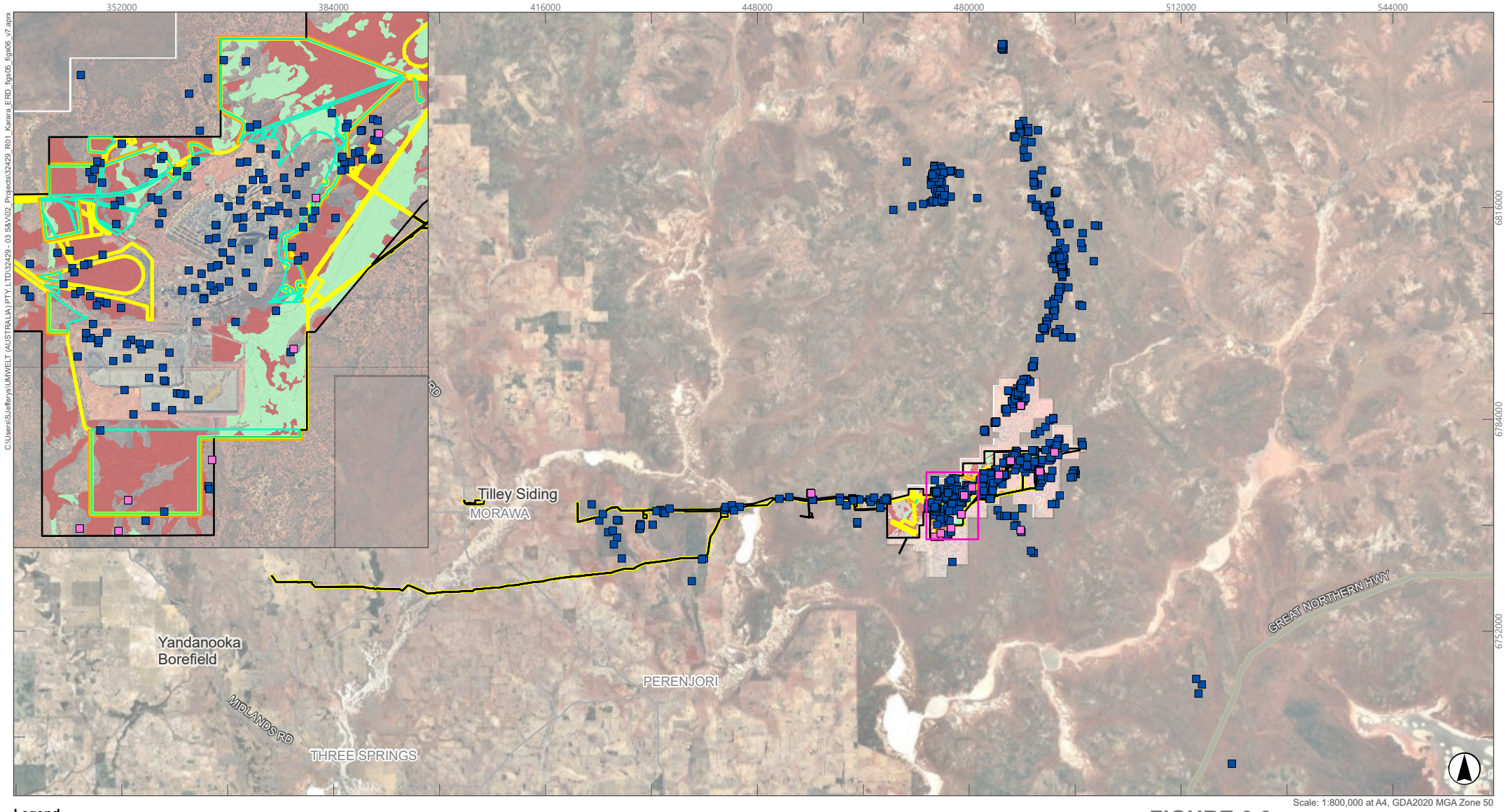


**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Combined Proposal Mitigated Disturbance Footprint
- Highway
- Main Road

**Malleefowl Mound**

- Active
- Historic
- Mapped Habitat for Malleefowl (nesting & foraging)
- Mapped Habitat for Malleefowl (foraging only)

Scale: 1:800,000 at A4, GDA2020 MGA Zone 50

**FIGURE 6.6**
Predicted Impacts to Malleefowl from KIOP MLE Proposal

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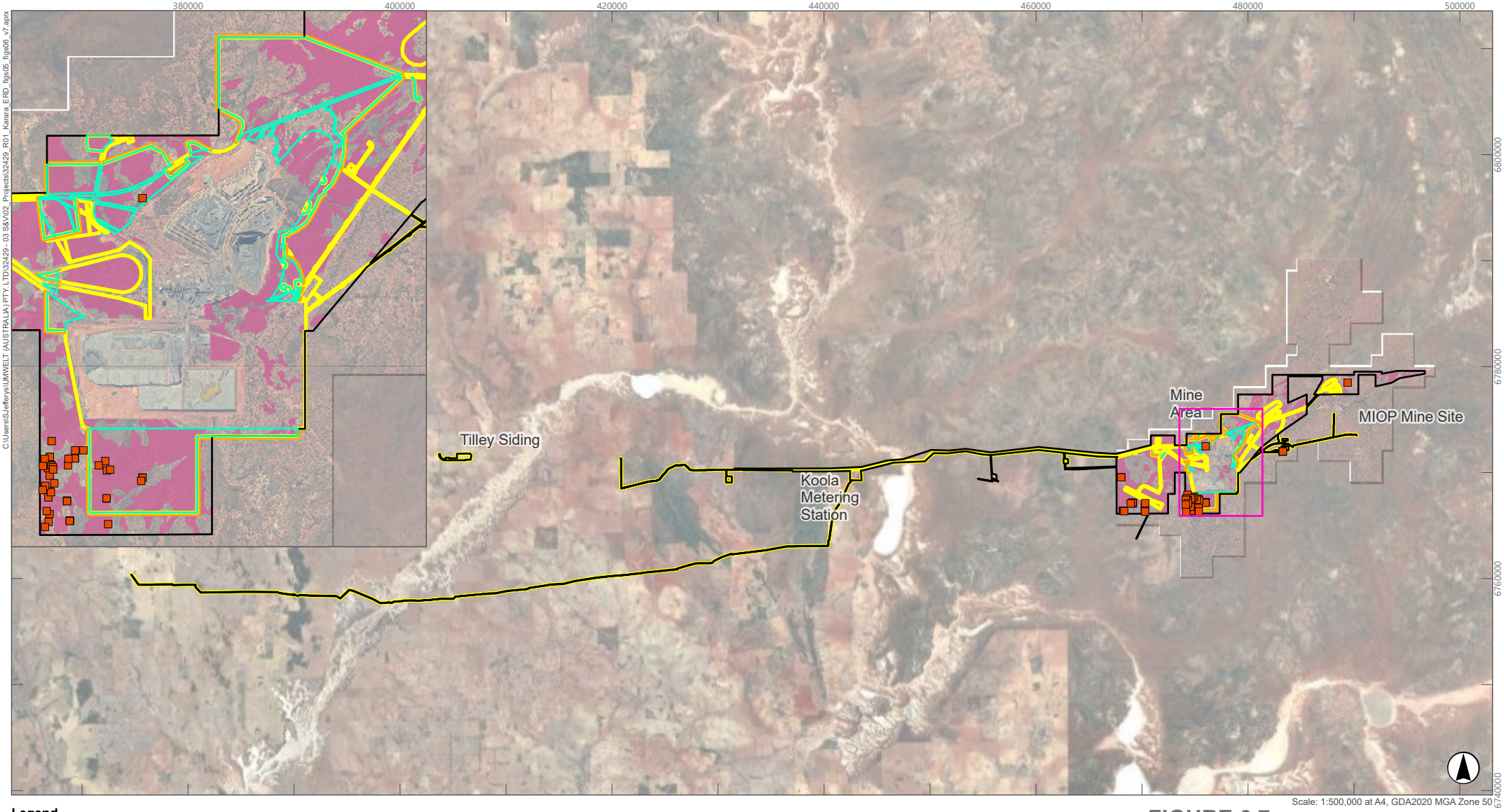


Scale: 1:500,000 at A4, GDA2020 MGA Zone 50

**Legend**

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

**Trapdoor Spider Burrow**

- *Idiosoma clypeatum*
- Mapped Habitat for *Idiosoma clypeatum*

**FIGURE 6.7**

Predicted Impacts to *Idiosoma clypeatum* from KIOP MLE Proposal

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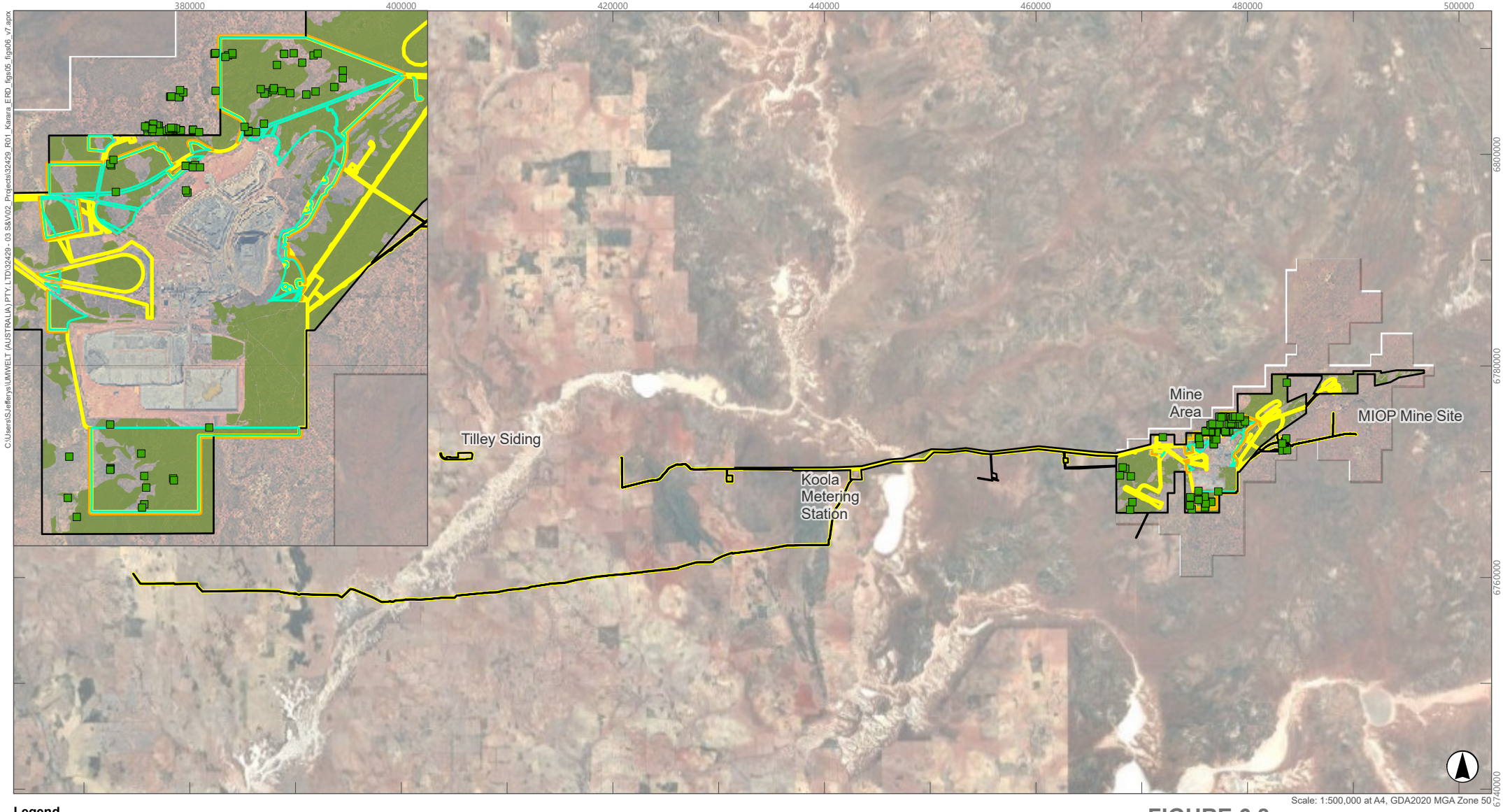


Scale: 1:500,000 at A4, GDA2020 MGA Zone 50

**Legend**

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

**Trapdoor Spider Burrow**

- *Idiosoma formosum*
- Mapped Habitat for *Idiosoma formosum*

**FIGURE 6.8**

Predicted Impacts to *Idiosoma formosum* from KIOP MLE Proposal

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## 6.8 Potential Impacts

### 6.8.1 Direct Impacts

The potential direct impacts to terrestrial fauna from KIOP MLE Mitigated Proposal activities comprise loss of habitat and individuals (including significant fauna species) as a result of clearing of native vegetation. Direct impacts have been assessed based on the KIOP MLE Mitigated Proposal.

### 6.8.2 Indirect Impacts

Activities and threats that may lead to indirect impacts to fauna or degradation of fauna habitats as a result of the KIOP MLE Mitigated Proposal include:

- vibration, noise, light and dust impacts
- 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 fauna habitats
- fragmentation and reduced connectivity between fauna habitats
- fauna becoming trapped in excavations
- vehicle strike
- habitat degradation due to weed invasion
- increase in the numbers of scavengers and/or non-native fauna, resulting in increased competition for native fauna and predation by feral fauna
- seepage from wet TSFs or leaking from pumping of wet tailings resulting in soil and water contamination
- spillage of hydrocarbons and other chemicals.

Hydrological modelling for the Combined Proposal undertaken by Stantec (2024) concluded that it is unlikely that predicted hydrological changes to the Karara Area would significantly impact surface water or groundwater dependent vegetation. Hydrological factors (i.e. changes to surface water hydrology or groundwater levels) and potential flow-on effects for fauna species have therefore been excluded from the indirect impact assessment.

A potential indirect impact zone was defined for the KIOP MLE Mitigated Proposal to account for any potential indirect impacts as a result of Proposal activities (refer to **Section 6.5**).

An assessment of the potential indirect impacts on terrestrial fauna associated with the Proposal focussed on significant fauna species that are expected to be Residents or Regular Visitors of the KIOP MLE Mitigated Proposal.

## 6.9 Mitigation

### 6.9.1 Application of the Mitigation Hierarchy

The Proposal has been developed in accordance with the mitigation hierarchy of avoid, minimise, rehabilitate, and offset in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023b). Mitigation measures during preliminary design have focused on eliminating the direct impacts of the KIOP MLE Proposal.

Measures implemented to **avoid** potential impacts to conservation significant terrestrial fauna and their habitats include:

- Design of the KIOP MLE Mitigated Proposal to avoid impacts to BIF landforms outside of Mt Karara (or minimise in the case of the WRD expansion), minimising/localising impacts on species utilising rocky environments (e.g. Gilled Slender Blue-tongue, Woolley's Pseudantechinus, Karara Millipede, Millipede PM1 and Mt Gairdner Scorpion).
- Existing above-ground powerlines will be used, minimising the potential for bird or bat electrocution events.

As of February 2026, further mitigations to the KIOP MLE mitigated disturbance footprint removed approximately 136 ha of the proposed disturbance to the south/east of the TSF. The disturbance footprint in the southern area has been designed to avoid three active Malleefowl mounds.

The following industry standard and best practice measures will be implemented during detailed design, construction, and operations of the Proposal to **minimise** potential impacts to terrestrial fauna:

- The proposed disturbance in the Wheatbelt area has now been removed from the Proposal, reducing potential impacts to species that area considered to be residents or regular visitors (**Table 6.5**).
- As of February 2026, further mitigations to the KIOP MLE mitigated disturbance footprint reduced impacts to known and potential terrestrial fauna habitat by removing approximately 87.8 ha (Syncline Turner haul road), 26 ha (WRD) and 6.5 ha (abandonment bund area).
- The KIOP MLE mitigated disturbance footprint has been designed to minimise impacts to significant fauna habitats by using previously disturbed areas where practicable.
- Inspections prior to proposed clearing will be conducted in line with KML's internal procedures (**Section 6.9.2**). These include relocation of fauna and/or habitat if required and specific management for Malleefowl and Western Spiny-tailed Skink.
- Lighting will be designed to minimise light spill in accordance with *Position Statement: Dark sky and astrotourism* (DPLH, 2022) and industry best practice to reduce impacts on nocturnal fauna.
- KML's internal land disturbance procedure will be implemented to prevent unplanned, unnecessary or unauthorised clearing, including:
    - A Ground Disturbance Permit (GDP) must be obtained from the KML Environment Department prior to any activity that disturbs the ground surface or vegetation
    - Each GDP application will be assessed against heritage, flora, fauna, and legislative requirements

  - GDPs may include conditions to avoid disturbance to conservation-significant fauna, which will be tracked through to completion
  - Areas approved for clearing will be surveyed, clearly marked, and clearing will be supervised to prevent over-clearing
  - Ground disturbance activities will undergo both pre- and post-clearing assessments and inspections.
- Water storage facilities will be fenced and access to pit lakes will be restricted to minimise the risk of access by terrestrial fauna and subsequent health impacts or potential death by drowning. Fauna egress points will also be installed at wet TSFs and water storage facilities as required.
- Strict speed limits (20 km/hr at the plant site and 60 km/hr on haul roads and public roads) will be enforced to reduce fauna strikes, with fauna mortality incidents recorded in KML's Fauna Register for adaptive management.
- Workforce inductions and toolbox training will include information on fauna awareness and mitigation measures.
- Chemicals and hydrocarbons will be safely stored and spills promptly cleaned up/managed to prevent environmental harm.
- Hot works will be conducted away from vegetation in suitable locations, and in accordance with industry best practice.

The following measures will be implemented to **rehabilitate** fauna habitat impacted by the Proposal:

- A mine closure management will be developed for the Proposal in line with DMPE and EPA guidance, including fauna-related closure objectives and completion criteria informed by stakeholder consultation. Mine Closure and Rehabilitation is described under Condition 12 of MS 805.
- Disturbed areas will be progressively rehabilitated during operations where practicable, with remaining active areas rehabilitated at the end of mine life.
- Rehabilitation will introduce habitat features suitable for fauna where possible, including:
  - Sandy and gravelly substrate with shrubs where feasible (based on slope stability and availability of material) to provide potential nesting habitat for Malleefowl
  - Log piles with several overlapping hollow (if possible) logs and dense shrubs to provide potential colony sites for Western Spiny-tailed Skink.
  - York Gum woodland to provide ongoing regeneration of hollow log piles as suitable habitat for Western Spiny-tailed Skink.
- Further mitigation measures will be applied during detailed design, construction, and operations to reduce likelihood of indirect impacts.

### 6.9.2 Management Measures

KML will continue to implement the following conditions as per MS 805 (Conditions 8 through 11) and 806 (Conditions 8 through 10) relevant to fauna management:

- **Fauna protection from trenches** – Excavations will be inspected and any vertebrate fauna relocated prior to excavation closure or recommencement of work.

- **Spider monitoring –** KML will monitor changes in population in terms of:
  - number and size of area(s) inhabited by spiders;
  - number, size and distribution of burrows in occupied areas; and
  - number of burrows occupied by spiders.
- **Fauna mortality register -** Records of fauna mortalities, injuries, and translocations will be maintained in KML's Fauna Register and incident management system (INX In-Control) allowing for identification and minimisation of the risk of repeated impacts.
- **Conservation significant reptiles -** Prior to ground disturbing activities the proponent shall carry out field surveys for conservation significant reptile species. Operations will avoid conservation significant reptile species were practicable. If this cannot be achieved, conservation significant reptile species shall be re-located into areas of suitable habitat in an area safe from disturbance from mining and associated operations.

Existing management system documents will continue to be used by KML:

- Approvals Request and Ground Disturbance Procedure (CORP-EN-PRO-1004) (**Appendix 5-7**).
- Fauna Management Plan (CORP-EN-PLN-1008) (**Appendix 6-3**).
- Terrestrial Fauna Management Environmental Procedure (CORP-EN-PRO-1010) (**Appendix 6-4**), as well as species-specific procedures outlined below for Malleefowl and Western Spiny-tailed Skink.
- Fauna Sighting and Mortality Form (CORP-EN-FRM-1045) (**Appendix 6-5**).
- KML's Fauna Register, which includes key information to assist KML in determining the appropriate management measures to reduce fauna mortality incidents (for example, additional road signage, reducing speed limits) over time.

Species-specific procedures for Malleefowl and Western Spiny-tailed Skink to be implemented for the Proposal are described in **Section 6.9.2.1** and **Section 6.9.2.2**.

#### 6.9.2.1 Malleefowl

KML will manage the Proposal in accordance with KML's Environmental Procedure – Malleefowl Management and Monitoring (CORP-EN-PRO-1035) (**Appendix 6-6**), which has been reviewed by DBCA and DCCEEW.

Key management measures that will be implemented for this species include:

- Where practicable, plant and equipment shall maintain a 50 m buffer from active mounds through demarcation of the mound in the field as per the ground disturbance permit. A spotter shall be used if this buffer cannot be maintained.
- Where mounds are identified during the ground disturbance desktop review process, further inspections will determine their activity status and presence of eggs as part of the KML Pre-Ground Disturbance Inspection.
- Clearing near active mounds will be scheduled outside the breeding season (1 September to 30 April) where practicable.
- If a mound contains eggs, work will be postponed until incubation ends or eggs are removed.

- Where avoidance is not possible, KML will coordinate with DBCA for mound excavation and safe handling of eggs and chicks.
- KML will maintain records of all Malleefowl and mound sightings.
- Annual monitoring of Malleefowl mounds will continue, with results reported to DCCEEW, DBCA, and DWER in annual reporting. This monitoring is undertaken during the breeding season in accordance with the National Malleefowl Monitoring Manual (NMRT, 2020).

#### 6.9.2.2 Western Spiny-tailed Skink

KML will manage the Proposal in accordance with KML's Environmental Procedure – Western Spiny-tailed Skink, Management, Monitoring and Translocation (CORP-EN-PRO-1024) (**Appendix 6-7**), which has been reviewed by Department of Agriculture, Water and the Environment (DAWE; now DCCEEW) and DWER.

Key management measures that will be implemented for this species include:

- Ground truthing is conducted prior to disturbance activities to ensure inhabited logs are not impacted.
- Large trees and logs will be retained within infrastructure and road areas to mimic habitat and encourage the return of Western Spiny-tailed Skink post-construction.
- Re-created habitat will be placed at least 5 m from disturbance edges in areas with understorey vegetation.
- If colonies or habitats cannot be avoided, KML will obtain the required licencing and conduct translocation of Western Spiny-tailed Skinks.
- KML will annually monitor control, impact, translocation, and surveyed sites within and beyond the Survey Area during spring or early summer when the species is most active. The objectives of the monitoring are to detect impacts from disturbance associated with mining, detect impacts from changed management such as feral species control, and examine the effectiveness of translocations.
- Details of translocated, injured, or deceased skinks as well as any unauthorised disturbances to Western Spiny-tailed Skink sites will be reported in KML's Annual Environmental Report.

## 6.10 Assessment of Residual Impacts

The impact assessment for significant terrestrial fauna was done in accordance with the methods described in the Terrestrial Fauna Impact Assessment (Umwelt, 2025d) and was applied to the mitigated Proposal areas. Vegetation and Substrate Associations (VSAs) as described by Bamford Consulting Ecologists (2025) were used for direct and indirect impacts, with cumulative impacts being calculated with Pre-European Vegetation Associations (PEVSAs) within CAA 1. Further details of the methods are provided in *KIOP MLE Environmental Values Updated Impact Assessment* (Umwelt, 2026b) (**Appendix 5-3**) and the results are presented in the below sections.

### 6.10.1 Residual Direct and Indirect Impacts to Fauna Habitats

Excluding CCAC areas, the Proposal will result in direct impact to 1,182.3 ha of vegetation and indirect impact to 127.4 ha of vegetation. This will result in direct and indirect impact to the habitat for significant fauna species.

**Table 6.6** assesses direct and indirect impacts to all fauna habitat types, or Vegetation and Substrate Associations [VSAs]) based on the mitigated Proposal areas, and the results are described below.

VSAs 1, 3, 4, 6 and 7 have the greatest proportional impact as a result the KIOP MLE Mitigated Proposal (impact to 11-18% of each VSA within the Survey Area). These VSAs also have the highest proportional impact from the Combined Proposal (impact to 21-32% of each VSA within the Survey Area). This includes:

- VSA 1 Breakaways and Rocky Ridges
    - 100.1 ha (11.0%) within the Proposed direct impact area
    - 271.6 ha (29.7%) within the Combined Proposal area
    - Preferred habitat of the Gilled Slender Blue-tongue, Peregrine Falcon, Central Long-eared Bat, Long-tailed Dunnart, Karara Millipede, Millipede sp. nov. 'PM1', Mt Gairdner Scorpion and Northern Shield-backed Trapdoor Spider.
- VSA 3 Acacia Tall Shrubland
    - 269.6 ha (11.2%) within the Proposed direct impact area
    - 527.3 ha (21.9%) within the Combined Proposal area
    - Preferred habitat of the Gilled Slender Blue-tongue, Malleefowl (nesting/foraging habitat), Peregrine Falcon, Southern Whiteface, Central Long-eared Bat, Long-tailed Dunnart, Karara Millipede, Millipede sp. nov. 'PM1', Mt Gairdner Scorpion and Northern Shield-backed Trapdoor Spider.
- VSA 4 Acacia Shrubland with Sand Pine
    - 342.4 ha (14%) within the Proposed direct impact area
    - 573.4 ha (23.4%) within the Combined Proposal area
    - Preferred habitat of Malleefowl (nesting/foraging habitat), Peregrine Falcon, Southern Whiteface, Central Long-eared Bat and Ornate Trapdoor Spider.
- VSA 6 Acacia Low Shrubland on Gravelly Rises
    - 80.7 ha (17.7%) within the Proposed direct impact area
    - 103.4 ha (22.7%) within the Combined Proposal area
    - Preferred habitat of Malleefowl (nesting/foraging habitat), Peregrine Falcon, Southern Whiteface, Central Long-eared Bat, Northern Shield-backed Trapdoor Spider and Ornate Trapdoor Spider.
- VSA 7 York Gum Open Woodland
    - 239.1 ha (12.6%) within the Proposed direct impact area
    - 603.1 ha (31.7%) within the Combined Proposal area

- Preferred habitat of the Gilled Slender Blue-tongue, Western Spiny-tailed Skink, Malleefowl (foraging only habitat), Peregrine Falcon, Central Long-eared Bat, Long-tailed Dunnart and Ornate Trapdoor Spider.
- VSAs 1, 3, 4, 6 and 7 are also preferred habitat of several locally significant species (see **Table 6.6.**

**Table 6.7** shows the updated impact assessment (mitigated residual impacts) for habitat per conservation significant fauna species, including direct and indirect impacts.

Further details of impacts to conservation significant fauna are provided in **Section 6.10.2** (fauna habitat values), **Section 6.10.3** (bioregional assessment for Southern Whiteface) and **Section 6.10.4** (assessment of significance of impacts).

**Table 6.6 Direct and Indirect Local Impacts to Fauna Habitat Types (VSAs)**

| VSA | Extent in Survey Area (ha) [proxy for region] | Extent in Combined Proposal mitigated DE including CCAC (ha) | Approved impact from MS 805 & 806 (ha) | Approved impact from MS 805 & 806 (% of the region) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of the region) | Combined Impact – Combined Proposal mitigated DF (ha) | Combined Impact – Combined Proposal mitigated DF (% of the region) | Proposed indirect impact – Extent in mitigated indirect impact zone (ha) |
|---|---|---|---|---|---|---|---|---|---|
| 1 Breakaways and Rocky Ridges | 913.7 | 913.7 | 171.5 | 18.8 | 100.1 | 11.0 | 271.6 | 29.7 | 15.5 |
| 2 Acacia Shrubland over Granite | 112.4 | 112.4 | 1.7 | 1.5 | 3.8 | 3.4 | 5.5 | 4.9 | 5.4 |
| 3 Acacia Tall Shrubland | 2,408.4 | 2,405.8 | 258.5 | 10.7 | 269.6 | 11.2 | 527.3 | 21.9 | 21.6 |
| 4 Acacia Shrubland with Sand Pine | 2,445.6 | 2,445.6 | 231 | 9.4 | 342.4 | 14.0 | 573.4 | 23.4 | 32.4 |
| 5 Mixed Acacia and Tall Thicket (Acacia and Melaleuca) | 2,309.8 | 2,309.8 | 118.2 | 5.1 | 149.1 | 6.5 | 267.4 | 11.6 | 16 |
| 6 Acacia Low Shrubland on Gravelly Rises | 456.1 | 456.1 | 22.8 | 5.0 | 80.7 | 17.7 | 103.4 | 22.7 | 12.1 |
| 7 York Gum Open Woodland | 1,904.4 | 1,900.7 | 364 | 19.1 | 239.1 | 12.6 | 603.1 | 31.7 | 24.2 |
| 8 *Eucalyptus clelandiorum* Woodland/Forest | 64.3 | 64.3 | - | - | - | - | - | - | - |
| 9 Chenopod Shrubland/Salt Lakes/Clay Pans | 186.1 | 186.1 | 30.5 | 16.4 | - | - | 30.5 | 16.4 | - |
| 10 Cleared Land | 2,756.4 | 2,694.7 | 2,321.2 | 84.2 | 1.5 | 0.1 | 2,319.1 | 84.1 | 0.1 |
| 11 Creek lines | 4.7 | - | - | - | - | - | - | - | - |
| 12 Planted Eucalypts | 3.9 | 0.3 | 0.3 | 7.7 | - | - | 0.3 | 6.8 | - |
| Water | 1.6 | 1.6 | - | - | - | - | 0.0 | 1.1 | - |

**Table 6.7 Direct and Indirect Local Impacts to Habitat for Conservation Significant Fauna**

| Species | Status | Habitat VSAs | Habitat VSAs Extent in Survey Area (ha) | Habitat VSAs Extent in Combined Proposal mitigated DE including CCAC (ha) | Approved impact from MS 805 & 806 (ha) | Approved impact from MS 805 & 806 (% of the Survey Area) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of the Survey Area) | Combined Impact – Combined Proposal mitigated DF (ha) | Combined Impact – Combined Proposal mitigated DF (% of the Survey Area) | Proposed indirect impact – Extent in mitigated indirect impact zone (ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Frogs** | | | | | | | | | | | |
| Desert Trilling Frog | • Locally significant | 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12 and water | 13,381.3 | 13,305.0 | 3,489.2 | 26.1 | 1,186.3 | 8.9 | 4,671.1 | 34.9 | 127.4 |
| **Reptiles** | | | | | | | | | | | |
| Gilled Slender Blue-tongue | • VU (WA) | 1, 2, 3, 7 and 11 | 5,343.7 | 5,332.6 | 795.7 | 14.9 | 612.6 | 11.5 | 1,407.5 | 26.3 | 66.8 |
| Mulga Dragon | • Locally significant | 3, 4, 5 and 6 | 7,619.9 | 7,617.3 | 630.5 | 8.3 | 841.8 | 11.0 | 1,471.5 | 19.3 | 82.1 |
| Reticulated Velvet Gecko | • Locally significant | 7 | 1,904.4 | 1,900.7 | 364.0 | 19.1 | 239.1 | 12.6 | 603.1 | 31.7 | 24.2 |
| Western Spiny-tailed Skink | • VU (WA)<br>• EN (EPBC) | 7 | 1,904.4 | 1,900.7 | 364.0 | 19.1 | 239.1 | 12.6 | 603.1 | 31.7 | 24.2 |
| **Birds** | | | | | | | | | | | |
| Bush Stone-curlew | • Locally significant | 3, 4, 5 and 6 | 7,619.9 | 7,617.3 | 630.5 | 8.3 | 841.8 | 11.0 | 1,471.5 | 19.3 | 82.1 |
| Crested Bellbird | • Locally significant | 3, 4, 5 and 6 | 7,619.9 | 7,617.3 | 630.5 | 8.3 | 841.8 | 11.0 | 1,471.5 | 19.3 | 82.1 |
| Major Mitchell's Cockatoo | • Locally significant | 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12 and water | 13,381.3 | 13,305.0 | 3,489.2 | 26.1 | 1,186.3 | 8.9 | 4,671.1 | 34.9 | 127.4 |

| Species | Status | Habitat VSAs | Habitat VSAs Extent in Survey Area (ha) | Habitat VSAs Extent in Combined Proposal mitigated DE including CCAC (ha) | Approved impact from MS 805 & 806 (ha) | Approved impact from MS 805 & 806 (% of the Survey Area) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of the Survey Area) | Combined Impact – Combined Proposal mitigated DF (ha) | Combined Impact – Combined Proposal mitigated DF (% of the Survey Area) | Proposed indirect impact – Extent in mitigated indirect impact zone (ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Malleefowl –habitat (nesting/foraging) | • VU (WA)<br>• VU (EPBC) | 3, 4 and 6 | 5,310.1 | 5,307.5 | 512.3 | 9.6 | 692.6 | 13.0 | 1,204.1 | 22.7 | 66.2 |
| Malleefowl – habitat (foraging only) | | 7 and 11 | 1,909.2 | 1,900.7 | 364.0 | 19.1 | 239.1 | 12.5 | 603.1 | 31.6 | 24.2 |
| Peregrine Falcon | • OS (WA) | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and water | 13,567.5 | 13,491.1 | 3,519.7 | 25.9 | 1,186.3 | 8.7 | 4,701.5 | 34.7 | 127.4 |
| Redthroat | • Locally significant | 3, 4, 5 and 6 | 7,619.9 | 7,617.3 | 630.5 | 8.3 | 841.8 | 11.0 | 1,471.5 | 19.3 | 82.1 |
| Regent Parrot | • Locally significant | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and water | 13,567.5 | 13,491.1 | 3,519.7 | 25.9 | 1,186.3 | 8.7 | 4,701.5 | 34.7 | 127.4 |
| Rufous Treecreeper | • Locally significant | 7 and 8 | 1,968.7 | 1,965.0 | 364.0 | 18.5 | 239.1 | 12.1 | 603.1 | 30.6 | 24.2 |
| Southern Whiteface | • VU (WA)<br>• VU (EPBC) | 3, 4, 5, 6 and 9 | 7,806.1 | 7,803.4 | 661.0 | 8.5 | 841.8 | 10.8 | 1,502.0 | 19.2 | 82.1 |
| Western Yellow Robin | • Locally significant | 3, 4, 5 and 6 | 7,619.9 | 7,617.3 | 630.5 | 8.3 | 841.8 | 11.0 | 1,471.5 | 19.3 | 82.1 |
| White-browed Babbler | • Locally significant | 3, 4, 5 and 6 | 7,619.9 | 7,617.3 | 630.5 | 8.3 | 841.8 | 11.0 | 1,471.5 | 19.3 | 82.1 |
| White-browed Treecreeper | • Locally significant | 6 and 7 | 2,360.5 | 2,356.8 | 386.8 | 16.4 | 319.8 | 13.5 | 706.5 | 29.9 | 36.3 |
| **Mammals** | | | | | | | | | | | |
| Central Long-eared Bat | • P3 (WA) | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and water | 13,567.5 | 13,491.1 | 3,519.7 | 25.9 | 1,186.3 | 8.7 | 4,701.5 | 34.7 | 127.4 |
| Kultarr | • Locally significant | 3, 4, 5 and 6 | 7,619.9 | 7,617.3 | 630.5 | 8.3 | 841.8 | 11.0 | 1,490.9 | 19.3 | 82.1 |
| Long-tailed Dunnart | • P4 (WA) | 1, 2, 3, 7 and 11 | 5,343.7 | 5,332.6 | 795.7 | 14.9 | 612.6 | 11.5 | 1,423.6 | 26.3 | 66.8 |
| Woolley's Pseudantechinus | • Locally significant | 1, 2, 3, 7 and 11 | 5,343.7 | 5,332.6 | 795.7 | 14.9 | 612.6 | 11.5 | 1,423.6 | 26.3 | 66.8 |
| **Invertebrates** | | | | | | | | | | | |
| Karara Millipede | • Locally significant<br>• SRE | 1 and 3 | 3,322.2 | 3,319.5 | 430.0 | 12.9 | 369.7 | 11.1 | 805.8 | 24.0 | 37.2 |
| Millipede sp. nov. 'PM1' | • Locally significant<br>• SRE | 1 and 3 | 3,322.2 | 3,319.5 | 430.0 | 12.9 | 369.7 | 11.1 | 805.8 | 24.0 | 37.2 |
| Mt Gairdner Scorpion | • Locally significant<br>• SRE | 1 and 3 | 3,322.2 | 3,319.5 | 430.0 | 12.9 | 369.7 | 11.1 | 805.8 | 24.0 | 37.2 |
| Northern Shield-backed Trapdoor Spider | • P3 (WA)<br>• VU (EPBC) | 1, 3, 5, 6 | 6,088.0 | 6,085.4 | 571.0 | 9.4 | 599.5 | 9.8 | 1,187.3 | 19.2 | 65.2 |
| Ornate Trapdoor Spider | • EN (WA) | 4, 5, 6 and 7 | 7,115.9 | 7,112.2 | 736.0 | 10.3 | 811.3 | 11.4 | 1,572.1 | 21.7 | 84.7 |
| Unidentified trapdoor spider* | • Locally significant | 2 | 112.4 | 112.4 | 1.7 | 1.5 | 3.8 | 3.4 | 5.5 | 4.9 | 5.4 |

*Aganippe (Idiosoma) sp.

### 6.10.2 Fauna Habitat Values

These tables present the residual impacts to specific fauna habitat values: Malleefowl mounds (active and historic) (**Table 6.8**), Western Spiny-tailed Skink active and potential colony sites (recorded suitable log piles) (**Table 6.9**) and Trapdoor Spider burrows per species (**Table 6.10**).

The calculation of fauna habitat values in approved impact areas is based on available monitoring and survey data, which largely focuses on areas outside of approved and cleared areas. Therefore, these tables do not accurately represent the actual impact from previous approvals.

Predicted impacts from the proposed KIOP MLE mitigated disturbance footprint (based on combined BCE and KML records) to recorded significant fauna habitat values is:

- **Malleefowl mounds –** a total of two active mounds impacted (13.3%) and 27 historic mounds (3.4%).
- **Western Spiny-tailed Skink colony sites –** a total of seven active colony sites (5.7%) and 326 potential colony sites (43%).
- **Trapdoor Spider burrows –** total impact to 29 (16.4%) *Idiosoma clypeatum* burrows and 167 (49.4%) *Idiosoma formosum* burrows, with a further 64 burrows (65.3%) of Trapdoor Spiders that were only able to be identified at a genus level (*Idiosoma sp*.).

**Table 6.8 Direct and Indirect Local Impacts to Malleefowl Mounds**

| Category | Total Combined Population (based on BCE and KML Records) | Recorded in Combined Proposal mitigated DE (#) | Approved impact from MS 805 & 806 (#) ^ | Approved impact from MS 805 & 806 (% of records) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (#) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of records) | Combined Impact – Combined Proposal mitigated DF (#) | Combined Impact – Combined Proposal mitigated DF (% of records) | Proposed indirect impact – Extent in mitigated indirect impact zone (#) |
|---|---|---|---|---|---|---|---|---|---|
| Active / recently active mounds (classed as active any year from 2020 onwards) | 15 | 10 | 1 | 6.7 | 2 | 13.3 | 3 | 20.0 | 0 |
| Historic | 789 | 278 | 128 | 16.2 | 27 | 3.4 | 153 | 19.4 | 4 |
| **TOTAL** | **804** | **288** | **129** | **16.0** | **29** | **3.6** | **156** | **19.4** | **4** |

**Table 6.9 Direct and Indirect Local Impacts to Western Spiny-tailed Skink Log Piles**

| Category | Total Combined Population (based on BCE and KML Records) | Recorded in Combined Proposal mitigated DE (#) | Approved impact from MS 805 & 806 (#) ^ | Approved impact from MS 805 & 806 (% of records) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (#) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of records) | Combined Impact – Combined Proposal mitigated DF (#) | Combined Impact – Combined Proposal mitigated DF (% of records) | Proposed indirect impact – Extent in mitigated indirect impact zone (#) |
|---|---|---|---|---|---|---|---|---|---|
| Active colonies (scats present or individual sighted) | 123 | 29 | 9 | 7.3 | 7 | 5.7 | 16 | 13.0 | 2 |
| Potential colony sites (potentially suitable log piles) | 758 | 593 | 100 | 13.2 | 326 | 43.0 | 426 | 56.2 | 8 |
| **TOTAL** | **881** | **622** | **109** | **12.4** | **333** | **37.8** | **442** | **50.2** | **10** |

**Table 6.10 Direct and Indirect Local Impacts to Trapdoor Spider Burrows**

| Category | Total Combined Population (based on BCE and KML Records) | Recorded in Combined Proposal mitigated DE (#) | Approved impact from MS 805 & 806 (#) * | Approved impact from MS 805 & 806 (% of records) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (#) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of records) | Combined Impact – Combined Proposal mitigated DF (#) | Combined Impact – Combined Proposal mitigated DF (% of records) | Proposed indirect impact – Extent in mitigated indirect impact zone (#) |
|---|---|---|---|---|---|---|---|---|---|
| *Idiosoma clypeatum* (previously known as *Idiosoma nigrum*) Northern Shield-backed Trapdoor Spider | 177 | 174 | 0 | - | 29 | 16.4 | 29 | 16.4 | 0 |
| *Idiosoma formosum* Ornate Trapdoor Spider | 338 | 208 | 27 | 8.0 | 167 | 49.4 | 194 | 57.4 | 3 |
| *Idiosoma sp.*^ | 98 | 97 | 1 | 1.0 | 64 | 65.3 | 65 | 66.3 | 4 |
| **TOTAL** | **613** | **479** | **28** | **4.6** | **260** | **42.4** | **288** | **47.0** | **7** |

* The calculation of fauna habitat values in approved impact areas is based on available monitoring and survey data, which largely focuses on areas outside of approved and cleared areas. Therefore, these tables do not accurately represent the actual impact from previous approval.

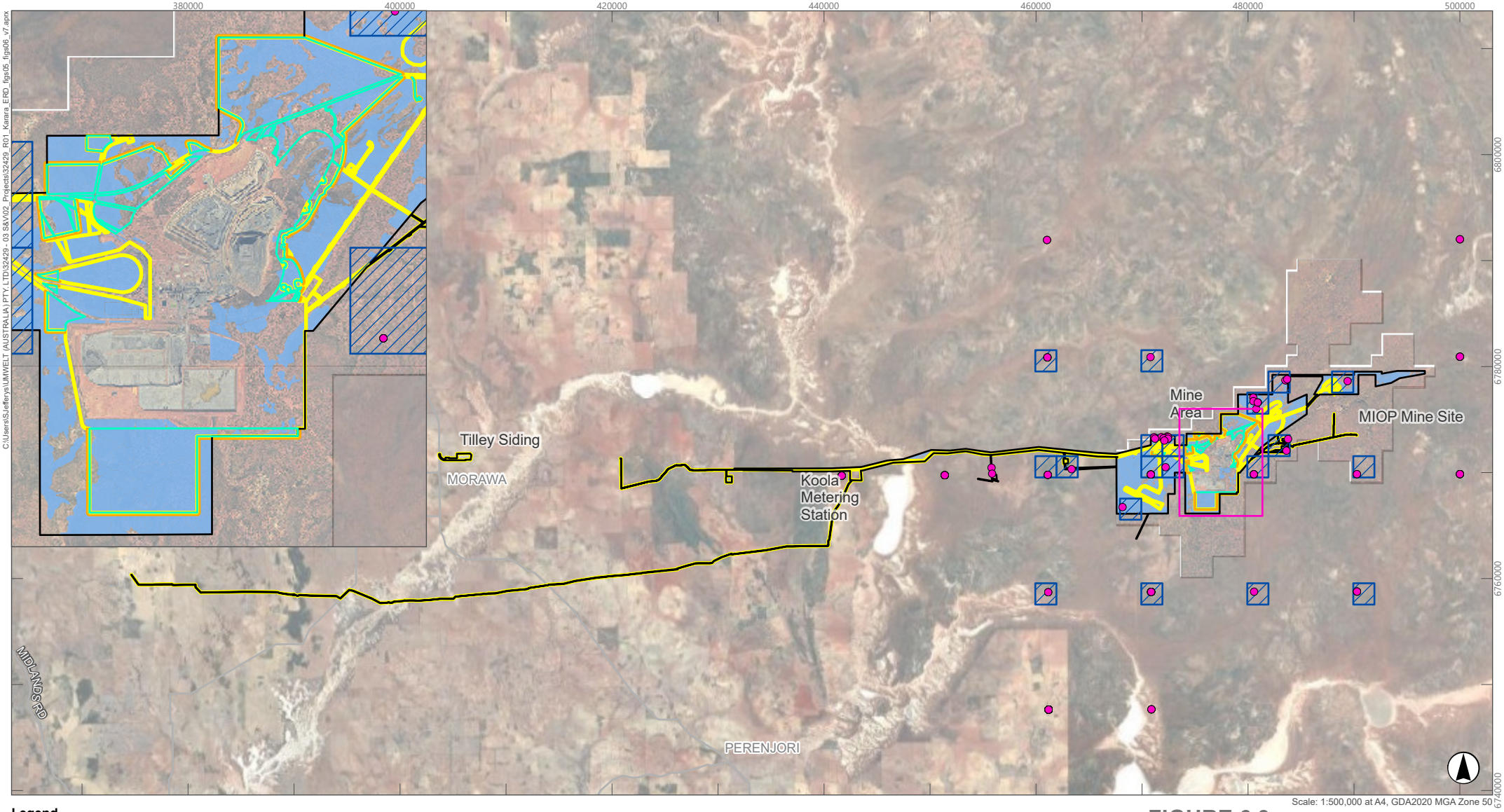
^Trapdoor spiders recorded to genus level only.

### 6.10.3 Southern Whiteface Bioregional Assessment

A Bioregional Assessment was undertaken (Umwelt, 2026a) (**Appendix 6-8**) to calculate the impact the Proposal will have on Southern Whiteface at a population level within the bioregion, and how this might impact its entire distribution. To achieve this, impacts to preferred habitat on a regional level were quantified and assessed against habitat on a national level.

In 2024 a Bioregional Assessment of Southern Whiteface was conducted by Umwelt on two projects in South Australia. This approach was endorsed by the DCCEEW for both projects, with no offset conditions being required for Southern Whiteface. The same approach has been adopted for this assessment.

The assessment concluded that Karara Mining Limited's Mine Life Extension (the Proposal) would impact 0.03% of potential habitat within the Tallering Interim Biogeographical Regionalisation of Australia (IBRA) subregion (where the project is located) and reduce the species national Area of Occupancy (AOO) by 0.0001%. AOO for the Proposal, as well as BCE and ALA records are shown in **Figure 6.9.**




Scale: 1:500,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Mitigated Indirect Impact Zone
- Combined Proposal Mitigated Disturbance Footprint
- Main Road
- Southern Whiteface Record (Bamford Consulting Ecologists and Atlas of Living Australia)
- Southern Whiteface Area of Occupancy in Mine Area
- Mapped Habitat for Southern Whiteface

# FIGURE 6.9

## Predicted Impacts to Southern Whiteface from KIOP MLE Proposal

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0 10 20 km

**Image Source:** KML (2024), ESRI Basemap (2025) | **Data Source:** Landgate (2025), KML (2025)

### 6.10.4 Significant Residual Impacts

The significance of residual impacts for all conservation-significant fauna species that were rated as 'resident' or 'regular visitor' within the Proposal area was assessed in *KIOP MLE Review Significance of Residual Impacts* (Umwelt, 2026c) (**Appendix 5-4**). This included assessment against the *Matters of National Environmental Significance – Significant impact guidelines 1.1* (Department of the Environment, 2013) for fauna listed under the EPBC Act. **Table 6.11** presents the assessment for MNES vertebrate fauna.

The assessment determined that residual impacts to the following ecological values are **considered significant** and would require an offset:

- Western Spiny-tailed Skink (Endangered – EPBC Act, Vulnerable – BC Act)
- Malleefowl (breeding and foraging habitat) (Vulnerable – EPBC Act & BC Act)
- *Idiosoma formosum* (Endangered – BC Act).

The residual impacts to the following ecological values are **potentially significant** and may require an offset:

- Gilled Slender Blue-tongue (Vulnerable – BC Act)
- Unidentified trapdoor spider (Aganippe (*Idiosoma*) sp.) (potential new species)
- Karara Millipede (*Antichiropus* sp. nov. 'Karara') (short range endemic).

The residual impact to *Idiosoma clypeatum* is not significant. An assessment was conducted against IUCN listing criteria for *Idiosoma clypeatum* and *Idiosoma formosum* (**Table 6.12**). The assessment concluded that *Idiosoma clypeatum* does not meet IUCN criteria for listing, but *Idiosoma formosum* meets criteria for listing as Endangered (which corresponds with the State-level listing for both species).

The assessment against the *Matters of National Environmental Significance – Significant impact guidelines 1.1* (Department of the Environment, 2013) for the trapdoor spider species is presented in **Table 6.13**. The assessment determined that there would be a significant impact to *Idiosoma clypeatum*. However, this species does not meet the criteria for listing as Vulnerable; therefore, assessment against the MNES significant impact guidelines is not warranted. Furthermore, the predicted impact to *Idiosoma clypeatum* would not increase the threat level to the species such that it would trigger listing under IUCN criteria or increase the cumulative impact to a critical level. Therefore, the impact to the species is not significant according to the criteria for assessing significance of residual impact in the *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014).

**Table 6.11 MNES Significant Impact Assessment – Vertebrate Fauna Species**

| MNES Significant Impact Guidelines 1.1– Endangered Species [adjustments for Vulnerable in brackets] | *Egernia stokesii badia*<br>**Western Spiny-tailed Skink**<br>Endangered– EPBC Act, Vulnerable – BC Act | *Leipoa ocellata*<br>**Malleefowl**<br>Vulnerable – EPBC Act & BC Act | *Aphelocephala leucopsis*<br>**Southern Whiteface**<br>Vulnerable – EPBC Act & BC Act |
|---|---|---|---|
| **Published conservation advice and recovery plans** | No approved conservation advice<br><br>Western Spiny-tailed Skink (*Egernia stokesii*) National Recovery Plan (DEC, 2012)<br><br>All populations are considered **important populations**. **Threats** include habitat clearing and degradation, modification of natural processes that generate hollow logs, and predation. **Criteria for recovery** plan success include maintaining the number of populations and habitat and at least 50% of known remnant woodland populations being managed for conservation.<br><br>**Critical habitat** is not defined in the Recovery Plan.<br><br>**Recovery actions** include determining essential habitat requirements, clarifying distribution and threatening processes, managing known populations in remnant woodland, protecting habitat remnants, preventing illegal collection, engaging landholders to support conservation efforts, minimising the impact of stock on habitat, developing conservation agreements with landholders and mining companies to retain and link remnant woodland patches, and developing a strategy for translocation of at-risk populations.<br><br>Research into the species has identified preferred habitat as hollow log piles with long logs, an average of three logs and overhanging mid-storey vegetation with low canopy cover (Bradley et al, 2022). | No approved conservation advice<br><br>National Recovery Plan for the Malleefowl (*Leipoa ocellata*) (DCCEEW, 2024a).<br><br>All populations and areas occupied by malleefowl are considered of **equal importance** for the protection and recovery of the malleefowl, despite any variability of population density, size, conservation challenges or other factors.<br><br>The recovery plan identifies that while there is an incomplete understanding of **critical habitat** for Malleefowl, a sandy substrate and abundance of leaf litter are clear requirements for construction of their nests and density of birds is generally greatest in areas of higher rainfall and with greater shrub diversity.<br><br>**Performance criteria** in the National Recovery Plan include: mound activity (as an indicator of population trend) is stable or increasing, and the area of occupancy is maintained or increased at all locations at which Malleefowl occur.<br><br>Malleefowl is identified as a priority species in the Australian Government *Threatened Species Action Plan 2022-2032* (DCCEEW, 2022b). The Action Plan target is for all priority species to be on track for improved trajectory by 2027 and implementation of priority actions for priority species is tracked and published.<br><br>The threatened species action plan for Malleefowl (DCCEEW, 2023) includes the following information on key threats and priority actions:<br><br>The identified **key threats** for malleefowl are loss and fragmentation of habitat, inappropriate fire regimes, predation, herbivores competing for food and droughts.<br><br>The **priority actions** for malleefowl are to reduce the size and frequency of hot large-scale fires, continue restorage of habitat linkages and protect remaining mallee habitat, targeted predator control and continued management of grazing pressure. | Conservation Advice for *Aphelocephala leucopsis* (Southern Whiteface) dated 31 March 2023.<br><br>**Important populations** are not described.<br><br>**Habitat critical to the survival** of the species is areas of:<br><br>• relatively undisturbed open woodlands and shrublands that support an understorey of grasses and/or shrubs<br><br>• areas with low tree density and an herbaceous, litter-rich understorey that provides essential foraging opportunities<br><br>• the presence of both living and dead trees containing hollows or crevices suitable for roosting and nesting.<br><br>**Key threats** are clearing of habitat for agriculture, degradation of habitat by livestock grazing and climate-related pressures such as drought.<br><br>Primary conservation objectives are to stabilise population trends of both subspecies and understand the causes of population declines. **Conservation priorities** are to cease clearing of habitat critical to the survival of the species, secure occupied habitat patches in areas where the birds have a patchy distribution, undertake revegetation, promote ecological management and connectivity of woodland remnants and promote agriculture and biodiversity stewardship programs to retain habitat.<br><br>No approved recovery plan. |
| **Lead to a long-term decrease in the size of a population of a species**<br><br>**[important population for Vulnerable species]** | Yes – the Proposal could lead to a long-term decrease in the size of a population of the species.<br><br>The species has already experienced loss of habitat from the KIOP and monitoring in the Karara mine area has recorded decline in the number of active colonies (Bamford Consulting Ecologists, 2025). This is attributed to increase predation due to greater abundance of feral animals and crows in the local area, particularly associated with the KIOP landfill attracting crows (Bamford Consulting Ecologists, 2025). These impacts are likely to continue with implementation of the KIOP MLE Proposal. The KIOP MLE will also directly impact seven active Western Spiny-tailed Skink colonies. Although individuals will be translocated in accordance with KML procedures, the potential success of translocation is uncertain and is likely to result in some loss of individuals, contributing to a potential long-term decrease in the local numbers. | No – the Proposal is not expected to lead to a long-term decrease in the size of the regional Malleefowl population, indicated by the number of active Malleefowl mounds in the Mine Area.<br><br>The MNES Significant Impact Guidelines 1.1 defines a population as an occurrence of a species in a particular area, such as a geographically distinct regional population or a bioregion. For this assessment, the Tallering IBRA subregion is used to define the population extent. As per the Conservation Advice, all populations are considered of equal importance. Therefore, the Tallering IBRA bioregional population is an important population.<br><br>Monitoring of Malleefowl mounds in the Karara Mine Area has recorded a higher number and proportion of active mounds in recent monitoring periods (Bamford Consulting Ecologists, 2025). In the National Recovery Plan for the Malleefowl, mound activity is adopted as an indicator of Malleefowl population trend. Therefore, the increasing number of active Malleefowl mounds indicates an increasing population trend. This shows that the current Karara mining operations has not resulted in a decrease in the local numbers of Malleefowl.<br><br>The current Karara mining operations (MS 805 & 806) approved impact to Malleefowl is 512.3 ha (9.6%) of habitat mapped as suitable for nesting and 364 ha (19.1%) of mapped foraging-only habitat in the Survey Area, as well as removal of one active and 128 historic Malleefowl mounds. | No – the proposal is unlikely to lead to a long-term decrease in the size of an important population of the species.<br><br>The Conservation Advice does not define any important populations of the species. The MNES Significant Impact Guidelines 1.1 defines an important population as one that is necessary for a species' long-term survival and recovery, including key source populations, populations necessary for maintaining genetic diversity, or those near the limit of the species range.<br><br>The species is broadly distributed across Australia. The distribution in Western Australia encompasses the width of the state in a broad band that extends to the south and north of the Karara Mine Area.<br><br>Given the broad distribution of the species, the population at the KIOP Mine Area is not considered to be an important population for genetic diversity, as a source population, or near the limit of the species range. |

| MNES Significant Impact Guidelines 1.1– Endangered Species [adjustments for Vulnerable in brackets] | *Egernia stokesii badia*<br>**Western Spiny-tailed Skink**<br>Endangered– EPBC Act, Vulnerable – BC Act | *Leipoa ocellata*<br>**Malleefowl**<br>Vulnerable – EPBC Act & BC Act | *Aphelocephala leucopsis*<br>**Southern Whiteface**<br>Vulnerable – EPBC Act & BC Act |
|---|---|---|---|
| | | The proposed KIOP MLE mitigated disturbance footprint would impact 692.6 (13%) of mapped nesting habitat and 239.1 ha (12.5%) of mapped foraging-only habitat in the Survey Area, as well as removal of 2 active and 27 historic Malleefowl mounds.<br>The impact from the proposed KIOP MLE is a comparable level of impact to potential Malleefowl habitat as the approved Karara mining operations, although substantially lower impact to historic Malleefowl mound locations.<br>Monitoring at the existing Karara mining operations demonstrates an increasing population trend despite the impacts to date.<br>As the proposed impacts are a similar or lower level of disturbance to Malleefowl habitat values compared to the existing operations, the proposed increase in impacts is not expected to lead to a long-term decrease in the local Malleefowl activity or the broader Tallering bioregional population. | |
| **Reduce the area of occupancy of [an important population] the species** | Yes – the Proposal is expected to decrease the area of occupancy of the species.<br>The proposed KIOP MLE will directly impact mapped habitat values including active colonies, log piles and vegetation systems mapped as suitable potential habitat.<br>The proposed disturbance area had a high occurrence of log piles recorded as suitable habitat for colonies. Therefore, it is reasonable to assume that the direct impact to 239.1 ha of mapped suitable habitat would have a comparable reduction on the area of occupancy.<br>The area of occupancy calculated by Atlas of Living Australia spatial portal (February 2026) for the Western Spiny-tailed Skink species is 19,200 ha. The proposed impact to 239.1 ha is 1.2% of the area of occupancy of the species. | Yes – the Proposal is expected to decrease the area of occupancy of the Tallering IBRA bioregional population.<br>The MNES Significant Impact Guidelines 1.1 defines a population as an occurrence of a species in a particular area, such as a geographically distinct regional population or a bioregion. For this assessment, the Tallering IBRA subregion is used to define the population extent. As per the Conservation Advice, all populations are considered of equal importance. Therefore, the Tallering IBRA bioregional population is an important population.<br>The area of occupancy calculated by Atlas of Living Australia spatial portal (February 2026) for Malleefowl in the Tallering IBRA subregion is 12,800 ha.<br>The proposed KIOP MLE mitigated disturbance footprint would impact 692.6 of mapped nesting habitat and 239.1 ha of mapped foraging-only habitat. The proposed disturbance footprint also included records of active Malleefowl mounds and tracks. The proposed impact to a combined 931.7 ha of mapped suitable habitat is 7.3% of the area of occupancy of the regional population. | No – the Proposal will not decrease the area of occupancy of an important population of the species.<br>The population at the KIOP Mine Area is not considered to be an important population.<br>The proposed KIOP MLE disturbance footprint will impact only 0.0001% of the National area of occupancy of the species. This is an insignificant area and is not considered to support an important population. |
| **Fragment an existing population [important population] into two or more populations** | No – the Proposal is not expected to fragment the existing population.<br>The KIOP MLE disturbance footprint is adjacent to already disturbed areas. While the disturbance footprint will clear residual habitat, the proposed clearing will expand existing cleared areas and will not fragment patches of habitat. The impact areas are localised and do not serve as corridors between other suitable habitat for the species. | No – the Proposal is not expected to fragment the existing population.<br>While habitat fragmentation is a major threat across the species entire distribution, the MLE Proposal involves additional clearing adjacent to already impacted areas. Therefore, there will be no additional fragmentation. | No – the Proposal will not fragment an important population.<br>The population at the Mine Area is not considered an important population for the species. Southern Whiteface records are scattered around the KIOP Mine Area and potentially suitable habitat has been mapped as occurring broadly in the Mine Area and the region. |
| **Adversely affect habitat critical to the survival of a species** | Yes – the Proposal will result in clearing of habitat that can be considered habitat critical to the survival of the species.<br>The MNES Significant Impact Guidelines 1.1 defines habitat critical to the survival of a species as areas that are necessary for foraging, breeding, roosting or dispersal, for long-term maintenance of the species or to maintain genetic diversity. For this assessment, log piles and York Gum woodland are considered critical habitat as the log piles are necessary for colonies to forage, breed and roost. | Yes – the Proposal will adversely affect habitat critical to the survival of the species by clearing habitat suitable for nesting and active and historic mounds.<br>The MNES Significant Impact Guidelines 1.1 defines habitat critical to the survival of a species as areas that are necessary for foraging, breeding, roosting or dispersal, for long-term maintenance of the species or to maintain genetic diversity. For this assessment, habitat critical to the survival of the species is considered to include habitat mapped as suitable for nesting, and existing mounds.<br>The proposed KIOP MLE mitigated disturbance footprint would impact 692.6 (13%) of mapped nesting habitat in the Survey Area, as well as removal of 2 active and 27 historic Malleefowl mounds. | Yes - the conservation advice states that any known or likely habitat should be considered as habitat critical to the survival of the species. There is known habitat for the species that will be adversely affected (cleared).<br>The species depends on open woodlands with dead timber and herbaceous litter (DCCEEW, 2023). The proposed KIOP MLE will impact 842 ha (10.8%) of mapped habitat in the Survey Area which is 0.03% of potential habitat in the Tallering IBRA subregion. This impact will be localised and is negligible compared to the existing habitat in the wider area and across the species' range. |

| MNES Significant Impact Guidelines 1.1– Endangered Species [adjustments for Vulnerable in brackets] | *Egernia stokesii badia*<br>**Western Spiny-tailed Skink**<br>Endangered– EPBC Act, Vulnerable – BC Act | *Leipoa ocellata*<br>**Malleefowl**<br>Vulnerable – EPBC Act & BC Act | *Aphelocephala leucopsis*<br>**Southern Whiteface**<br>Vulnerable – EPBC Act & BC Act |
|---|---|---|---|
| | The proposed KIOP MLE will result in clearing of 239.1 ha of York Gum woodland and 326 log piles mapped as potential colony sites. | | |
| **Disrupt the breeding cycling of a population [important population]** | No - the Proposal will not disrupt breeding of the population at a regional scale.<br>The MNES Significant Impact Guidelines 1.1 defines a population as an occurrence of a species in a particular area, such as a geographically distinct regional population or a bioregion.<br>For this assessment, the Tallering IBRA subregion is used to define the population extent.<br>Although the Proposal will disrupt individual Western Spiny-tailed Skink colonies, the breeding cycling across the Tallering IBRA bioregion will not be disrupted. | No - the Proposal will not disrupt breeding of the population at a regional scale.<br>Monitoring at the existing Karara mining operations demonstrates increased numbers of active Malleefowl mounds despite the impacts to date.<br>As the proposed KIOP MLE will impact substantially fewer Malleefowl mounds compared to the existing operations, the proposed impact is not expected to disrupt the breeding cycle of the local Malleefowl or the broader Tallering bioregional population. | No – the Proposal will not disrupt the breeding cycle of an important population. The local population is not considered to be an important population.<br>This species builds a dome-shaped nest with a side entrance mostly in a hollow branch, a tree trunk, crevice between branches, a stump, a fence post or in a recumbent log entrance through a knot-hole or crack. Nests are made with grass, bark, rootlets, feathers and wool and lined with feathers, wool, fur and soft plant down (Johnstone et al., 2004). This type of habitat and materials are widely available in the local and regional area. Based on the geographic records, Southern Whiteface breeds in many locations in the semi-arid areas of WA. |
| **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** | Yes – the Proposal will decrease the availability of habitat which might contribute to ongoing decline of the species.<br>The Proposal will directly impact habitat for Western Spiny-tailed Skink including 239.1 ha of mapped preferred habitat, 326 potentially suitable log piles (43% of log pile records in the Survey Area) and 7 active colonies (5.7% of active colonies known from monitoring).<br>Monitoring of the species at KIOP since 2018 has recorded a decline in the number of occupied colony sites, likely due to predation by little crows and feral cats, with landfills associated with mining exacerbating this (modification of habitat by attraction of predators due to presence of landfill).<br>The Proposal will directly remove known and potential habitat values (colonies and log piles) and will contribute to ongoing modification of habitat by attraction of predators through the ongoing operation of the mine site landfill. | No – the Proposal will not remove or decrease the quality of habitat to the extent that the species is likely to decline.<br>There will be impact to habitat used for nesting and foraging, however this represents a minor and localised reduction and is not expected to have a significant impact on the species at the regional or national scale.<br>Monitoring at the existing Karara mining operations demonstrates an increasing population trend despite the impacts to date.<br>As the proposed impacts are a similar or lower level of disturbance to Malleefowl habitat values compared to the existing operations, the proposed increase in impacts is not expected to lead to a long-term decrease in the local Malleefowl activity or the broader Tallering bioregional population. | No – the Proposal will not decrease the availability or quality of habitat to the extent that the species is likely to decline.<br>The proposed KIOP MLE will impact only 10.8% of mapped habitat in the Survey Area and 0.03% of potential habitat in the Tallering IBRA subregion.<br>Whilst there will be an impact to potential habitat from the proposal, there is extensive habitat in the bioregion across the species' range. The habitat will not be impacted to an extent that the species is likely to decline. |
| **Result in invasive species that are harmful to the species becoming established in the species' habitat** | No – the Proposal will not result in establishment of invasive species in the species' habitat.<br>Predation by invasive species such as foxes, cats and over-abundant native species including the little crow is a known threat (Bamford Consulting Ecologists, 2025). However, these species are already present in the habitat (due to the ongoing operations). No new invasive or harmful species are expected to be introduced or become established due to the Proposal. The Proposal is for continuation of existing operations – the population of these invasive species is not expected to increase due to the Proposal. | No – the Proposal will not result in establishment of invasive species in the species' habitat.<br>Invasive predators and some invasive weeds such as buffel grass are listed as a known threat to Malleefowl. Foxes and cats are major predators and are already present in the KIOP MLE Proposal area. No new invasive species are expected to be introduced due to continuation of the existing operations. | No – the Proposal will not result in establishment of invasive species in the species' habitat.<br>There are no invasive species currently documented as affecting this species. No new invasive or harmful species are expected to be introduced or become established due to the Proposal. |

| MNES Significant Impact Guidelines 1.1– Endangered Species [adjustments for Vulnerable in brackets] | *Egernia stokesii badia*<br>**Western Spiny-tailed Skink**<br>Endangered– EPBC Act, Vulnerable – BC Act | *Leipoa ocellata*<br>**Malleefowl**<br>Vulnerable – EPBC Act & BC Act | *Aphelocephala leucopsis*<br>**Southern Whiteface**<br>Vulnerable – EPBC Act & BC Act |
|---|---|---|---|
| **Introduce disease that may cause the species to decline** | No – the Proposal will not introduce diseases that may cause the species to decline.<br>There is no disease threat currently documented as affecting this species. Diseases are unlikely to be introduced by the KIOP MLE Proposal. | No – the Proposal will not introduce diseases that may cause the species to decline.<br>There is no disease threat currently documented as affecting this species. Diseases are unlikely to be introduced by the KIOP MLE Proposal. | No – the Proposal will not introduce diseases that may cause the species to decline.<br>There is no disease threat currently documented as affecting this species. Diseases are unlikely to be introduced by the KIOP MLE Proposal. |
| **Interfere with the recovery of the species** | No – the Proposal is not expected to interfere with recovery of the species. Criteria for recovery plan success include maintaining the number of populations and habitat and at least 50% of known remnant woodland populations being managed for conservation. The Proposal will not reduce the number of populations. | Yes – the Proposed MLE will interfere with recovery of the species by reducing the area of occupancy at a location where Malleefowl are known to occur.<br>A key performance criterion of the National Recovery Plan for the Malleefowl is to maintain or increase the area of occupancy at all locations at which Malleefowl occur. | No – the Proposal will not interfere with recovery of the species.<br>No active recovery actions are currently being carried out within the Proposal area or its vicinity. |
| **Outcome** | Significant residual impact due to clearing of habitat critical to the survival of the species (known and potential colony sites), contributing to long-term trend of declining number of active colonies in the local area. | Significant residual impact due to clearing of habitat critical to the survival of the species (habitat mapped as suitable for nesting, and active and historic mounds), leading to reduced area of occupancy for the bioregional population. All populations of Malleefowl are considered equally important. | Not a significant residual impact as the local population is not an important population of the species, and the impact to habitat is not significant at a bioregional level. |

**Table 6.12 IUCN Criteria Assessment for *Idiosoma* species**

| Criteria | Critically Endangered | Endangered | Vulnerable | Assessment for *Idiosoma clypeatum* | Assessment for *Idiosoma formosum* |
|---|---|---|---|---|---|
| **Key Data to Inform Assessment** | | | | | |
| Extent of occurrence | | | | 120,000 km$^2$<br>*Idiosoma clypeatum* has a wide distribution in the Yalgoo and Murchison bioregions (extent of occurrence of over 120,000 km$^2$) (Rix et al, 2018).<br>The extent of occurrence mapped by Atlas of Living Australia concurs with this estimate (121,951 km$^2$). This includes records in the Karara Mine Area. | 2,382-3,780 km$^2$<br>*Idiosoma formosum* has a restricted distribution in the Lake Moore catchment (junction of Wheatbelt, Yalgoo and Coolgardie bioregions) with extent of occurrence of 3,780 km$^2$ (Rix et al, 2018).<br>The Atlas of Living Australia (February 2026) maps the extent of occurrence as 2,311 km$^2$, but doesn't include records from the Karara mine area.<br>The mapped habitat in the Karara Survey Area is 7,115.9 ha (71 km$^2$).<br>If the Karara Mine Area records are added to the Atlas of Living Australia, the extent of occurrence would be approximately 2,382 km$^2$. |
| Area of occupancy | | | | 12,800 ha<br>The area of occupancy as mapped by Atlas of Living Australia is 128 km$^2$. | 2,000 ha<br>Atlas of Living Australia (February 2026) maps the area of occupancy as 20 km$^2$ (2,000 ha), although this doesn't include records from the Karara Mine Area. |
| Number of locations | | | | The Atlas of Living Australia has 78 locations recorded in Australia. | Not required for assessment. |
| Estimated population size | | | | 1,792,000 individuals<br>This species is very abundant in suitable areas, with density estimated as 140-623 spiders/ha in the Karara area (Bamford Consulting Ecologists, 2025). An indicative estimate of total population is calculated from area of occupancy x density:<br>• The area of occupancy as is 12,800 ha.<br>• Density – apply lowest end of recorded density range in the Karara area (140 spiders/ha).<br>• Total population estimate 1,792,000 spiders across area of occupancy. | 1,572,614 individuals<br>This species is abundant in suitable areas, with density estimated as 221-364 spiders/ha in the Karara area (Bamford Consulting Ecologists, 2025). An indicative estimate of population in the Karara Mine Area was calculated from mapped habitat area x density:<br>• The mapped habitat in the Karara Mine Area is 7,115.9 ha.<br>• Density – apply lowest end of recorded density range in the Karara area (221 spiders/ha).<br>• Total population estimate 1,572,614 spiders in the Karara Mine Area. |
| **1 – Population Size Reduction** | | | | | |
| Population reduction observed or estimated in the past where causes of the reduction have not ceased or may not be reversible | ≥ 80% | ≥ 50% | ≥ 30% | Past population reduction estimated from cumulative impact to mapped habitat from approved projects within 15 km buffer of Karara Mine Area:<br>• 9,754.0 ha<br>• 3.4% of suitable regional habitat types (Umwelt, 2026b) | Past population reduction estimated from cumulative impact to mapped habitat from approved projects within 15 km buffer of Karara Mine Area:<br>• 10,011.1 ha<br>• 3.3% of suitable regional habitat types (Umwelt, 2026b) |
| Population reduction, projected or suspected in the future | ≥ 80% | ≥ 50% | ≥ 30% | Projected future population reduction estimated from KIOP MLE proposed impact to mapped habitat in the Fauna Survey Area:<br>• 599.5 ha<br>• 9.8% of mapped habitat within Survey Area (Umwelt, 2026b) | Projected future population reduction estimated from KIOP MLE proposed impact to mapped habitat in the Fauna Survey Area:<br>• 811.3 ha<br>• 11.4% of mapped habitat within Survey Area (Umwelt, 2026b) |
| Criterion 1 category | | | | Does not meet criterion for listing. | Does not meet criterion for listing. |

| Criteria | Critically Endangered | Endangered | Vulnerable | Assessment for *Idiosoma clypeatum* | Assessment for *Idiosoma formosum* |
|---|---|---|---|---|---|
| **2 – Limited Geographic Distribution** | | | | | |
| Extent of occurrence OR | < 100 km$^2$ | < 5,000 km$^2$ | < 20,000 km$^2$ | 120,000 km$^2$ – does not meet criterion | 3,780 km$^2$ – meets criterion for Endangered |
| Area of occupancy AND | < 10 km$^2$ | < 500 km$^2$ | < 2,000 km$^2$ | 128 km$^2$ – restricted | Not required as above criterion is met. |
| Number of locations AND | = 1 | ≤ 5 | ≤ 10 | ~78 – does not meet criterion | |
| Continuing decline or extreme fluctuations in extent of occurrence, area of occupancy, number of locations, or number of mature individuals. | | | | Not relevant as large number of locations does not meet criterion. | |
| Criterion 2 category | | | | Does not meet criterion. | **Meets criterion for Endangered** |
| **3 – Population Size and Decline** | | | | | |
| Estimated number of mature individuals AND | < 250 | < 2,500 | < 10,000 | Indicative 1,792,000 individuals | Indicative 1,572,614 individuals |
| Observed or projected decline of at least | 25% in 3 years | 20% in 5 years | 10% in 10 years | Not relevant as first component is not met. | Not relevant as first component is not met. |
| Criterion 3 category | | | | Does not meet criterion for listing. | Does not meet criterion for listing. |
| **4 – Number of Mature Individuals** | | | | | |
| Number of mature individuals | < 50 | < 250 | < 1,000 | Indicative 1,792,000 individuals | Indicative 1,572,614 individuals |
| Criterion 4 category | | | | Does not meet criterion for listing. | Does not meet criterion for listing. |

**Table 6.13 MNES Significant Impact Assessment – Trapdoor Spider Species**

| MNES Significant Impact Guidelines 1.1– Endangered Species [adjustments for Vulnerable in brackets] | ***Idiosoma nigrum* important population (*Idiosoma clypeatum*, Northern Shield-backed Trapdoor Spider)**<br>Vulnerable – EPBC Act, P3 – BC Act | ***Idiosoma formosum***<br>**Ornate Trapdoor Spider**<br>Endangered – BC Act |
|---|---|---|
| **Published conservation advice and recovery plans** | Approved Conservation Advice for *Idiosoma nigrum* (shield-backed spider) dated 26 April 2013.<br>Females spend their entire life in the burrow or within its proximity, and male dispersal is estimated to be less than 500 m. Although **critical habitat** is not defined, for the purpose of this assessment the burrows are considered critical habitat.<br>Main **threats** are land clearing, habitat fragmentation and grazing.<br>**Priority actions** include managing threats and minimising adverse impacts from land use changes, especially mining.<br>DCCEEW considers *Idiosoma clypeatum* qualifies as an 'important population' of *Idiosoma nigrum*.<br>No approved recovery plan. | There is no published conservation advice or recovery plan.<br>Listing advice under the BC Act is not published or publicly available. |
| **Lead to a long-term decrease in the size of a population of a species**<br>**[important population for Vulnerable species]** | No – the Proposal is not expected to lead to a long-term decrease in the size of an important population of the species. *Idiosoma clypeatum* as a species is assessed as an 'important population' of *Idiosoma nigrum*. *Idiosoma clypeatum* has a large extent of occurrence and estimated total population of almost 2 million individuals and does not meet the IUCN criteria for listing as Vulnerable. An impact on a small proportion of the known area of occurrence will not lead to a long-term decrease in the size of the total population of *Idiosoma clypeatum*.<br>The significance of residual impact was assessed in accordance with the *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014):<br>Impacts are potentially significant if they are likely to result in a species or ecosystem requiring protection under statute (i.e. meeting criteria for listing) or increasing the cumulative impact to a critical level (i.e. cumulative impacts meeting criteria for listing).<br>The proposed KIOP MLE mitigated disturbance footprint will impact 599.5 ha of mapped habitat for *Idiosoma clypeatum* (9.8% of habitat mapped in the Survey Area, 4.7% of area of occupancy).<br>The Combined Proposal disturbance footprint would impact 1,187 ha of mapped habitat for *Idiosoma clypeatum*. Using the same methods, the Combined Proposal could impact 9.3% of the indicative population.<br>The predicted impact to *Idiosoma clypeatum* (proportional impact to the total area of occupancy) would not increase the threat level to the species such that it would increase the cumulative impact to a critical level or lead to long-term decrease of the population. | Yes – the Proposal could lead to a long-term decrease in the size of a population of the species. *Idiosoma formosum* meets IUCN criteria for listing as Endangered based on geographic distribution (small extent of occurrence). The predicted impact to 11.4% of the Karara Mine Area population could be considered a substantial impact on the population.<br>The proposed KIOP MLE mitigated disturbance footprint will impact 811.3 ha of mapped habitat for *Idiosoma formosum* (11.4% of habitat mapped in the Survey Area). The Combined Proposal disturbance footprint would impact 1,572.1 ha of mapped habitat for *Idiosoma formosum* (21.7% of habitat mapped in the Survey Area).<br>The predicted impact to 11.4% of the local population could lead to a long-term decrease in the size of a population of the species. |
| **Reduce the area of occupancy of [an important population] the species** | Yes – the Proposal is expected to decrease the area of occupancy of the species. However, this impact is not significant as *Idiosoma clypeatum* has been recorded in numerous locations and does not demonstrate a continuing decline or extreme fluctuations in the extent of its occurrence.<br>The area of occupancy as mapped by Atlas of Living Australia is 128 $km^2$ (12,800 ha), which includes records from Karara Mine Area.<br>The proposed KIOP MLE mitigated disturbance footprint will impact 29 recorded burrows of *Idiosoma clypeatum* (16.4% of locations recorded in the Survey Area).<br>The impact to 16.4% of recorded locations in the Survey Area would reduce the area of occupancy of the species in the Karara Mine Area. | No – the studies completed for the KIOP MLE have extended the known area of occupancy of *Idiosoma formosum*. Although some of the newly recorded locations will be impacted by the Proposal, the net outcome is an increase in the area of occupancy of the species.<br>The area of occupancy recorded by Atlas of Living Australia is 2,000 ha, which doesn't include records from Karara Mine Area.<br>The proposed KIOP MLE mitigated disturbance footprint will impact 167 recorded burrows of *Idiosoma formosum* (49.4% of locations recorded in the Survey Area).<br>The net impact is an increase in the area of occupancy compared to published records on Atlas of Living Australia. |
| **Fragment an existing population [important population] into two or more populations** | No – the Proposal will not fragment an important population.<br>The KIOP MLE Proposal involves additional clearing adjacent to already impacted areas. Therefore, there will be no additional fragmentation. | No – the Proposal will not fragment an important population.<br>The KIOP MLE Proposal involves additional clearing adjacent to already impacted areas. Therefore, there will be no additional fragmentation. |

| MNES Significant Impact Guidelines 1.1– Endangered Species [adjustments for Vulnerable in brackets] | ***Idiosoma nigrum* important population (*Idiosoma clypeatum*, Northern Shield-backed Trapdoor Spider)**<br>Vulnerable – EPBC Act, P3 – BC Act | ***Idiosoma formosum***<br>**Ornate Trapdoor Spider**<br>Endangered – BC Act |
|---|---|---|
| **Adversely affect habitat critical to the survival of a species** | Yes – the Proposal will result in clearing of habitat that can be considered habitat critical to the survival of the species.<br>The MNES Significant Impact Guidelines 1.1 defines habitat critical to the survival of a species as areas that are necessary for foraging, breeding, roosting or dispersal, for long-term maintenance of the species or to maintain genetic diversity. For this assessment, the trapdoor spider burrows and mapped preferred habitat are considered critical habitat as the burrows are necessary for the individuals to forage, breed and roost, and the preferred habitat is necessary for hosting burrows (and will contain more burrows that feasible to record during a survey).<br>The proposed KIOP MLE will result in clearing of 599.5 ha of mapped habitat and 29 recorded *Idiosoma clypeatum* burrows. | Yes – the Proposal will result in clearing of habitat that can be considered habitat critical to the survival of the species.<br>The MNES Significant Impact Guidelines 1.1 defines habitat critical to the survival of a species as areas that are necessary for foraging, breeding, roosting or dispersal, for long-term maintenance of the species or to maintain genetic diversity. For this assessment, the trapdoor spider burrows and mapped preferred habitat are considered critical habitat as the burrows are necessary for the individuals to forage, breed and roost, and the preferred habitat is necessary for hosting burrows (and will contain more burrows than feasible to record during a survey).<br>The proposed KIOP MLE will result in clearing of 811.3 ha of mapped habitat and 167 recorded *Idiosoma formosum* burrows. |
| **Disrupt the breeding cycling of a population [important population]** | No – the Proposal will not disrupt the breeding cycle of an important population of *Idiosoma nigrum*.<br>*Idiosoma clypeatum* as a species is assessed as an 'important population' of *Idiosoma nigrum*.<br>The proposed MLE will directly impact on recorded burrows where females spend their entire lives. Destruction of burrows will result in loss of females and disruption of breeding potential. Based on spider density and proportional impacts to area of occupancy, approximately 4.7% of the indicative total population of *Idiosoma clypeatum* would be impacted. This extent of impact is not expected to disrupt the breeding cycle of the entire *Idiosoma clypeatum* species (assessed as an important population of *Idiosoma nigrum*). | Yes – the Proposal could disrupt the breeding cycle of a population of *Idiosoma formosum*.<br>The MNES Significant Impact Guidelines 1.1 defines a population as an occurrence of a species in a particular area, such as a geographically distinct regional population or a bioregion. As *Idiosoma formosum* has a restricted distribution in the Lake Moore catchment, the entire distribution of the species is considered one population for the purpose of this assessment.<br>The proposed MLE will directly impact on recorded burrows where females spend their entire lives. Destruction of burrows will result in loss of females and disruption of breeding potential. Based on spider density and proportional impacts to the mapped habitat in Karara Mine Area, approximately 11.4% of the indicative numbers at the Karara Mine Area would be impacted by the proposal. This extent of impact could disrupt the breeding cycle of *Idiosoma formosum* in the local area. |
| **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline** | No – the Proposal will not decrease the availability or quality of habitat to the extent that the species is likely to decline. *Idiosoma clypeatum* has a large extent of occurrence and estimated total population of almost 2 million individuals. An impact on a small proportion of the known area of occurrence would not be considered a substantial impact on the total species.<br>The proposed KIOP MLE mitigated disturbance footprint will impact 599.5 ha of mapped habitat for *Idiosoma clypeatum* (4.7% of area of occupancy). Whilst there will be an impact to potential habitat from the proposal, the species has a wide distribution and does not meet criteria for listing as Vulnerable. The habitat will not be impacted to an extent that the species is likely to decline. | Yes – the Proposal could decrease the availability or quality of habitat to the extent that the species is likely to decline.<br>*Idiosoma formosum* meets IUCN criteria for listing as Endangered based on geographic distribution (small extent of occurrence). The predicted impact to 11.4% of the Karara Mine Area population could be considered a substantial impact on the population, which is a large component of the total known species. |
| **Result in invasive species that are harmful to the species becoming established in the species' habitat** | No – the Proposal will not result in establishment of invasive species in the species' habitat.<br>There are no invasive species currently documented as affecting this species. No new invasive or harmful species are expected to be introduced or become established due to the proposal. | No – the Proposal will not result in establishment of invasive species in the species' habitat.<br>There are no invasive species currently documented as affecting this species. No new invasive or harmful species are expected to be introduced or become established due to the proposal. |
| **Introduce disease that may cause the species to decline** | No – the Proposal will not introduce diseases that may cause the species to decline.<br>There is no disease threat currently documented as affecting this species. Diseases are unlikely to be introduced by the KIOP MLE Proposal. | No – the Proposal will not introduce diseases that may cause the species to decline.<br>There is no disease threat currently documented as affecting this species. Diseases are unlikely to be introduced by the KIOP MLE Proposal. |
| **Interfere with the recovery of the species** | No – there is no approved recovery plan. *Idiosoma clypeatum* does not meet IUCN criteria for listing. *Idiosoma clypeatum* has been formally assessed and listed as Priority 3 (Rix et al, 2018). Priority 3 listing by DBCA means the species has several poorly known populations and needs monitoring. No recovery of the species is required. | No – there is no approved recovery plan and species recovery actions are not known. |
| **Outcome** | Significant residual impact assessed against MNES significant impact guidelines for Vulnerable species, due to impact on habitat critical to the survival of a species (burrows and mapped suitable habitat) and reduction in area of occupancy.<br>However, *Idiosoma clypeatum* does not meet IUCN criteria for listing due to large extent of occurrence, large total known population and high number of locations. The predicted impact to *Idiosoma clypeatum* would not increase the threat level to the species such that it would trigger IUCN criteria or increase the cumulative impact to a critical level. Therefore, the impact to the species is not significant according to the criteria for assessing significance of residual impact in the *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014). Residual impacts not significant. | Significant residual impact due to impact on habitat critical to the survival of a species (burrows and mapped suitable habitat), which could lead to decline in species numbers.<br>*Idiosoma formosum* meets IUCN criteria for Endangered based on small extent of occurrence. |

### 6.10.5 Cumulative Impacts to Fauna Habitats

The cumulative impact assessment for the Proposal considered existing impacts within the region (Cumulative Assessment Area 1 (CCA 1), which is a 15 km buffer on the Mine Area, was the area used for regional assessment of terrestrial fauna). The distance of this buffer is based upon guidance for regional context from the EPA (2016e). This assessment incorporated both existing and previously approved impacts from CCAC land where information was available. Historical clearing that was included in the cumulative impact assessment for CAA 1 comprised of:

- CCAC areas.
- Approved disturbance footprints for KML 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 cumulative direct impact assessment for CAA 1 evaluated the 27 conservation significant fauna species identified as Residents or Regular Visitors of the Mine Area, and quantified impacts based on existing and proposed disturbances to DPIRD (2019) PEVSAs (that represent fauna habitat VSAs [see **Section 6.6**]).

The Combined Proposal is expected to cause no more than a 4.7% loss of habitat for any significant species, with the Proposed MLE contributing no more than 2% of this loss of habitat (**Table 6.14**). At least 95.3% of suitable habitat for each species is predicted to remain intact within CAA 1.

**Table 6.14 Cumulative Direct Impacts to Fauna Habitat Within 15 km Buffer of KIOP MLE Mitigated Disturbance Footprint**

| Species | Status (WA) | Status (EPBC) | Original Pre-European Extent of PEVSAs in CAA 1 (ha) | Historical Impact to PEVSAs in CAA 1 (ha) | Historical Impact to PEVSAs in CAA 1 (% of original extent) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed direct impact – KIOP MLE mitigated disturbance footprint (% of original extent) | Total Cumulative Impact to PEVSAs in CAA 1* (ha) | Total Cumulative Impact to PEVSAs in CAA 1 (% of original extent) |
|---|---|---|---|---|---|---|---|---|---|
| **Frogs** | | | | | | | | | |
| Desert Trilling Frog | - | - | 520,980.4 | 13,068.0 | 2.5 | 6,229.7 | 1.2 | 16,990.3 | 3.3 |
| **Reptiles** | | | | | | | | | |
| Gilled Slender Blue-tongue | VU | - | 340,412.1 | 8,954.5 | 2.6 | 4,279.6 | 1.3 | 11,705.6 | 3.4 |
| Mulga Dragon | - | - | 253,821.6 | 4,732.6 | 1.9 | 1,950.1 | 0.8 | 5,919.0 | 2.3 |
| Reticulated Velvet Gecko | - | - | 119,658.4 | 3,540.4 | 3.0 | 1,950.1 | 1.6 | 5,492.5 | 4.6 |
| Western Spiny-tailed Skink | VU | EN | 119,658.4 | 3,540.4 | 3.0 | 1,950.1 | 1.6 | 5,490.5 | 4.6 |
| **Birds** | | | | | | | | | |
| Bush Stone-curlew | - | - | 253,821.6 | 4,732.6 | 1.9 | 1,950.1 | 0.8 | 5,919.0 | 2.3 |
| Crested Bellbird | - | - | 253,821.6 | 4,732.6 | 1.9 | 1,950.1 | 0.8 | 5,919.0 | 2.3 |
| Major Mitchell's Cockatoo | - | - | 520,980.4 | 13,068.0 | 2.5 | 6,229.7 | 1.2 | 16,990.3 | 3.3 |
| Malleefowl – foraging only habitat | VU | VU | 120,676.1 | 3,575.2 | 3.0 | 1,950.1 | 1.6 | 4,761.2 | 3.9 |
| Malleefowl – nesting/foraging habitat | | | 200,904.9 | 4,244.2 | 2.1 | 1,950.1 | 1.0 | 5,430.4 | 2.7 |
| Peregrine Falcon | OS | | 537,104.7 | 13,283.6 | 2.5 | 7,015.0 | 1.3 | 17,212.7 | 3.2 |
| Redthroat | - | - | 253,821.6 | 4,732.6 | 1.9 | 1,950.1 | 0.8 | 5,919.0 | 2.3 |
| Regent Parrot | - | - | 537,104.7 | 13,283.6 | 2.5 | 7,015.0 | 1.3 | 17,212.7 | 3.2 |
| Rufous Treecreeper | - | - | 119,734.5 | 3,540.4 | 3.0 | 1,950.1 | 1.6 | 4,726.4 | 3.9 |
| Southern Whiteface | VU | VU | 269,945.9 | 4,948.2 | 1.8 | 2,735.4 | 1.0 | 6,141.3 | 2.3 |
| Western Yellow Robin | - | - | 253,821.6 | 4,732.6 | 1.9 | 1,950.1 | 0.8 | 5,919.0 | 2.3 |
| White-browed Babbler | - | - | 253,821.6 | 4,732.6 | 1.9 | 1,950.1 | 0.8 | 5,919.0 | 2.3 |
| White-browed Treecreeper | - | - | 194,035.2 | 6,694.3 | 3.5 | 3,900.2 | 2.0 | 9,051.2 | 4.7 |
| **Mammals** | | | | | | | | | |
| Inland Long-eared Bat | P4 | - | 537,104.7 | 13,283.6 | 2.5 | 7,015.0 | 1.3 | 17,212.7 | 3.2 |
| Kultarr | - | - | 253,821.6 | 4,732.6 | 1.9 | 1,950.1 | 0.8 | 5,919.0 | 2.3 |
| Long-tailed Dunnart | P4 | - | 340,412.1 | 8,954.5 | 2.6 | 4,279.6 | 1.3 | 11,705.6 | 3.4 |
| Woolley's Pseudantechinus | - | - | 340,412.1 | 8,954.5 | 2.6 | 4,279.6 | 1.3 | 11,705.6 | 3.4 |
| **Invertebrates** | | | | | | | | | |
| Karara Millipede | - | - | 155,919.8 | 3,761.2 | 2.4 | 1,164.7 | 0.7 | 4,940.6 | 3.2 |
| Millipede sp. nov. 'PM1' | - | - | 155,919.8 | 3,761.2 | 2.4 | 1,164.7 | 0.7 | 4,940.6 | 3.2 |
| Mt Gairdner Scorpion | - | - | 155,919.8 | 3,761.2 | 2.4 | 1,164.7 | 0.7 | 4,940.6 | 3.2 |
| Northern Shield-backed Trapdoor Spider | P3 | - | 283,213.2 | 7,403.5 | 2.6 | 3,114.8 | 1.1 | 9,754.0 | 3.4 |
| Ornate Trapdoor Spider | EN | - | 300,150.6 | 7,654.0 | 2.6 | 3,900.2 | 1.3 | 10,011.1 | 3.3 |
| Unidentified trapdoor spider^ | - | - | 63,816.2 | 1,618.0 | 2.5 | 1,164.7 | 1.8 | 2,782.7 | 4.4 |

*All CCAC and Combined Proposal mitigated DF impact (within CAA 1).

^Aganippe (Idiosoma) sp.

## 6.11 Environmental Outcomes

**Table 6.15** summarises the environmental outcomes, proposed assurance and monitoring for terrestrial fauna.

When issued in 2009, both MS 805 for the KIOP and MS 806 for the MIOP incorporated activities of relevance to terrestrial fauna, including:

- relating to the protection of fauna from trenches (condition 8 of MS 805 and MS 806)
- relating to the implementation of a monitoring program for Shield-backed Trapdoor Spider (condition 9 of MS 805)
- relating to the preparation and implementation of strategies to avoid fauna deaths and maintenance of a Fauna Mortality Register (condition 10 of MS 805 and condition 9 of MS 806)
- relating to the completion of surveys for conservation significant reptiles prior to ground disturbance activities (condition 11 of MS 805 and condition 10 of MS 806)
- relating to mine closure and rehabilitation and specifically monitoring of feral animal populations (condition 12 of MS 805 and condition 11 of MS 806).

KML recommends that these conditions be retained and consolidated into a new MS for the KIOP MLE Proposal.

**Table 6.15 Proposed Outcomes for Terrestrial Fauna**

| Environmental Outcome | Proposed Regulation | Proposed Monitoring | Consistency with EPA Objective |
|---|---|---|---|
| **Significant residual impacts are managed and contained to the Combined Proposed DE.** | Clearing within the KIOP MLE Mitigated Proposal of no more than:<br>• 239 ha of Western Spiny-tailed Skink habitat<br>• 613 ha of Gilled Slender Blue-tongue habitat<br>• 693 ha of Malleefowl nesting habitat.<br>Condition in relation to offsets.<br>Relevant conditions from MS 805 and MS 806, and EPBC Approval 2006/3017 | Pre-disturbance surveys in accordance with Ministerial implementation conditions.<br>Adherence to KML's environmental management system documents, including:<br>• *Environmental Procedure – Western Spiny-tailed Skink, Management, Monitoring and Translocation* (Document Number CORP-EN-PRO-1024); and annual monitoring during breeding season in accordance with SWP - Western Spiny-Tailed Skink Monitoring (EN-SWP-023).<br>• *Environmental Procedure – Malleefowl Management and Monitoring* (Document Number CORP-EN-PRO-1035); and annual monitoring during breeding season in accordance with SWP – Malleefowl Monitoring (EN-SWP-043). | Yes, the potential significant residual impact of the proposed clearing to cumulative impacts can be counterbalanced by offsets such that the environmental outcome is consistent with the EPA objective. |

| Environmental Outcome | Proposed Regulation | Proposed Monitoring | Consistency with EPA Objective |
|---|---|---|---|
| | | • *Fauna Sighting, Relocation and Mortality* (CORP-EN-FRM-1045) and the National Malleefowl Monitoring Manual; annual monitoring and opportunistic observational records of Malleefowl and its mounds.<br>Reporting in accordance with requirements of EPBC Approval 2006/3017 (annual compliance report); MS 805, MS 806 & MS 968 (annual compliance assessment reports) and DMPE Annual Environmental Report. | |
| **The viability of the significant fauna known from the Combined Proposal DE will be maintained.** | **Condition A1 Limitations and extent of proposal**<br>Disturbance to no more than 1,185 ha of native vegetation within the Combined Proposal DE. | Monitoring in accordance with Ministerial implementation conditions.<br>Implementation of mitigation measures outlined in **Section 6.9**.<br>Adherence to KML environmental management system documents. | Yes, the potential significant residual impact of the proposed clearing to cumulative impacts can be counterbalanced by offsets such that the environmental outcome is consistent with the EPA objective. |
| **Activities and threats that may lead to indirect impacts to fauna are managed within the Combined Proposal DE such that they are not significant.** | KML environmental management system documents.<br>Relevant conditions from MS 805 and MS 806. | Monitoring in accordance with Ministerial implementation conditions.<br>Implementation of mitigation measures outlined in **Section 6.9**.<br>Adherence to KML environmental management system documents. | Yes, aims to minimise potential indirect impacts to terrestrial fauna values. |
| **Avoid disturbance to any Malleefowl mound, regardless of activity status, in breeding season** | Condition of approval | Monitor as per KML Environmental Procedure – Malleefowl Management and Monitoring (CORP-EN-PRO-1035). | Yes, minimises disturbance to breeding for Malleefowl |

# 7.0 Landforms

## 7.1 Landforms Summary

The Mine Area is in the Banded Iron Formation (BIF) Blue Hills Range System, which comprises five separate ranges: Mt Karara, Blue Hills, Windaning Hill, Mungada Ridge, and Jasper Hill. KIOP is in the Mt Karara range and MIOP is distributed across the Mt Karara range, Blue Hills range and Mungada ridge.

BIF ranges across the Midwest region are recognised as having very significant biodiversity value and supporting endemic flora and fauna species (Department of Environment and Conservation (DEC), 2007). The *Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields* (Department of Environment and Conservation (DEC), 2007) was prepared to facilitate a strategic approach in environmental impact assessments to consider biodiversity conservation and resource utilisation. The conservation principles and guiding items in the strategic review have been applied in the landforms impact assessment for the KIOP MLE Proposal.

The already approved KIOP (MS 805) and MIOP (MS 806) have a permanent impact to the Blue Hills Range System of approximately 427.0 ha, which represents 22.0% of the BIF ranges local assessment unit (LAU) (see **Section 7.5.1**). Of this permanent impact, 357.0 ha is to Mt Karara.

The KIOP MLE Proposal will increase the residual (permanent) impact to Mt Karara by 32.5 ha, which represents an additional 6.4% impact. The combined residual impact to Mt Karara including the approved extent of KIOP and MIOP is 389.5 ha (77% of the landform). Based on an evaluation by Umwelt (2025c) of the significance considerations of landforms, described in *Environmental Factor Guideline – Landforms* (EPA, 2018), Mt Karara is not considered a significant example of a BIF landform.

The KIOP MLE Proposal has been designed to avoid impacts to BIF landforms outside of Mt Karara and to minimise impacts to Mt Karara where possible.

The KIOP MLE Proposal is unlikely to result in a change in International Union for the Conservation of Nature and Natural Resources (IUCN) Threat Category for significant flora, terrestrial fauna and ecological communities that are reliant on the BIF landform. While the Blue Hills PEC and *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (WA P1) flora taxa appear to already meet criteria for Endangered and Vulnerable status respectively, the predicted impacts of the KIOP MLE Proposal do not elevate their threat levels. The proposed impact to BIF habitat will not increase the IUCN Threat Category for any conservation significant fauna or listed flora species. Only one ecological value could experience a change in IUCN Threat Category - *Crassula* sp. *nov*. However, this is due to the very few records of this potential new species, rather than its association with the BIF landform.

Temporary impacts to landforms, such as infrastructure, will be reshaped during mine closure to blend to the natural surface, restoring landform values as much as possible. Re-establishment of vegetation in rehabilitation will achieve at least 70% species composition comparable with the pre-mining vegetation within five years of cessation of productive mining.

The proposed impact to Mt Karara landform is not considered significant as it is not considered a significant example of a BIF landform and it will not increase the threat (as per the IUCN Threat Categories) for any ecological values that are reliant on the BIF ranges landform.

## 7.2 EPA Objective

The EPA objective for landforms is *'To maintain the variety and integrity of significant physical landforms so that environmental values are protected'* (EPA, 2018b).

## 7.3 Relevant Policy and Guidance

**Table 7.1** lists the EPA and other policy and guidance relevant to landforms and describes how the policy and guidance have been considered.

**Table 7.1 Policy and Guidance Relevant to Landforms**

| Policy and Guidance | How the Policy and Guidance have been Considered |
|---|---|
| ***Environmental Factor Guideline – Landforms*** **(EPA, 2018b)** | The supporting studies and this ERD provide the information required for environmental impact assessment as specified in the guideline, including description of the landform, significance of the landform, calculation of predicted impacts (including cumulative impacts), description of mitigation measures and significance of the residual impact. |
| ***Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields*** (Department of Environment and Conservation (DEC), 2007) | The conservation principles and guiding items in the strategic review have been applied in the landforms impact assessment for the KIOP MLE Proposal. |

## 7.4 Receiving Environment

This section describes the receiving environment for landforms including the supporting studies (**Section 7.4.1**), the landform spatial extent (**Section 7.4.2**), morphology and environment values (**Section 7.4.3**) and significance of the landform (**Section 7.4.4**).

### 7.4.1 Supporting Studies and Information

**Table 7.2** lists the supporting studies and information that informed the environment impact assessment for landforms, including comments regarding consistency with EPA Guidance.

**Table 7.2 Supporting Studies for Landforms**

| Study Title | Timing | Study Methods | Consistent with EPA Guidance |
|---|---|---|---|
| *Landforms Assessment Technical Report Karara Iron Ore Project Mine Life Extension* (Umwelt, 2025c)<br>**Appendix 7-1** | Desktop assessment undertaken in 2024–2025 | Spatial extent of landform defined using contour slope analysis.<br>Landform morphology, ecological values and significance described.<br>Temporary and permanent impacts from the KIOP MLE Proposal and cumulative impacts calculated. | The technical report provides the following information required by the *Environmental Factor Guideline – Landforms* (EPA, 2018b):<br>• identify spatial extent of landform<br>• describe morphology and environmental values supported by the landform<br>• analysis of landform significance |

| Study Title | Timing | Study Methods | Consistent with EPA Guidance |
|---|---|---|---|
| | | | • calculate direct, indirect and cumulative impacts. |
| *Karara Iron Ore Project Mine Life Extension – Environmental Values Updated Impact Assessment* (Umwelt, 2026b) **Appendix 5-3** | Desktop assessment undertaken February 2026, incorporating data and regulator feedback up to December 2025. | Desktop GIS-based landform assessment using mapping, geodesic area calculations, updated disturbance footprints, and cumulative impact analysis. | The assessment report provides the following information required by the Environmental Factor Guideline - Landforms (EPA, 2018b):<br>• quantification of direct, indirect and cumulative impacts |

### 7.4.2 Spatial Extent of Landform

The spatial extent of the landform has been defined in the local and regional context.

The approach used to generate the spatial extent for the BIF landform was adopted from the Sinosteel Midwest Corporation Limited Blue Hills Mungada East Expansion Public Environmental Review (PER) (Sinosteel, 2016). The Mungada East Expansion is located approximately 10 km northeast of the KIOP MLE mitigated disturbance footprint and is one of the most recent proposals in the region that has been assessed by the EPA for impacts on landforms.

Regional contour line data was acquired from Landgate (10 m intervals) and converted into a digital elevation model (DEM) layer (5 m resolution) using ArcGIS Pro. A contour slope analysis on the surface was conducted, selecting for any slope ≥5 degrees, and a 50 m buffer was applied to smooth, fill and join smaller polygons into larger groups to better represent formations for regional visualisation. The resulting layer produced for the landform LAU was similar in overall area to that of the LAU used in the Mungada East PER (3.6 % smaller due to smoothing process used) (Umwelt, 2025c).

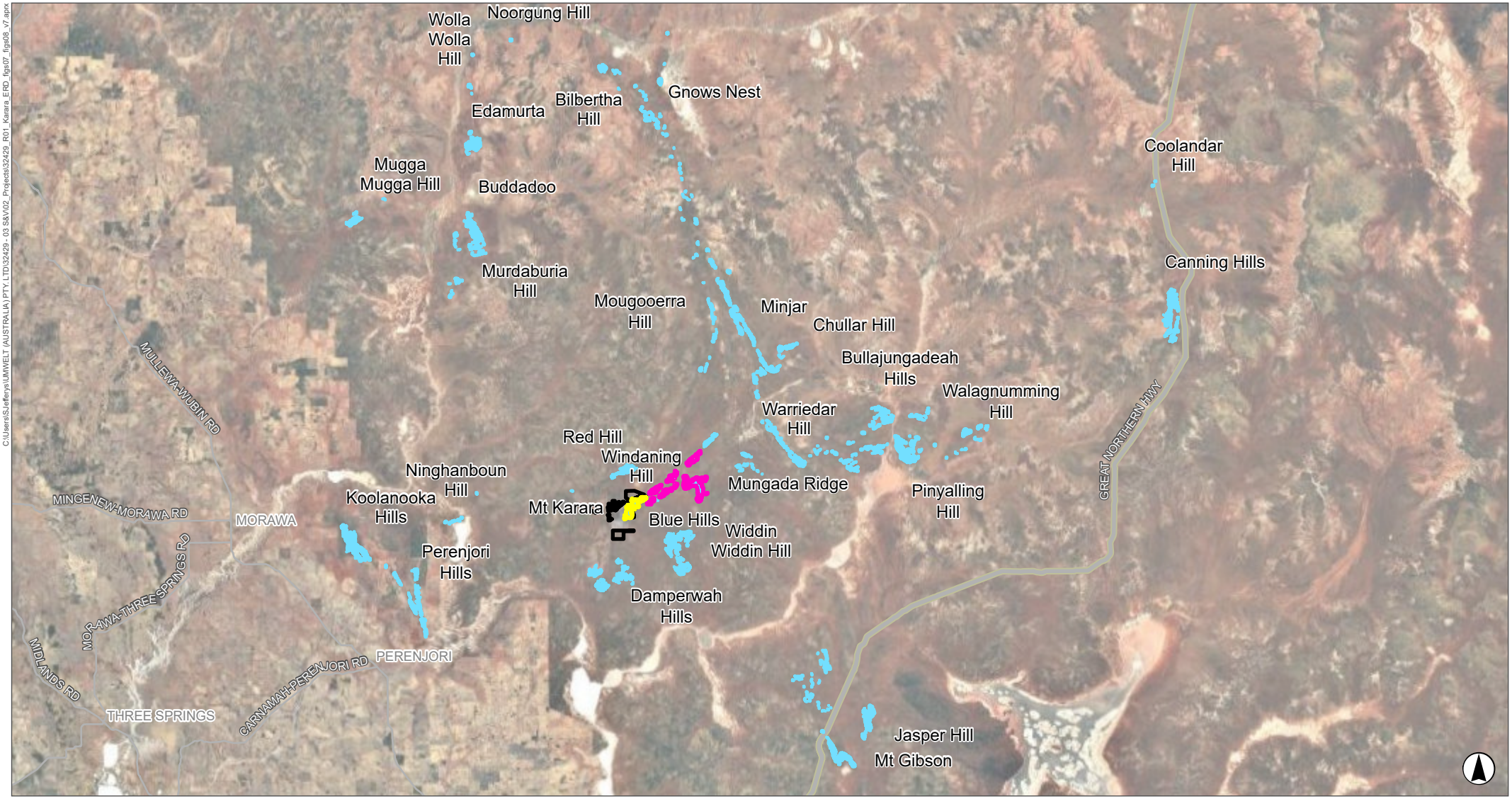
The spatial extent of the landform comprises:

- Local context: Mt Karara immediate landform (506 ha)
- Regional context: Blue Hills Range System LAU (1,939 ha).

The local and regional spatial extent of the BIF landforms are shown in **Figure 7.1**.

Mt Karara is the only landform within the LAU that would be permanently impacted by the KIOP MLE Proposal. Currently approved disturbance areas (MS 805 and MS 806) have both temporary (e.g. bores, access roads and/or general infrastructure) and permanent impacts (mine pits, WRDs and/or abandonment bunds) on Mt Karara. Other mining operations in the area (MS 811 and MS 1071), while impacting the greater LAU, do not have a direct impact on the Mt Karara landform. Small areas of overlap exist between the spatial datasets that represent MS 805 and MS 806; however this is unlikely to have any meaningful impact on the results of the assessment.

Permanent impacts to Mt Karara from KML's existing approvals are estimated to be 357 ha (70.6% of Mt Karara), and temporary impacts are estimated to be 6.1 ha (of Mt Karara). Most of the permanent impact to Mt Karara is from the current and approved open pit area under MS 805.




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

**Legend**

- KIOP MLE Mitigated Disturbance Footprint
- Mt Karara (included as part of the LAU)
- Blue Hills Local Assessment Unit (LAU)
- Indicative BIF Landforms
- Highway
- Main Road

## FIGURE 7.1
Local and Regional Extent of Banded Iron Formation Landforms

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0 20 40 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

umwelt

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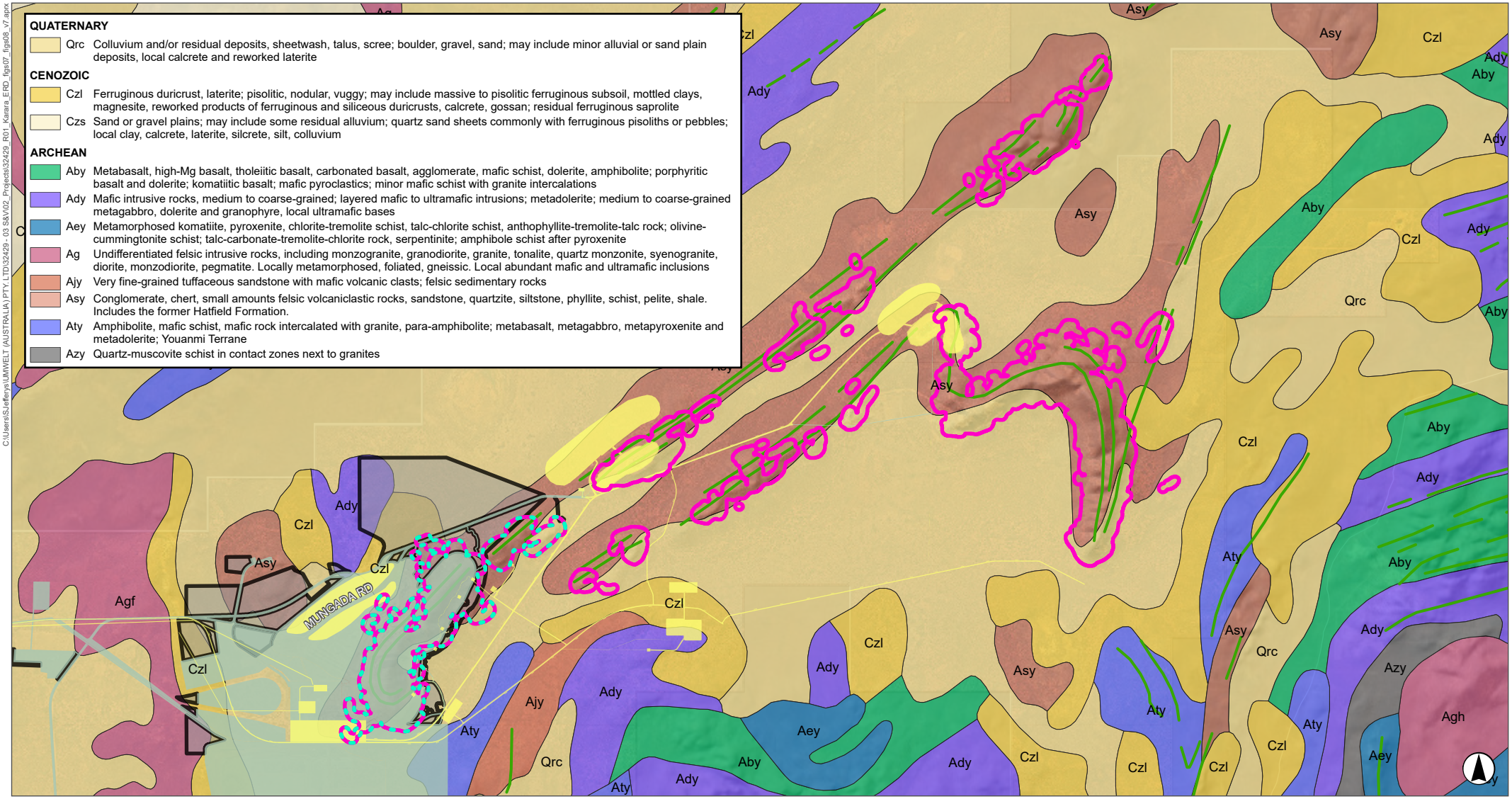


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Scale: 1:100,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Mt Karara (included as part of the LAU)
- Blue Hills Local Assessment Unit (LAU)
- MIOP MS 806 Disturbance Footprint
- KIOP MS 805 Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Indicative BIF (A-h - Hematite, Magnetite-Quartz)

# FIGURE 7.2
## Geology of the Blue Hills Range System

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0 2 4 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), DMIRS (2024), Umwelt (2025)

### 7.4.3 Landform Environmental Values

The Blue Hills Range System LAU is comprised of five ranges, including Mt Karara. This section describes the geology, morphology, land system and ecological values of the local and regional area.

The main geology types in the Blue Hills Range System LAU (**Figure 7.2**), as per Geoscience Australia's Surface Geology spatial data (2012), are:

- **Asy (Archean):** Conglomerate, chert, small amounts felsic volcaniclastic rocks, sandstone, quartzite, siltstone, phyllite, schist, pelite, shale. Includes the former Hatfield Formation.
- **Qrc (Quarternary):** Colluvium and/or residual deposits, sheetwash, talus, scree; boulder, gravel, sand; may include minor alluvial or sand plain deposits, local calcrete and reworked laterite.

BIF landforms within the LAU occur predominantly on the Asy geological type, with the KIOP MLE Proposal spread equally across the Asy and Qrc geological types (the Qrc geological type is predominately representative of the outwash slopes of the BIF landform, rather than the hill itself) (Umwelt, 2025c). These geology types are not restricted to Mt Karara, or indeed the LAU, and are found in various locations throughout the region (Umwelt, 2025c).

While currently approved mining activities (MS 805) have changed the overall morphology of the Mt Karara range, historical information indicates that the landform was oriented northerly to north-northeasterly with a length of approximately 6 km. The highest recorded elevation is from a historic survey mark (BA11) at 452 mAHD (Umwelt, 2025c). The data collected at survey mark BA11 predates mining activities and is no longer part of the landform.

The dominant system in the Blue Hills Range System LAU is the Tallering land system. Ninety-three percent of the LAU is mapped as Tallering land system (representing 5.5% of the total area currently mapped as this land system type in WA) (Umwelt, 2025c). The Tallering land system is known to include BIF ranges and extends from Mt Karara to Yalgoo in the north. It is characterised by ridges/hills of sedimentary rock, dolerite and banded ironstone which support acacia shrublands (DPIRD, 2022).

The Mt Karara landform is spread across four different land systems (Campsite, Moriarty, Pindar and Tallering), with 444 ha (88%) of the landform within the Tallering land system (Umwelt, 2025c).

The LAU is situated between the arid Eremaean botanical province and the South West botanical province and has been well surveyed for mining developments operating out of the area. The Blue Hills LAU has high diversity and endemism of plant taxa, including *Acacia woodmaniorum* (listed as Endangered under the EPBC Act and BC Act). Several other conservation significant flora occur in the Blue Hills LAU, including *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1) and *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1).

Based on the Umwelt (2025a) and BCE (2025) survey reports, conservation significant flora, ecological communities and fauna habitat are known to occur on Mt Karara and may be impacted by the KIOP MLE Proposal. Such conservation significant flora taxa include:

- *Acacia karinae* (P3)
- *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
- *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3)
- *Gunniopsis divisa* (P3)
- *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)
- *Rhodanthe collina* (P3).

Within the LAU, a total of 109 ha (22% of the entire Mt Karara area) was mapped as the WA PEC 'Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation assemblages (banded ironstone formation)' (P1)'.

**Table 7.3** lists conservation significant terrestrial fauna species that may be considered residents or regular visitors to the remaining portions of Mt Karara (based on the presence of suitable fauna habitat vegetation and substrate associations (VSAs 1, 3, 4, 5 and 7) (Bamford Consulting Ecologists, 2025)).

**Table 7.3 Conservation Significant Fauna Species with Habitat on Mt Karara**

| Scientific Name | Common Name | BCE Conservation Significance | Status (WA) | Status (EPBC) |
|---|---|---|---|---|
| **Frogs** | | | | |
| *Neobatrachus centralis* | Desert Trilling Frog | CS3 | - | - |
| **Reptiles** | | | | |
| *Caimanops* (*Diporiphora*) *amphiboluroides* | Mulga Dragon | CS3 | - | - |
| *Hesperoedura reticulata* | Reticulated Velvet Gecko | CS3 | - | - |
| *Cyclodomorphus branchialis* | Gilled Slender Blue-tongue | CS1 | VU | - |
| *Egernia stokesii badia* | Western Spiny-tailed Skink | CS1 | VU | EN |
| **Birds** | | | | |
| *Burhinus grallarius* | Bush Stone-curlew | CS3 | - | - |
| *Cacatua leadbeateri* | Major Mitchell's Cockatoo | CS3 | - | - |
| *Climacteris affinis* | White-browed Treecreeper | CS3 | - | - |
| *Climacteris rufus* | Rufous Treecreeper | CS3 | - | - |
| *Falco peregrinus* | Peregrine Falcon | CS1 | OS | |
| *Leipoa ocellata* | Malleefowl | CS1 | VU | VU |
| *Oreoica gutturalis* | Crested Bellbird | CS3 | - | - |
| *Pyrrholaemus brunneus* | Redthroat | CS3 | - | - |
| *Aphelocephala leucopsis* | Southern Whiteface | CS1 | VU | VU |
| *Eopsaltria griseogularis* | Western Yellow Robin | CS3 | - | - |
| *Pomatostomus superciliosus* | White-browed Babbler | CS3 | - | - |
| *Polytelis anthopeplus* | Regent Parrot | CS3 | - | - |
| *Neophema splendida* | Scarlet-chested Parrot | CS3 | - | - |
| **Mammals** | | | | |
| *Antechinomys laniger* | Kultarr | CS3 | - | - |
| *Nyctophilus major tor* | Central Long-eared Bat | CS2 | P3 | - |
| **Invertebrates** | | | | |
| *Idiosoma clypeatum* | Northern Shield-backed Trapdoor Spider | CS2 | P3 | - |
| *Idiosoma formosum* | Ornate Trapdoor Spider | CS1 | EN | - |
| *Antichiropus* sp. nov. 'Karara' | Karara Millipede | CS3 | - | - |
| *Millipede* sp. nov. 'PM1' | Millipede PM1 | CS3 | - | - |
| *Urodacus* sp. nov. 'Mt Gairdner' | Mt Gairdner Scorpion | CS3 | - | - |

### 7.4.4 Significance of the Landform

The KIOP MLE mitigated disturbance footprint proposes additional disturbance to the Mt Karara landform within the Blue Hills Range System LAU. The significance of the Mt Karara landform has been evaluated using the criteria specified in the *Environmental Factor Guideline – Landforms* (EPA, 2018b). The evaluation in **Table 7.4** summarises information from the *Landforms Assessment Technical Report Karara Iron Ore Project Mine Life Extension* (Umwelt, 2025c).

MS 805 already has an approved area that will impact a large amount of the remaining portion of the Mt Karara landform, leaving only the lower slopes of the main landform's eastly and northeasterly facing aspects. There is a single ridge (approximately 78 ha in size) that sits to the northeast of Mt Karara's main landform mass that remains outside approved operations. However, the main landform mass itself (as well as all other minor ridges that make up Mt Karara) are likely to be impacted by approved and proposed operations. As a result, the assessment of the significance of the landform was conducted on the remaining 149 ha (29%) of Mt Karara.

**Table 7.4 Evaluation of Significance of Landform**

| Item | EPA Criteria (EPA, 2018b) | Supporting Information for Mt Karara (Umwelt, 2025c) | Conclusion of Significance of Mt Karara |
|---|---|---|---|
| **Variety** | The landform is a particularly good or important example of its type. The landform is not well represented over the local, regional or national scale or differs from other examples at these scales. | The overall size of Mt Karara is already approved to be reduced to 29% of the original landform size. The predicted elevation after approved disturbance (ranging from ~340 mAHD to ~380 mAHD) will be significantly lower than the highest peaks in the LAU (510 mAHD). The residual slopes are less steep than the historical survey mark BA11 and those in the LAU. The geology types (Asy and Qrc), as well as the land system types (primarily Tallering) are not unique to Mt Karara, with analogous landforms of similar geological composition found in the LAU and greater region. | Mt Karara is not a particularly good, important or unique example of a BIF landform in the local or regional area. |
| **Integrity** | The landform is intact, being largely complete or whole and in good condition. | Mt Karara is currently the most disturbed landform within the LAU, with an approved permanent impact area of 357 ha (70.6%). This is a result of exploration, mining and/or infrastructure development including WRDs, mine pits and run of mine area associated with KIOP (MS 805). The greatest impacts coincide with the historically highest points/steepest aspects of Mt Karara, removing many of the unique identifying physical characteristics of the landform. | Mt Karara is not intact. |

| Item | EPA Criteria (EPA, 2018b) | Supporting Information for Mt Karara (Umwelt, 2025c) | Conclusion of Significance of Mt Karara |
|---|---|---|---|
| **Ecological Importance** | The landform has a distinctive or exclusive role in maintaining existing ecological and physical processes; for example, by providing a unique microclimate, source of water flow, or shade. The landform supports endemic or highly restricted plants or animals. | The areas of greatest ecological importance on Mt Karara (the BIF ridge crest) have already been removed or are approved to be cleared. While the location of proposed impact for the KIOP MLE Proposal is comparatively less ecologically significant than the previously approved clearing areas, the Proposal will remove part of the already heavily-impacted landform. | Few of the landform's features of greatest ecological importance remain, therefore, any proposed activities conducted on currently uncleared land should prioritise minimal permanent ground disturbance and rehabilitation is recommended where possible. |
| **Scientific Importance** | The landform provides evidence of past ecological processes or is an important geomorphological or geological site. The landform is of recognised scientific interest as a reference site, or an example of where important natural processes are operating. | Using the Mungada East PER as a point of reference, the assessment of scientific importance was based on the shape of the landform and its geoheritage status. Geoheritage focuses on rocks, minerals and fossils that offer information on broadscale geological processes, including the formation of landforms and other geomorphological features (Brocx & Semeniuk, 2007). The Mungada East PER had concluded that none of the BIF landforms in the LAU were likely to attain geoheritage status, noting the lack of known fossils sites or asteroid/meteorite impact structures (Sinosteel, 2016). At present there are still no sites within the LAU with geoheritage status (DEMIRS, 2021). Mungada Ridge, despite having a distinctly unique crescent shape, was not regarded as scientifically important on based on this criteria (Sinosteel, 2016). It is unlikely that Mt Karara (being of a far more degraded state) would be considered scientifically important based on landform shape. | Due to its degraded state, Mt Karara is unlikely to be of specific scientific importance and is not noticeably different from other BIF landforms in the LAU or surrounding region. |
| **Rarity** | The landform is rare or relatively rare, being one of the few of its type at a national, regional or local level. | The Mungada East Expansion Appeals Convenor Report referred to the fact that there are numerous BIF landforms both within the LAU and the surrounding region. As there are substantially more than a 'few' BIF landforms locally and regionally, by the EPA guideline considerations, it is unlikely that rarity would be triggered for Mt Karara as it is not an 'extremely limited landform type' (EPA, 2018). | Mt Karara is not considered to be rare. |

| Item | EPA Criteria (EPA, 2018b) | Supporting Information for Mt Karara (Umwelt, 2025c) | Conclusion of Significance of Mt Karara |
|---|---|---|---|
| **Social Importance** | The landform supports significant amenity, cultural or heritage values. | The BIF landforms within the LAU are important as they support conservation significant flora, fauna and ecosystems, as well as supporting social and cultural values. However, due to mining operations (both current and approved (MS 805 and MS 806)), it is unclear how socially significant the remaining landform is. A majority of Mt Karara has been permanently altered from mining activities, namely the main pit void and WRDs, which have impacted both the aesthetic and ecological value of the landform. At present, public access to the LAU is limited, restricting tourism and cultural uses of the area (EPA, 2017). | The Mt Karara landform is not identified as supporting significant amenity, cultural or heritage values. |

The Mt Karara landform is not considered to be significant (due to variety, integrity, ecological importance, scientific importance, rarity or social importance) as; 70.6% of the original landform has already been approved for permanent disturbance, and the physical characteristics of the remaining landform are no more remarkable than other landforms in the Blue Hills Range System LAU.

## 7.5 Potential Environmental Impacts

Impacts to landforms can be classified as permanent or temporary impacts, and include the removal or alteration of a landform's defining morphology, geology or abiotic processes (EPA, 2018b). Permanent impacts are irreversible damages that have lasting effects on landforms and cannot be fully rehabilitated after the disturbance to the landform has ceased. Examples of permanent effects include aspects such as decommissioned pits, abandonment bunds and/or waste rock stockpiles. Temporary impacts are any superficial disturbances to a landform and can be rehabilitated after a disturbance has ceased. Examples of temporary effects can include aspects such as access tracks, drill pads and/or laydown areas (Appeals Convenor, 2017).

Note that all area calculations have been updated using geodesic methodology (rather than planar) to produce accurate and constant data, which means some of the original areas are not the same calculated area as the previous Proposal Content Document.

### 7.5.1 Impacts to Spatial Extent of Landform

This section calculates the spatial impact to BIF landforms due to the KIOP MLE Proposal, as well as all other projects within proximity to the LAU.

The scope of the impacts assessed for the Blue Hills Range System LAU (total landform extent 1,939 ha) and Mt Karara (total landform 506 ha) were as follows:

- KIOP MLE Mitigated disturbance footprint –residual (permanent) impacts after mine closure and rehabilitation.

- Combined Mitigated Proposal disturbance footprint – combined permanent impacts of the MLE with the approved KIOP (MS 805), and MIOP (MS 806).
- Cumulative permanent impacts with other approved projects in the Blue Hills area – Blue Hills Mungada East Extension, MS 1071 (extrapolated from the Mungada East PER and associated Appeals Convenor report (Appeals Convenor, 2017; Sinosteel, 2016)).

The impacts and landform spatial areas are shown in **Figure 7.3**.

The calculated direct (permanent) and cumulative impacts are summarised in **Table 7.5**, which shows the residual (mitigated) impacts to Mt Karara and the Blue Hills LAU, and **Table 7.6**, which presents the total cumulative permanent impacts when combined with other approved regional projects.

The approved KML proposals (KIOP, MS 805 and MIOP, MS 806) will result in permanent impacts to the Blue Hills LAU of 427 ha. The KIOP MLE Proposal would add an additional permanent impact to the Blue Hills LAU of 32.5 ha (1.7%). The cumulative impacts from all approved projects (KML and SMC) plus the KIOP MLE mitigated Proposal would result in permanent impacts to the Blue Hills LAU of 491,5 ha. The cumulative permanent disturbance to the Blue Hills LAU would increase from 23.7% to 25.3% by the addition of the KIOP MLE.

The KIOP MLE Proposal would impact only the Mt Karara landform within the Blue Hills Range system LAU. The current approved permanent disturbance to Mt Karara landform is 357 ha (70.6%) of the landform) from two KML projects (KIOP, MS 805 and MIOP, MS 806). The KIOP MLE mitigated Proposal would add an additional 32.5 ha (6.4%) of permanent impact to Mt Karara. The increase in permanent disturbance of the Mt Karara landform is mainly due to expansion of the WRD. There would also be approximately 6.1 ha of temporary impacts to Mt Karara from general infrastructure (e.g. topsoil stockpiling).

**Table 7.5 Mitigated Residual Proposal Impacts – Banded Iron Formation Landform Values**

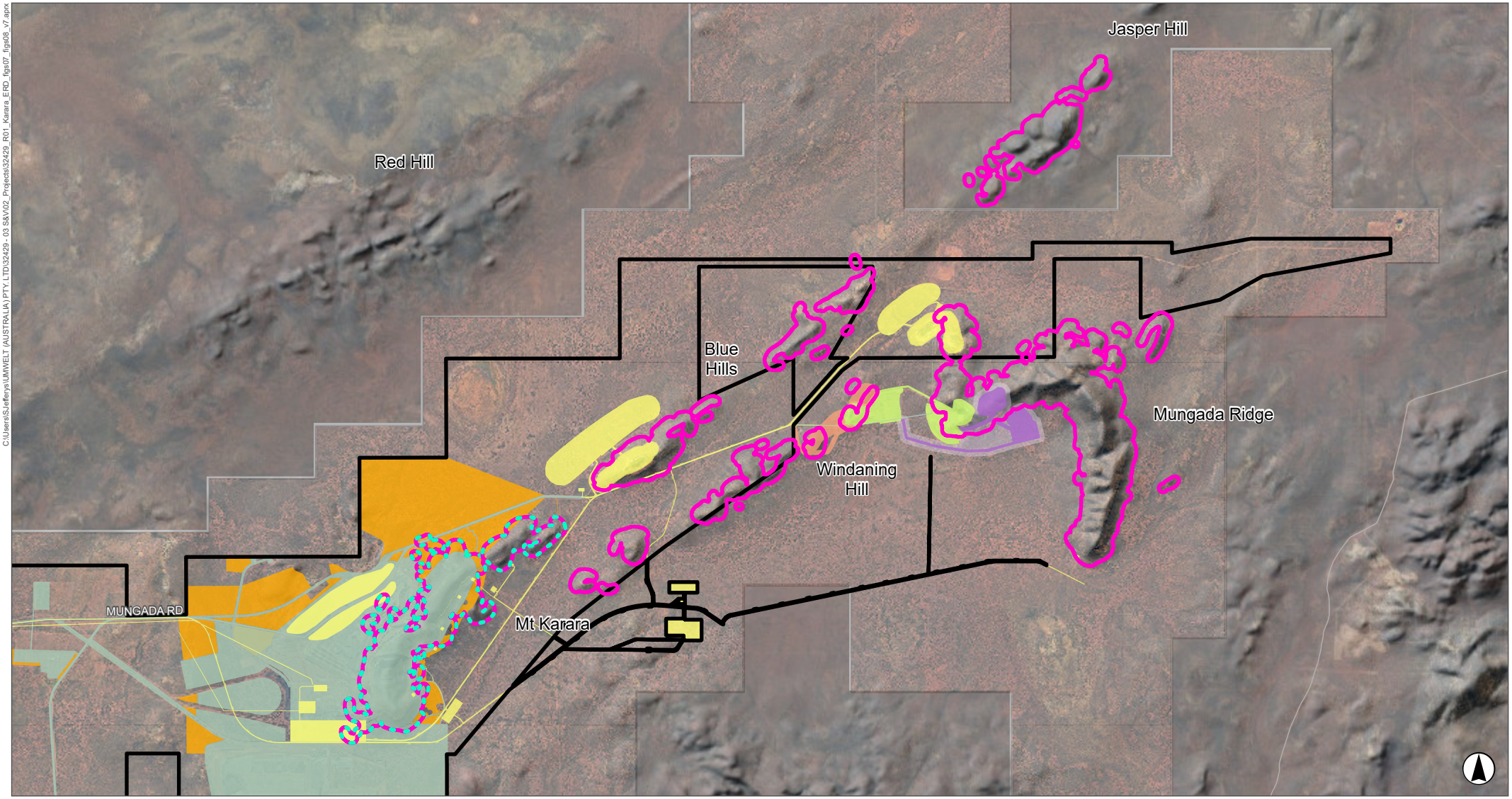
| Landform Value | Mapped Landform Value Area (ha) | Approved permanent impact from MS 805 & 806 (ha) | Approved permanent impact from MS 805 & 806 (% of landform area) | Proposed permanent impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed permanent impact – KIOP MLE mitigated disturbance footprint (% of landform area) | Combined Impact – Combined Proposal mitigated DF (ha) | Combined Impact – Combined Proposal mitigated DF (% of landform area) | Proposed temporary impact – Extent in mitigated indirect impact zone (ha) |
|---|---|---|---|---|---|---|---|---|
| **Mt Karara*** | 506.0 | 357.0 | 70.6 | 32.5 | 6.4 | 389.5 | 77.0 | 6.1 |
| **Blue Hills Local Assessment Unit (LAU)** | 1,939.0 | 427.0 | 22.0 | 32.5 | 1.7 | 491.5 | 25.3 | 6.1 |

*Mt Karara is part of the LAU.

**Table 7.6 Cumulative Impacts – Banded Iron Formation Landform Values**

| Landform Value | Mapped Landform Value Area (ha) | Current cumulative permanent impact from approved projects in region – CCAC (ha) | Current cumulative permanent impact from approved projects in region (% of landform area) | Proposed permanent impact – KIOP MLE mitigated disturbance footprint (ha) | Proposed permanent impact – KIOP MLE mitigated disturbance footprint (% of landform area) | Total cumulative permanent impact – current + proposed (ha) | Total cumulative permanent impact – current + proposed (% of landform area) |
|---|---|---|---|---|---|---|---|
| **Mt Karara*** | 506.0 | 357.0 | 70.6 | 32.5 | 6.4 | 389.5 | 77.0 |
| **Blue Hills Local Assessment Unit (LAU)** | 1,939.0 | 459.0 | 23.7 | 32.5 | 1.7 | 491.5 | 25.3 |

*Mt Karara is part of the LAU.




Scale: 1:100,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Mt Karara (included as part of the LAU)
- Blue Hills Local Assessment Unit (LAU)
- Combined Proposal Mitigated Development Envelope
- MIOP MS 806 Disturbance Footprint
- KIOP MS 805 Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- East Mungada Proposed Disturbance Footprint
- East Mungada Approved DSO Expansion
- East Mungada Approved West Expansion
- East Mungada Development Envelope

**FIGURE 7.3**

Blue Hills Range System Local Assessment Unit and Impacts

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0 2 4 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Umwelt (2025)

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### 7.5.2 Impacts to Ecological Values Supported by Landform

The KIOP MLE Proposal is unlikely to result in a change in IUCN Threat Category for significant flora, terrestrial fauna or ecological communities. Ecological communities and species were assessed against IUCN criteria if they have a dependence on the BIF landform (i.e. the landform comprises important habitat for the species or community). This assessment applied the Environmental Factor Guideline - Landforms (EPA, 2018b) to frame significance in the landform context and used IUCN criteria to evaluate any change in threat category for values supported by the BIF ridge and slope systems.

The BIF landform in the Proposal area supports conservation-significant ecological values whose preferred habitat overlaps with vegetation types and VSAs typical of BIF systems (e.g., rocky ridges and slopes). The outcomes of the assessment are summarised in **Table 7.7**, which lists significant ecological values that have at least half of their preferred habitat aligned with the BIF landform and indicates whether the Proposal would change their IUCN Threat category. The assessment informing this table is detailed in the *Karara Iron Ore Project Mine Life Extension – Review Significance of Residual Impacts* (Umwelt, 2026c) (see **Appendix 5-4**).

The Blue Hills PEC currently aligns with the Endangered IUCN category due to having limited geographic distribution and ongoing threat; the PEC also has a substantial rate of continuing detrimental change. The predicted cumulative impacts of the KIOP MLE Proposal do not increase the Blue Hills PEC IUCN threat category.

**Table 7.7 Assessment of Changes in IUCN Threat Category for Significant Ecological Values Associated with BIF Landform**

| Significant Ecological Values associated with BIF Landform | Preferred Habitat | Assessment Against IUCN Criteria Threat Category |
|---|---|---|
| **Blue Hills PEC** | Banded Iron Formation | Meets IUCN criteria for Endangered.<br>The Proposal will not change the threat level compared to the current threat level. |
| ***Calandrinia kalanniensis*** | A, B, F and O | Does not meet IUCN criteria for listing.<br>The Proposal will not change the threat level compared to the current threat level. |
| **Calandrinia *sp. Warriedar*** | O | Does not meet IUCN criteria for listing.<br>The Proposal will not change the threat level compared to the current threat level. |
| ***Crassula* sp. nov.** | B and O | KIOP MLE Proposal impacts are potentially significant due to increasing the impact to a level that would trigger IUCN criteria for listing, based on impact to two locations (of four total locations recorded to date). |
| ***Grevillea subtiliflora*** | F | No predicted impacts to individuals, only 13.2 ha impact to habitat from KIOP MLE mitigated disturbance footprint. Would not trigger IUCN criteria. |
| ***Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468)** | O and P | Meets IUCN criteria for Vulnerable.<br>The Proposal will not change the threat level compared to the current threat level. |
| ***Micromyrtus acuta*** | O | No predicted impacts to individuals, only 86.9 ha impact to habitat from KIOP MLE mitigated disturbance footprint. Would not trigger IUCN criteria. |

| Significant Ecological Values associated with BIF Landform | Preferred Habitat | Assessment Against IUCN Criteria Threat Category |
|---|---|---|
| ***Micromyrtus trudgenii*** | O | Predicted impact to 28 individuals of more than 12,000 individuals in the Survey Area +20 km buffer, only 86.9 ha impact to habitat from KIOP MLE mitigated disturbance footprint. Would not trigger IUCN criteria. |
| ***Millotia dimorpha*** | O | Does not meet IUCN criteria for listing.<br>The Proposal will not change the threat level compared to the current threat level. |
| ***Petrophile pauciflora*** | O | No predicted impacts to individuals, only 86.9 ha impact to habitat from KIOP MLE mitigated disturbance footprint. Would not trigger IUCN criteria. |
| ***Stylidium scintillans*** | O | Meets IUCN criteria for Endangered.<br>The Proposal will not change the threat level for compared to the current threat level. |
| **Gilled Slender Blue-tongue** | VSA 1 and 2 | Listed as Vulnerable under the BC Act, although could meet IUCN criteria for Endangered.<br>Assessment of impacts against IUCN criteria not completed as habitat requirements are unclear and no records have been made of the species in the impact zone despite intensive targeted searches. The Proposal will not increase the threat level compared to the current threat level. |
| **Woolley's Pseudantechinus** | VSA 1 and 2 | Does not meet IUCN criteria for listing.<br>The Proposal will not change the threat level compared to the current threat level. |
| **Mt Karara Millipede** | VSA 1 and 3 | Assessment of impacts against IUCN criteria not completed as habitat requirements are unclear and no records have been made of the species in the impact zone. The Proposal will not increase the threat level compared to the current threat level. |
| **Millipede PM1** | VSA 1 and 3 | Assessment of impacts against IUCN criteria not completed as habitat requirements are unclear and no records have been made of the species in the impact zone. The Proposal will not increase the threat level compared to the current threat level. |
| **Mt Gairdner Scorpion** | VSA 1 and 3 | Assessment of impacts against IUCN criteria not completed as habitat requirements are unclear and no records have been made of the species in the impact zone. The Proposal will not increase the threat level compared to the current threat level. |

The KIOP MLE Proposal will not result in a change in IUCN threat category for significant flora, terrestrial fauna and ecological communities. Only one ecological value could experience a change in IUCN Threat Category - *Crassula* sp. nov. However, this is due to the very few records of this potential new species, rather than its association with the BIF landform. The KIOP MLE Proposal is considered to align with the principles of the Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields (Department of Environment and Conservation (DEC), 2007) that requires no change in IUCN category of flora, fauna and ecological communities.

## 7.6 Mitigation

The mitigation hierarchy of avoid, minimise, rehabilitate, and offset has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023b). The mitigation measures listed below are arranged according to the mitigation hierarchy.

The KIOP MLE Proposal was designed to **avoid** impacts to landforms and BIF ecological values by avoiding impacts to BIF landforms outside of Mt Karara.

The KIOP MLE Proposal was designed to **minimise** potential impacts to landforms and BIF ecological values by designing the WRD to expand to the north to minimise impacts to BIF landforms. The nearest BIF landforms are located to the east of the WRD expansion.

Further avoidance of impacts was not feasible due to several physical, geotechnical and operational constraints. The WRD and TSF must remain continuous, consolidated landforms to maintain geotechnical stability thus creating “holes” or exclusion zones within these facilities is not possible, as this would compromise structural integrity and ultimately result in unintended disturbance within any exclusion area. Placement of the WRD and TSF adjacent to existing infrastructure minimises the overall disturbance footprint and reduces haul distances, which in turn reduces greenhouse gas emissions. Topsoil stockpiles also need to be located close to the areas of stripping to maintain soil quality and minimise dust generation.

Additional constraints relate to the future abandonment bund, for which the detailed design and exact location cannot be finalised until closer to mine closure. The bund must comply with minimum safety and geotechnical setback requirements, meaning the broader allowance area cannot be avoided at this stage even though only a small portion will ultimately be required. Within these constraints, the design was revised to avoid areas supporting priority flora and MNES fauna, including the removal of portions of the WRD (west) and TSF (east/south). Further changes were not practicable without fragmenting the WRD or TSF, increasing the disturbance footprint, or shifting infrastructure into areas with higher ecological values.

The following measures will be implemented to **rehabilitate** impacts to landforms and BIF ecological values:

- Temporary impacts to landforms, such as infrastructure, will be reshaped during mine closure to blend to the natural surface, restoring landform values as much as possible.
- Re-establishment of vegetation in rehabilitation that targets at least 70% species composition comparable with the pre-mining vegetation within five years of cessation of productive mining, as required by MS 805 condition 12-1(1).

## 7.7 Assessment and Significance of Residual Impacts

The *Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields* (Department of Environment and Conservation (DEC), 2007) states three conservation principles and three guiding items that should be considered for environmental assessment for impacts to landforms. The principles and guiding items are listed in **Table 7.7** with assessment information drawn from the *KIOP MLE Environmental Values Updated Impact Assessment* (Umwelt, 2026b) and *KIOP MLE Review Significance of Residual Impacts* (Umwelt, 2026c).

Based on the significance considerations of the *Environmental Factor Guideline – Landforms* (EPA, 2018), Mt Karara is not considered a significant example of a BIF landform. Nevertheless, Mt Karara does support significant ecological values that are associated with the BIF landform, including the Blue Hills PEC, *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468), Long-tailed Dunnart and Gilled Slender Blue-tongue.

**Table 7.8** summarises how the KIOP MLE Proposal aligns with the conservation principles and guiding items of the Strategic Review in the context of residual impacts to the Mt Karara landform and the ecological values it supports.

**Table 7.8 Assessment of KIOP MLE Proposal Compliance with Principles of the Strategic Review of the BIF Ranges**

| Strategic Review of the BIF Ranges – Principles and Guidance | Assessment for KIOP MLE Proposal |
|---|---|
| No development activity should proceed if it would result in the increase of an IUCN Threat Category of any plant or animal taxon. | The Proposed KIOP MLE impacts to BIF landform will not result in the increase of IUCN Threat Category of any plant or animal (Table 7.7). Only one ecological value could experience a change in IUCN Threat Category - *Crassula* sp. nov. However, this is due to the very few records of this potential new species, rather than its association with the BIF landform. |
| No development activity should proceed if it would result in the increase of an IUCN Threat Category of any ecological community. | The Blue Hills PEC already qualifies for the Endangered IUCN category due to having limited geographic distribution with ongoing threat, and an existing substantial rate of continuing detrimental change. The predicted cumulative impact of the proposed KIOP MLE do not increase the Blue Hills PEC IUCN threat category. |
| 15–30% of the total number of ranges should be reserved in their entirety so complete examples of landform and ecosystem are protected. | Approximately 23% of the total regional BIF landform area is reserved, but only one range in the region (Red Hill BIF landform) is reserved in its entirety (3% of the total number of ranges in the region). This is less than the 15 – 30% target.<br>The KIOP and MIOP mining areas, including the proposed KIOP MLE, are within Karara Conservation Park, which is managed by DBCA for conservation.<br>Although further ranges would need to be reserved to achieve the target protection, Mt Karara is already substantially impacted and thus is not a complete landform. Therefore, the proposed additional disturbance to Mt Karara would not influence achievement of this target. |
| Conservation reserves should include at least 60% of largely contiguous ecosystem/habitat for each of the key BIF species and communities restricted to the BIF ranges. | Contiguous habitat could only be defined for the Blue Hills PEC and *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468). Neither met the 60% target of conservation of contiguous habitat, with the Blue Hills PEC having 42% of the PEC present in conservation reserves, and *Lepidosperma* having 32% of suitable soil landscape systems present in conservation reserve within the taxon's EOO.<br>The KIOP MLE will not reduce the proportion of conservation reserve extent for any assessed value. |
| An objective of detailed mine site planning should be to maximise protection of any flora species or ecological community identified as being restricted to the BIF or dependent on the BIF for its conservation. | The proposed WRD has been designed to expand towards the north, which minimises impact to the Blue Hills PEC. Most of the undisturbed Blue Hills PEC is located to the east of the WRD expansion.<br>The location of infrastructure required to support the WRD (e.g. topsoil stockpiles) has been amended to minimise impacts to *Lepidosperma* sp. Blue Hills, which has substantially reduced the impacts to this species associated with the BIF landform.<br>The TSF expansion to the south will not result in any impact to the Blue Hills PEC. |

| Strategic Review of the BIF Ranges – Principles and Guidance | Assessment for KIOP MLE Proposal |
|---|---|
| Landscape, geodiversity, Aboriginal heritage values and the potential for nature-based tourism should be considered in developing a reserve system. | Mt Karara has not been identified as having significant landscape, geodiversity or Aboriginal heritage values. |

The assessment of IUCN criteria identified that the KIOP MLE Proposal will not have a significant additional cumulative impact on these ecological values (i.e. it will not result in a change in their IUCN Threat Category).

## 7.8 Environmental Outcomes

**Table 7.9** details the proposed outcomes and outcomes-based conditions for landforms, how outcomes can be assured, and proposed monitoring of outcomes.

The KIOP MLE Proposal is a significant amendment to MS 805. There are no current conditions on MS 805 relating to management of impacts specific to landforms.

**Table 7.9 Proposed Outcomes for Landforms**

| Proposed Outcome | Is Proposed Outcome Consistent with EPA Objectives | How Proposed Outcome can be Assured | Proposed Outcome-based Condition | Proposed Monitoring of Outcomes |
|---|---|---|---|---|
| Temporary impacts to landforms, such as infrastructure, will be reshaped during mine closure to blend to the natural surface, restoring landform values as much as possible. | Yes, aims to restore landform where possible. | Mine Closure Plan regulation by DMPE. | Not required – to be administered by DMPE. | Annual environmental reports to DMPE include information regarding rehabilitation. |
| Re-establishment of vegetation in rehabilitation will achieve at least 70% species composition comparable with the pre-mining vegetation within five years of cessation of productive mining. | Yes, aims to restore ecological values associated with the landform. | Ministerial Statement condition. | As per MS 805 condition 12-1. | Annual monitoring of rehabilitated vegetation species condition and reporting in annual compliance assessment reports. |

# 8.0 Inland Waters

## 8.1 Inland Waters Summary

Water-dependent environmental values that could be impacted by changes to inland waters due to the KIOP MLE Proposal are, ephemeral surface water features (claypans and gnamma holes) and surface and groundwater dependent vegetation types. Mongers Lake (ephemeral lake system and registered Aboriginal heritage site) is crossed by current KIOP linear infrastructure, however there is no proposed new disturbance or changes to activities near this system.

The KIOP MLE Proposal could impact inland waters by changing surface water flow. This ERD also presents the predicted impacts from groundwater drawdown and discharge associated with the life of mine pit, although the Proposal does not include any changes to the approved pit shape, previous hydrogeological models did not model the full pit extent.

The predicted impacts to inland waters have been modelled, with the hydrogeological model updated and calibrated several times throughout operations to incorporate new information, increasing confidence in the modelling predictions. The recent calibration demonstrated reasonable match between measured and modelled groundwater levels. The surface water models follow recognised methods and consider the proposed changes compared to the current operational status.

Impacts to inland waters will be mitigated as follows:

- Manage water abstraction from Karara mine site in accordance with *Karara Mining Limited Groundwater Licence Operating Strategy GWL171229 The Karara Iron Ore Project*.
- Manage surface water in accordance with KML Environmental Procedure – Surface Water (CORP-EN-PRO-1011).
- Pit dewater will be discharged into Terapod West pit, which will enable groundwater drawdown from mining of Terapod West pit to recover.

There are no predicted significant residual impacts from groundwater drawdown at the Karara mine site associated with the Proposal, as there are no significant groundwater-dependent environmental values within the predicted groundwater drawdown extent.

The KIOP MLE Proposal is not expected to result in any significant residual impacts to surface water, as the predicted impact will be only a small change in surface water flow depth in existing drainage lines south of the TSF.

Proposed environmental outcomes for inland waters are:

- Discharge of saline pit water is managed to ensure no impact to flora and vegetation health in the vicinity of the saline water disposal area.
- Tailings discharge and surface water at the TSF is managed to prevent spill of high-salinity water or tailings into the environment.

## 8.2 EPA Objective

The EPA objective for inland waters is ‘To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected’ (EPA, 2023b).

Hydrological regimes are the occurrence, distribution, connectively, movement and quantity of waters. Water quality refers to chemical, physical, biological and aesthetic characteristics (EPA, 2018a).

The focus of the factor and objective is on:

- Significant impacts that alterations of the hydrological regime will have on water dependent ecosystems and environmental values.
- How discharge of waste is minimised.
- How any discharge of waste or use of water might significantly impact on water quality, the local hydrological regime, and the supported environmental values.

The *Environmental Factor Guideline – Inland Waters* (EPA, 2018a) lists significant environmental values, ecosystems or beneficial uses supported by inland waters. This impact assessment considers if any of these values are present and are likely to be impacted by the proposed amendment.

## 8.3 Relevant Policy and Guidance

**Table 8.1** lists the EPA and other policy and guidance relevant to inland waters describes how the policy and guidance has been considered.

**Table 8.1 Policy and Guidance Relevant to Inland Waters**

| Policy and Guidance | How the Policy and Guidance has been Considered |
|---|---|
| ***Environmental Factor Guideline – Inland Waters*** **(EPA, 2018a)** | The guideline lists significant environmental values that can be supported by inland waters. This ERD identifies if any significant water-dependent environmental values are within the Proposal region.<br>The guideline lists activities with the potential to impact on inland waters. This ERD considers potential activities that could impact inland waters and describes the predicted impacts to inland waters associated with relevant activities. |
| ***Australian Groundwater Modelling Guidelines*** **(Barnett et al., 2012)** | The guidelines recommend a Class 2 model for providing estimates of dewatering volumes and impacts.<br>The current hydrogeological model (Rockwater Pty Ltd, 2024) would nominally be classified as a Class 2 model, as it meets the following characteristics of a Class 2 model:<br>uses metered groundwater extraction data, but there are spatial and temporal gaps in data<br>model has been calibrated but not throughout the full model domain<br>model predictive timeframe (30 years) is less than three times the duration of transient calibration (15 years)<br>model has not been independently reviewed by a hydrogeologist<br>Thus, the current model is fit for purpose for predicting impacts associated with pit dewatering. |

| Policy and Guidance | How the Policy and Guidance has been Considered |
|---|---|
| ***Strategic Policy 2.09 – Use of Mine Dewatering Surplus*** **(DWER, 2020d)** | The policy recommends mine dewatering should be used for mitigation of environmental impacts and fit-for-purpose on site use, before consideration of discharge. KML uses mine dewater for site activities where salinity is suitable for use. Pit dewater that is too saline or more volume than can be used on site is discharged to previously mined pits. This reduces the groundwater drawdown associated with the old pits, which mitigates potential environmental impacts. |
| ***Use of operational strategies in the water licensing process*** **(DWER, 2020c)** | The groundwater licence operating strategy must include management objectives to protect environmental values and monitoring to demonstrate compliance.<br>KML has approved operating strategies for the Karara mine site (KML, 2025b) and the Yandanooka borefield (KML, 2020). |

## 8.4 Receiving Environment

This section outlines the key studies the support the environmental impact assessment for inland waters and describes the existing environmental values. The relevant aspects of the receiving environment are those areas that are the subject of proposed new disturbance or activities for the KIOP MLE, including the Mine Area and Yandanooka borefield area.

### 8.4.1 Supporting Studies and Information

**Table 8.2** lists the supporting studies and information that informed the environment impact assessment for inland waters.

**Table 8.2 Supporting Studies for Inland Waters**

| Study Title | Timing | Study Methods | Consistent with EPA Guidance |
|---|---|---|---|
| ***Karara Mining Limited Groundwater Licence Operating Strategy GWL171229 The Karara Iron Ore Project*** **(KML, 2025b)** | Approved in June 2025 | Summarises water source, water use, management objectives and monitoring for groundwater abstraction at the Karara mine site. | The operating strategy provides information on the approved water use, operating rules and monitoring, to inform consideration of other decision-making authorities. |
| ***Karara Iron Ore Project Mine Life Extension Project - Surface Water Hydrology Assessment*** **(Stantec, 2024)** | Desktop modelling, completed in 2024 | Methods include rainfall-runoff modelling using XPRAFTS, development of critical-duration temporal patterns in accordance with Australian Rainfall and Runoff methodologies, and assessment of surface water runoff using 2D rain-on-grid hydraulic modelling with HEC-RAS. | This study addresses the following requirements of *Environmental Factor Guideline – Inland Waters* (EPA, 2018a):<br>• characterises the current (existing operations) surface water system<br>• models the impact to surface water from the proposed activities |

| Study Title | Timing | Study Methods | Consistent with EPA Guidance |
|---|---|---|---|
| ***Numerical Modelling of Dewatering Flows & Potential Impacts of Extended Mining*** **(Rockwater Pty Ltd, 2024)** | Numerical model recalibrated with data from 2008 to 2023 | Uses updated numerical model with two layers (deep layer added in 2021 to represent largely unfractured rocks, to 123 mAHD).<br>Model covers an area 15 km by 28.5 km. Model boundaries are constant head to represent groundwater flows.<br>The proposed life of mine pit to 2053 was modelled, with maximum depth -2 mAHD. | This study addresses the following requirements of *Environmental Factor Guideline – Inland Waters* (EPA, 2018a):<br>• models the impact of water abstraction<br>• models the impact from excess water discharge<br>• provides updated calibration to increase confidence in the modelling predictions. |
| ***Recalibration of Numerical Groundwater Model & Predicting Impacts of Planned Mining*** **(Rockwater Pty Ltd, 2021)** | Numerical model recalibrated with data from 2008 to 2020 | Uses updated numerical model with two layers (deep layer added to represent largely unfractured rocks, to 123 mAHD).<br>Model covers an area of 15 km by 24 km. Model boundaries are constant head to represent groundwater flows.<br>Modelled pit stages 4, 5 and 7 – maximum depth 124 mAHD. | This study addresses the following requirements of *Environmental Factor Guideline – Inland Waters* (EPA, 2018a):<br>• updated the numerical model to facilitate modelling of dewatering associated with the full pit depth<br>• calibrated the model and demonstrated a reasonable match between measured and modelled groundwater levels, providing confidence in the model predictions. |
| ***Karara Mining Limited Operating Strategy Yandanooka Borefield - Parmelia Aquifer*** **(KML, 2020)** | Approved in March 2020 | Summarises water source, water use, management objectives and monitoring for the Yandanooka borefield. | The operating strategy provides information on the approved water use, management objectives and monitoring, to inform consideration of other decision-making authorities. |
| ***Karara Iron Ore Project Surface Water Baseline and Impact Assessment*** **(MWH, 2008)** | Desktop modelling, completed in 2008 | Estimation of flood flows using rainfall-runoff modelling. Hydraulic modelling using MIKE11 to predict indicative flood extent and levels. | This study presents baseline (pre-mining) information on surface water at the Karara mine site. |
| ***Groundwater Impact Assessment, Karara Mine Site*** **(Rockwater Pty Ltd, 2008)** | Groundwater sampling and analysis: 2006 and 2007.<br>Groundwater exploration bores pumping tests and airlift yields: 2006 and 2007 | Numerical hydrogeological model, single layer, model base at 200-230 mAHD.<br>BIF transmissivity 14 $m^2/d$ (test pumping), across strike 1/10 of along strike value. Specific yield 0.005 (assumed), recharge 2.9 mm/a (1% of rainfall).<br>Modelled abstraction from production bores and pit for period of 23 years (to 2023). Area of pit modelled was smaller than approved pit. | This study presents baseline (pre-mining) information on groundwater at the Karara mine site. |

### 8.4.2 Karara Mine Site – Groundwater

The Karara mine site is in the Gascoyne proclaimed groundwater management area. KML holds a current licence to take water GWL 171229 that permits abstraction of up to 1.0 GL per annum from KIOP and MIOP.

The main aquifer is fractured rock within the BIF, with potential for localised perched aquifers and aquifers at the base of weathering (Rockwater Pty Ltd, 2024). The baseline (pre-mining) groundwater flow direction was generally from the northeast to the southwest along strike of the magnetite orebody, which hosted a groundwater mound (Rockwater Pty Ltd, 2024). The groundwater flows through palaeochannel aquifers and discharge to the Mongers Lake palaeodrainage system (Rockwater Pty Ltd, 2008).

Prior to commencement of mining, the groundwater table was approximately (Rockwater Pty Ltd, 2008):

- 30–50 m below ground level (mBGL) (330 m Australian Height Datum, mAHD) under the Mt Karara.
- 10–20 mBGL in areas outside of the BIF ranges.
- 5–10 mBGL (~310 mAHD) to the southwest, where the ground level is lower.

No groundwater dependent vegetation types have been identified in the Mine Area (Umwelt, 2025a). Although vegetation types M and N (low and sparse samphire shrubland) are potentially groundwater dependent, they were recorded in the existing linear infrastructure corridor (Umwelt, 2025a). There is no additional disturbance proposed in the existing infrastructure corridor from the KIOP MLE Proposal.

Groundwater level monitoring has been conducted since 2010. The groundwater level data was used to calibrate the numerical hydrogeological model, with good agreement between the modelled and observed changes in water table (Rockwater Pty Ltd, 2024). Groundwater monitoring records and modelled changes are presented in Rockwater (2024), a selection of monitoring records are summarised here for reference to describe the changes in groundwater due to pit dewatering and discharge of water to pits, which has been incorporated into the model calibration:

- bore MKW039 (adjacent to Karara Pit) the water level has decreased from 320 to 305 mAHD (drawdown of ~15 m) from 2018 to 2020
- bore MKW321 (approximately 1.7 km northeast of the current extent of Karara Pit) the water level decreased from approximately 322 to 317 mAHD (5 m drawdown) from 2020 to 2024
- bore BHN1002 (adjacent to Blue Hills North Pit, which was mined and then used for dewater discharge) the water level decreased from 330 to 312 mAHD from 2012 to 2015, then increased to 345 mAHD by 2024.

The groundwater quality before mining commenced was fresh to brackish in the upper portion of the water table, becoming highly saline below approximately 50 mBGL (Rockwater Pty Ltd, 2024). Sampling undertaken in 2023 recorded salinity (total dissolved solids) of 55,000 mg/L in Karara pit, 52,000 mg/L in Blue Hills North pit, and 4,900 mg/L in Terapod West pit. Baseline groundwater quality characterisation is provided in Rockwater (2008).

### 8.4.3 Karara Mine Site – Surface Water

The Combined Proposal is in the Yarra Yarra surface water area, which is not a Surface Water Proclamation Area under the *Rights in Water and Irrigation Act 1914* (RIWI Act).

Mongers Lake lies approximately 25 km south of the Karara mine site. Mongers Lake forms part of the Mongers Lake Waterway (a registered Aboriginal heritage site, ID 24380), which includes Lake Weelhamby (west of Karara mine site) and Lake Mullewa and ultimately discharges into the Yarra Yarra Lakes, near Three Springs. KML's existing linear infrastructure corridors cross the Mongers Lake Waterway north of Weelhamby Lake and south of Morawa. None of the proposed activities will cross the Mongers Lake Waterway.

Surface watercourses are ephemeral and flow in response to rain events. Surface water around the Karara mine site generally flows away from the KIOP MLE Proposal activities, which are on elevated terrain. Water from the southern side of the KIOP MLE new disturbance footprint would flow to the south (primarily along the eastern side of the TSF) (Stantec, 2024). Water on the northern side of the operations would flow to the east towards a claypan that is approximately 900 m north of the proposed KIOP MLE new disturbance footprint. At Syncline Turner Haul Road, water would flow away from the haul road (Stantec, 2024). There is a small claypan immediately north of the existing haul road, near the Terapod pits, and a gilgai south of the existing Terapod pits. Due to the ephemeral nature of surface water, no surface water quality characterisation information is available.

Vegetation types in the KIOP MLE new disturbance footprint, including Syncline Turner Haul Road, that are potentially surface water dependent are: VTs C, D, G, H and K (low open woodland including Eucalyptus and mixed shrubland). The following VTs represent riparian vegetation: VTs C, J, CP and U (low open Eucalyptus woodland over chenopod shrubland, isolated shrubs over sparse samphire, and claypans).

### 8.4.4 Yandanooka Area

The Yandabooka borefield is in the Arrowsmith proclaimed groundwater management area but is not in any Surface Water Proclamation Area under the RIWI Act.

KML holds a current licence to take water GWL 170861 that permits abstraction of up to 5.0 GL per annum from the Yandanooka borefield, from the Leederville-Parmelia aquifer in the Mingenew sub-area of the Arrowsmith proclaimed groundwater area (KML, 2020). Groundwater abstraction commenced in 2011. Water from the borefield is pumped to the Karara mine site and used for ore processing and potable water supply (KML, 2020).

Surface water flow in the Yandanooka area is ephemeral and generally flows from the south to the north, crossing the existing linear infrastructure corridor and proposed maintenance areas (Stantec, 2024).

Vegetation type HMVT D recorded on the western end of the Yandanooka borefield corridor is riparian vegetation and could be groundwater dependent (Umwelt, 2025a). No other surface or groundwater dependent vegetation types were recorded near the proposed KIOP MLE disturbance footprint in the Yandanooka borefield area.

There are no proposed changes to groundwater abstraction activities in the Yandanooka borefield.

### 8.4.5 Water-Dependent Environmental Values

The *Environmental Factor Guideline – Inland Waters* (EPA, 2018a) lists the types of significant ecosystems and beneficial uses of inland waters that are the focus of the EPA. **Table 8.3** lists the significant ecosystems and beneficial uses from the guideline and considers the relevance to the Proposal inland waters region.

The region for inland waters is the extent of modelling, which is approximately:

- Hydrogeological modelling – encompasses Karara pit, Blue Hills North pit and Terapod pits with approximately 7 km around all sides of this area.
- Surface water modelling – approximately 5 km around all sides of Karara pit, 2 km each side of Syncline Turner haul road, and 3–13 km each side of Yandanooka linear infrastructure corridor.

Water-dependent environmental values relevant to the inland waters region are ephemeral surface water features (claypans and gnamma holes) and surface and groundwater dependent vegetation types. The water-dependent environmental values surrounding the Combined Proposal are shown in **Figure 8.1**.

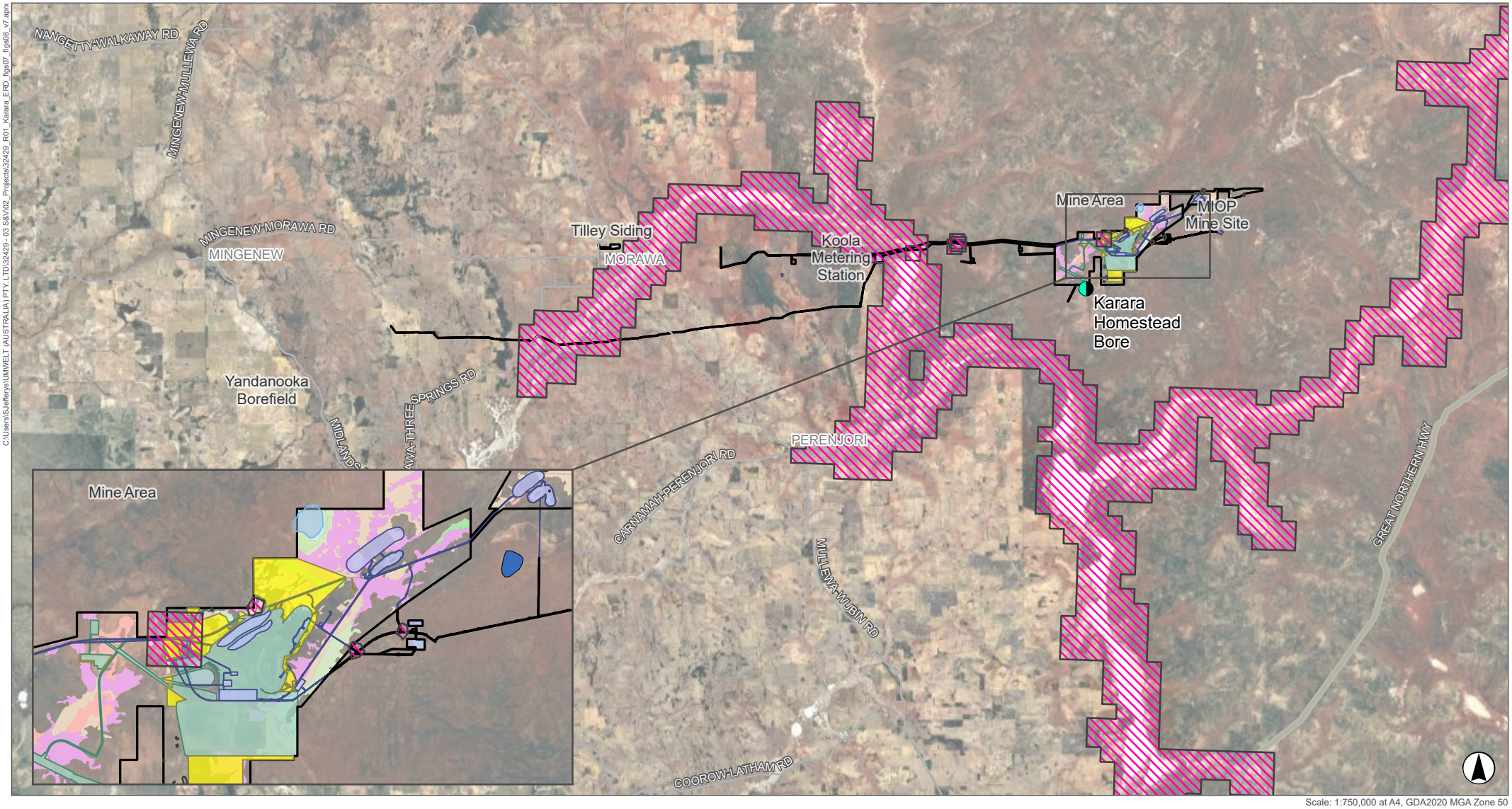
Mongers Lake (ephemeral lake system and registered Aboriginal heritage site) is crossed by current KIOP linear infrastructure but there are no proposed new disturbance or changes to activities near this system.

**Table 8.3 Relevance of Significant Water-dependent Environmental Values to the Proposal**

| Significant Water-dependent Environmental Values | Relevance to the Proposal | Reference |
|---|---|---|
| Wetlands of International Importance as listed under the Ramsar Convention | There are no Ramsar wetlands in the Proposal region for inland waters. | Ramsar sites dataset (DBCA-010) |
| Conservation category or resource enhancement wetlands as mapped in the Geomorphic Wetlands of the Swan Coastal Plains datasets | There are no conservation category or resource enhancement wetlands in the Proposal region for inland waters. | Geomorphic wetlands Swan Coastal Plain dataset (DBCA-019)<br>Geomorphic wetlands Cervantes Eneabba dataset (DBCA-015) |
| Wetlands in the Directory of Important Wetlands in Australia | Thundelarra Lignum Swamp, located approximately 25 km northeast of the eastern end of the Karara Area, is a listed swamp in the Australian Wetlands Database Directory of Important Wetlands.<br>There are no wetlands in the Directory of Important Wetlands in Australia in the Proposal region for inland waters. | Directory of Important Wetlands in Australia – Western Australia dataset (DBCA-045) |
| Wetlands protected by Environmental Protection Policies | There are no wetlands protected by Environmental Protection Policies in the Proposal region for inland waters. | https://www.epa.wa.gov.au/guidelines-and-procedures/environmental-protection-policies |
| Wild Rivers as identified by the Australian Heritage Commission and the Department of Water and Environmental Regulation | There are no wild rivers in the Proposal region for inland waters. | Wild Rivers dataset (DWER-087) |

| Significant Water-dependent Environmental Values | Relevance to the Proposal | Reference |
|---|---|---|
| Wetland types poorly represented in the conservation reserves system | There are no wetlands in the Proposal region for inland waters. | Hydrography linear dataset (DWER-031) |
| Springs and pools, particularly in arid areas | Several ephemeral surface water features, such as claypans and gnamma holes, have been recorded in the region for inland waters near the Karara mine site. The gnamma holes were identified as Aboriginal heritage sites in 2020.<br>As the baseline water table was approximately 20 mBGL near these surface water features, they are not considered groundwater dependent. | *Aboriginal Heritage Survey Report with the Widi Mob at the Karara Iron Ore Mine – Long Term Mine Planning survey areas, for Karara Mining Limited, Western Australia, June 2020* (Horizon Heritage Management, 2020).<br>*Groundwater Impact Assessment, Karara Mine Site* (Rockwater Pty Ltd, 2008) |
| Ecosystems which support surface or groundwater dependent significant flora, vegetation and fauna species or communities | Potentially groundwater dependent vegetation types (M and N) were recorded in the existing linear infrastructure corridor, which doesn't include any proposed new land disturbance. No groundwater dependent vegetation types have been identified in the Mine Area.<br>Vegetation type HMVT D recorded on the western end of the Yandanooka borefield corridor could be groundwater dependent.<br>Ten vegetation types (C, J, CP, L, HMVT A, HMVT C, M, N, U, HMVT D) represent riparian vegetation and are partially reliant on ephemeral surface water. Of these, HMVT D was recorded near Yandanooka borefield and VTs C, J, CP and U were recorded near the Mine Area.<br>Seven vegetation types (C, D, G, H, K, Y, Z) are partially dependent on surface water in the form of sheet flow. Five of these (VTs C, D, G, H and K) were recorded near the Mine Area. | *2023 and 2024 Detailed and Targeted Flora and Vegetation Assessment – Karara Iron Ore Project Mine Life Extension* (Umwelt, 2025a) |
| | Stygofauna have been recorded in regional reference sites but do not occur within the predicted pit dewatering impact area. | *Greater Karara Iron Ore Project Subterranean Fauna Biological Report* (Ecologia, 2008) |
| Water-dependent ecosystems which support significant amenity, recreation and cultural values | The Combined Proposal crosses the Mongers Lake Waterway registered Aboriginal heritage site (ID 24380). However, none of the proposed new land disturbance crosses this site, and the site is not in the region for inland waters. | Aboriginal cultural heritage register dataset (DPLH-099) |
| Saline lakes, estuaries and near shore ecosystems reliant on groundwater or surface water inputs | There are no saline lakes, estuaries or near shore ecosystems in the Proposal region for inland waters. | Hydrography linear dataset (DWER-031) |

| Significant Water-dependent Environmental Values | Relevance to the Proposal | Reference |
|---|---|---|
| Downstream marine ecosystems | There are no marine ecosystems in the Proposal region for inland waters. | The Proposal is not near the coast |
| Drinking water supplies | There are no drinking water supplies in the Proposal region for inland waters. | Public drinking water source areas dataset (DWER-033) |
| Significant current or potential water supplies | Water supplies in the region support the Proposal and other mining operations and pastoral activities (near the Karara mine site) and agricultural activities (near Yandanooka borefield).<br>The Proposal is in the RIWI Act proclaimed groundwater areas of Gascoyne (Karara mine site) and Arrowsmith (far western end of Yandanooka borefield linear infrastructure).<br>The Proposal is in the Yarra Yarra surface water area (not a surface water proclaimed area under the RIWI Act). | *Karara Mining Limited Groundwater Licence Operating Strategy GWL171229 The Karara Iron Ore Project* (KML, 2025b)<br>RIWI Act groundwater areas dataset (DWER-034)<br>Surface water management areas dataset (DWER-041) |
| Water supplies which support significant non-potable use and commercial activities | | |
| Inland waters with high levels of active and passive recreation | No inland waters with high levels of active and passive recreation occur in the region for inland waters. | No issues raised during stakeholder consultation or heritage surveys |
| Inland waters with significant cultural and aesthetic values | The Combined Proposal crosses the Mongers Lake Waterway registered Aboriginal heritage site (ID 24380). However, none of the proposed new land disturbance crosses this site, and the site is not in the region for inland waters. | Aboriginal cultural heritage register dataset (DPLH-099) |




Scale: 1:750,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP (MS 805) Disturbance Footprint
- MIOP (MS 806) Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Recorded Heritage Values
- Highway
- Main Road

**Surface Water Collection Areas**

- Claypan
- Gilgai

**Groundwater Dependent Vegetation Type**

- M
- N
- HMVT D

**Riparian Vegetation Type**

- C
- J
- L
- M
- N
- U
- HMVT A
- HMVT C
- HMVT D
- CP

**Surface Water Dependent Vegetation Type**

- C
- D
- G
- H
- K
- Y
- Z

# FIGURE 8.1
## Nearby Water-dependent Environmental Values

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0 15 30 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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## 8.5 Potential Environmental Impacts

The *Environmental Factor Guideline – Inland Waters* (EPA, 2018a) lists types of activities with the potential to impact on inland waters. The following types of activities from the Combined Proposal could impact inland waters:

- Expansion of the Dry Stack TSF
- Dewatering of Karara pit.
- Disposal of pit dewater to old pits, and creation of pit lakes after the completion of mining.
- Abstraction of groundwater from Yandanooka borefield for water supply.
- Diversion or modification of surface water systems.
- Management of potentially acid-forming waste rock (addressed in **Section 12.1**).

These potential impacts are described in the sections below.

### 8.5.1 Expansion of the Dry Stack TSF

Expansion of the Dry Stack TSF is not expected to impact on inland waters. Although monitoring of the TSF has detected rising water levels, this is attributed to the seepage from the Wet TSF. No expansion of the Wet TSF is proposed.

Tailings material is dewatered to approximately 15% moisture content before deposition (stacking) in the Dry Stack TSF (Red Earth Engineering, 2023) (**Appendix 1-5**). Analysis of the Dry Stack TSF under current operations and in design reports has identified a very low risk of seepage into groundwater or surface water runoff due to (Red Earth Engineering, 2021) (**Appendix 1-6**):

- Very high evaporation rates even in winter
- High water infiltration rates in the upper surface and edges of the Dry Stack TSF, which allows any water runoff to be readily infiltrated into the Dry Stack TSF
- Over seven years of full operations of the Dry Stack TSF, no seepage has been observed around the toe at any time

Therefore, the proposed expansion to the Dry Stack TSF is not expected to contribute to seepage into groundwater or surface water runoff.

Monitoring of the Wet TSF detected rising water levels from 2018 to 2020 which is attributed to seepage from the Wet TSF (Rockwater Pty Ltd, 2021). The proposed TSF expansion does not include any expansion to the Wet TSF and will be located on the expanded TSF footprint (i.e. not stacked on top of the Wet TSF area).

### 8.5.2 Groundwater Abstraction at the Karara Mine Site

Groundwater abstraction at Karara mine site includes pit dewatering and production bores. Karara pit requires dewatering to facilitate mining. The pit is dewatered via groundwater production bores and in-pit sumps (KML, 2025b). The abstracted water is used for mining, ore processing and dust suppression depending on suitability of water salinity.

Licence to take water GWL 171299 permits abstraction of up to 1,000 ML per annum from KIOP and MIOP. Based on the KML pit pumping data collated and adopted to calibrate the hydrogeological model (Rockwater Pty Ltd, 2024), the peak groundwater abstraction rate from the Karara mine site since operations commenced was approximately 570 ML per annum (1,600 kL/day) for Karara pit dewatering, and 1.0 GL per annum total pit dewatering and Karara mine site production bores.

The hydrogeological model (Rockwater Pty Ltd, 2024) assumes the following groundwater abstraction rates at the Karara mine site for the remaining life of mine:

- Karara pit dewatering – peak 620 ML per annum (1,700 kL/day), estimated to occur in 2034–2038.
- Production bores – peak 210 ML per annum (575 kL/day), expected to occur in 2024–2028.
- Total groundwater abstraction in the Karara mine site – typically 400–650 ML per annum, peak 675 ML per annum in approximately 2032.

Rockwater (2024) predicted the extent of groundwater drawdown by modelling:

- Karara pit – development of pit stages 4–8, maximum depth -2 mAHD (400 mBGL), with most stages reaching 100–180 mAHD deep (300–280 mBGL). Pit shape is unchanged from MS 805.
- Karara mine site production bores – abstraction ongoing until 2033.
- Blue Hills North pit – pit water level maintained at approximately 343 mAHD.
- Terapod West pit – discharge into pit of approximately 190 ML per annum (510 kL/day).

The model doesn't consider cumulative impacts with other operations in the region, such as Mungada East Expansion (Sinosteel Midwest Corporation Limited), as there was no available information on groundwater abstraction or monitoring data to inform modelling.

Groundwater drawdown of 10 m is predicted to extend approximately 4 km away from the pit along strike (northeast and southwest) as shown in **Figure 8.2**. No groundwater dependent vegetation types or other significant groundwater-dependent environmental values are present within the predicted groundwater drawdown extent.

### 8.5.3 Discharge of Pit Dewater

Pit dewater is used for on-site activities where salinity is suitable for use.

Excess dewater from Karara pit has previously been discharged to Blue Hills North pit. However, as Blue Hills North pit is reaching capacity, pit dewater is proposed to be primarily discharged to Terapod West pit. Discharge of pit dewater to these previously mined pits reduces the groundwater drawdown in the vicinity of the pits.

Karara pit dewater has historically been discharged to Blue Hills North pit (Licence L8721/2013/2). Rockwater (2024) presents current groundwater level at Blue Hills North pit, which shows the groundwater table has increased by approximately 30 m over ten years due to discharge of dewater to this pit.

Works Approval W6762/2022/1 approved the installation of equipment and time limited operations for dewatering from Karara pit to Terapod West pit. The DWER Licence L8721/2013/2 was amended in August 2024 to allow the continued discharge of pit dewater to Terapod West.

The updated hydrogeological model assumes pit dewater would be pumped to Terapod West pit (Rockwater Pty Ltd, 2024). A water balance was used to estimate water level in Terapod West pit from receiving dewater and included in the hydrogeological model of predicted drawdown (Rockwater Pty Ltd, 2024). The drawdown around Terapod West pit at end of mine life for the KIOP MLE Proposal is predicted to be a maximum of 10 m (Rockwater Pty Ltd, 2024).

The previous hydrogeological model update (Rockwater Pty Ltd, 2021) did not include discharge of dewater to Terapod West pit and predicted a maximum drawdown of 30 m at end of mine. Therefore, the discharge of dewater to Terapod West pit is predicted to reduce groundwater drawdown in the vicinity of Terapod West pit, with predicted reduction in groundwater drawdown shown in **Figure 8.3**.

### 8.5.4 Pit Lake Management

MS 805 condition 12-3 (and corresponding condition 11-3 in MS 806) requires the proponent to prepare a pit lake management plan within five years of cessation of mining. As mining of MIOP (Blue Hills North and Terapod pits) ceased more than five years ago, a pit lake management plan has been prepared (CORP-EN-PLN-1034 Ministerial Statement 806 Mungada Iron Ore Project Pit Lake Management Plan). The pit lake management plan summarises the environmental context and presents outcomes of hydrological and pit lake modelling.

The modelling outcomes include:

- No risk of pit lakes overflowing post-closure.
- Pit lake water level predicted to reach equilibrium 100 years post-closure, with water depth in the pits ranging from 9–36 m.
- Salinity of the pit lakes is predicted to increase over time and remain higher than thresholds for stock water use.
- All pits would function as groundwater sinks, with no discharge to groundwater. Therefore, there would be low risk to any environmental groundwater receptors.

The controls for management of pit lakes include:

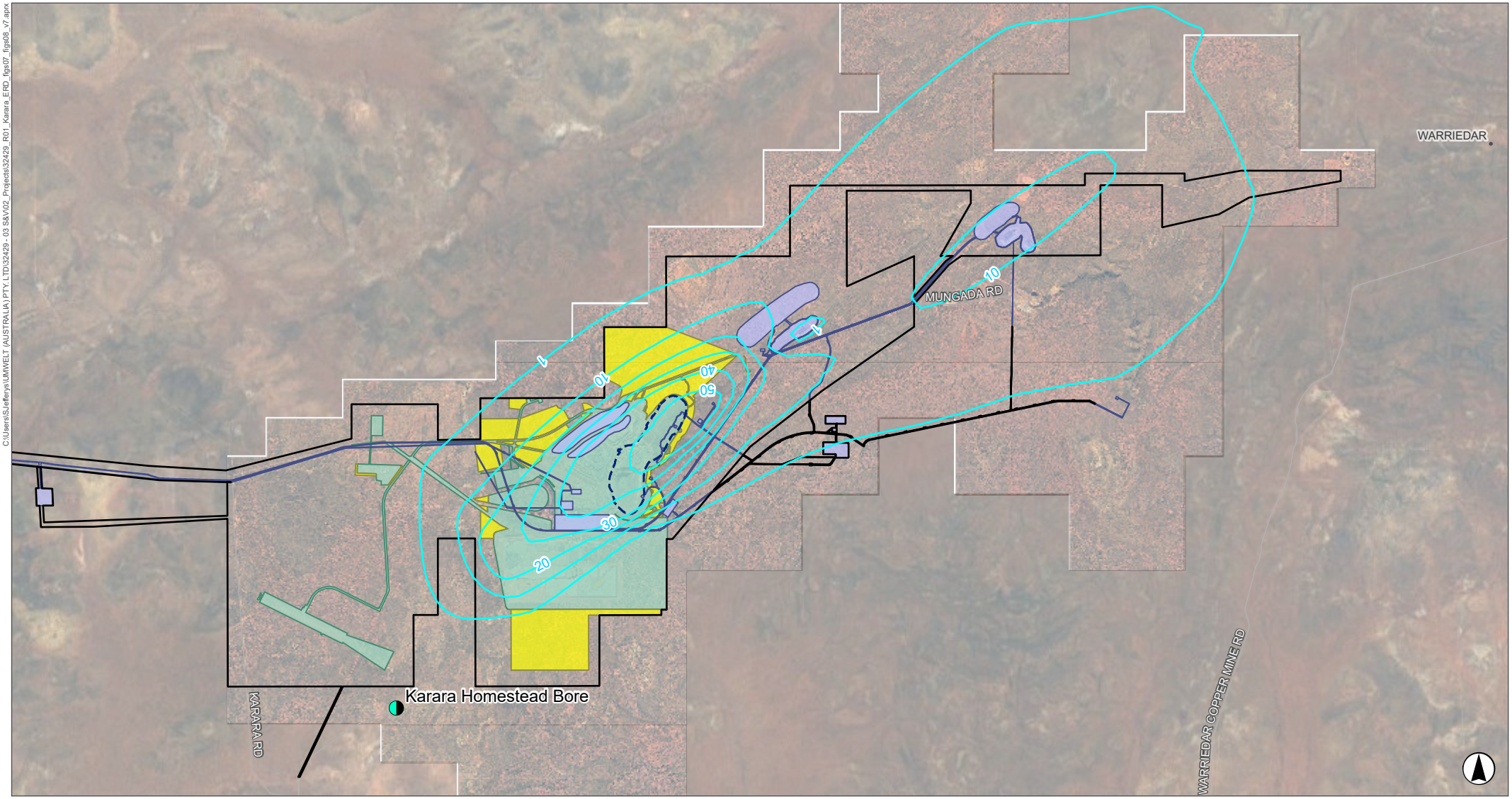
- Ongoing monitoring of groundwater levels and water quality during operations.
- Groundwater monitoring data review and annual reporting.
- Feral animal management to reduce potential attraction of feral animals to drink pit water.
- Geotechnical audits of pit wall stability.

A comparable pit lake management plan would be prepared for the Karara pit to assess and control potential risks from the pit lake post-closure.

### 8.5.5 Groundwater Abstraction at Yandanooka Borefield

Groundwater abstraction from the Yandanooka borefield is not a specified proposal element in the Proposal Content Document and will continue to be regulated under the *Rights in Water and Irrigation Act 1914* (RIWI Act) under licence to take water GWL 170861.

The decision-making processes for an application to take water under the RIWI Act are outlined in **Section 2.2**.




Scale: 1:140,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP (MS 805) Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- MIOP (MS 806) Disturbance Footprint
- Life of Mine – Pit Extent
- Karara Homestead Bore
- Predicted Groundwater Drawdown Contours, 2024

## FIGURE 8.2
Predicted Groundwater Drawdown from KIOP MLE

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0 2.8 5.6 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Rockwater (2024)

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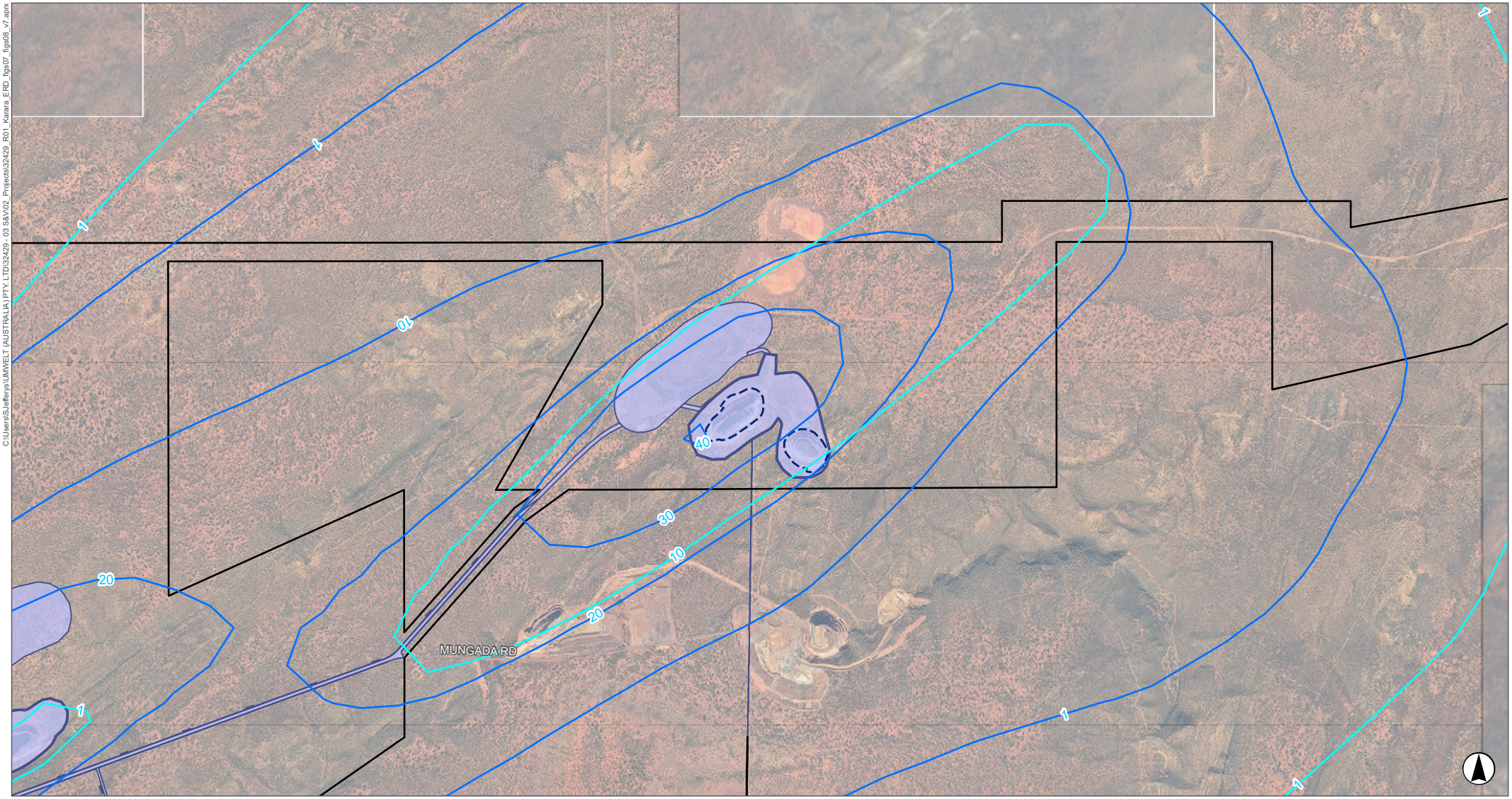


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Scale: 1:40,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- MIOP (MS 806) Disturbance Footprint
- Terapod – Pit Extent
- Previous Predicted Groundwater Drawdown, 2021
- Predicted Groundwater Drawdown Contours, 2024

# FIGURE 8.3
## Predicted Reduced Drawdown at Terapod Pit

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0 0.8 1.6 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Rockwater (2021, 2024)

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## 8.5.6 Changes to Surface Water Flow

The potential impact to surface water flow was modelled for the Mine Area (Stantec, 2024). The current operational surface water flow was also modelled (called 'baseline' it used 2021 terrain data and culverts) (Stantec, 2024). The outcomes are presented below.

### 8.5.6.1 Mine Area

The proposed activities at Karara mine site include expansion of the WRD to the north, expansion of the TSF to the south, and other small areas of infrastructure. The current ('baseline') water flow depth in a 1% average exceedance probability (AEP) event demonstrated that there is little surface water flow in the proposed disturbance footprints, except for the proposed TSF (Stantec, 2024).

The proposed TSF will overlap an existing main drainage line that flows to the southeast. The existing main drain will be adjusted to facilitate the proposed TSF expansion (Stantec, 2024). Approximately three kilometres of the existing drain will be diverted slightly to the north around the edge of the proposed TSF expansion (**Figure 8.4**). The modelling predicts that the surface water flow depth in the existing drainage lines would vary by approximately ±0.1 m during a 1% AEP event for the life of mine drainage design, compared to a total current (baseline) flow depth of 0.5–0.75 m (**Figure 8.5**) (Stantec, 2024). This small variation in surface water flow depth is not significant, particularly as the surface water flow is predicted to remain within the existing drainage lines (except for the small drain diversion).

The model does not predict any change to surface water flow depth associated with the WRD or other infrastructure expansion areas (Stantec, 2024). Surface water management infrastructure will be required around the expanded WRD to manage facilitate drainage, prevent erosion and manage sedimentation.

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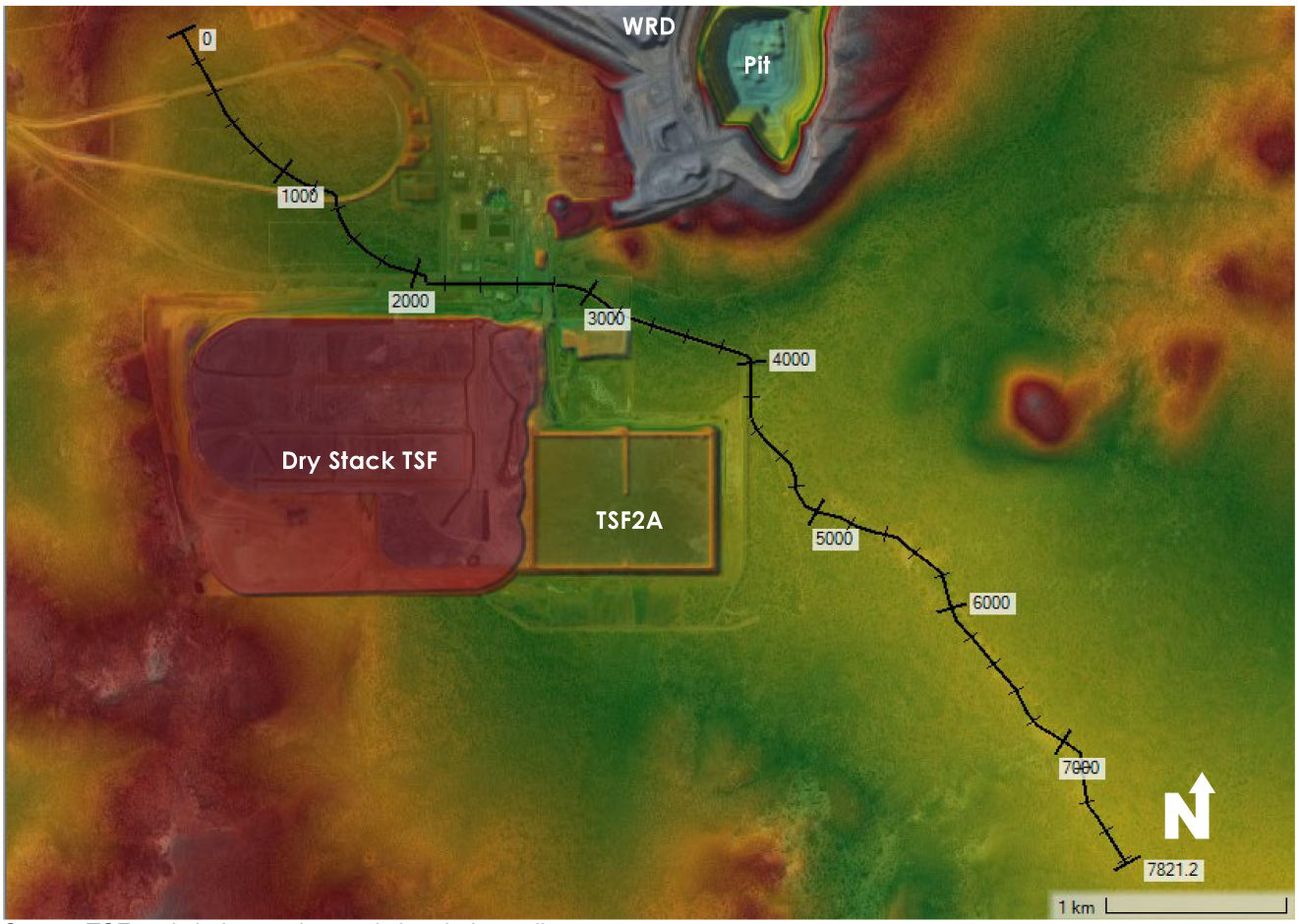
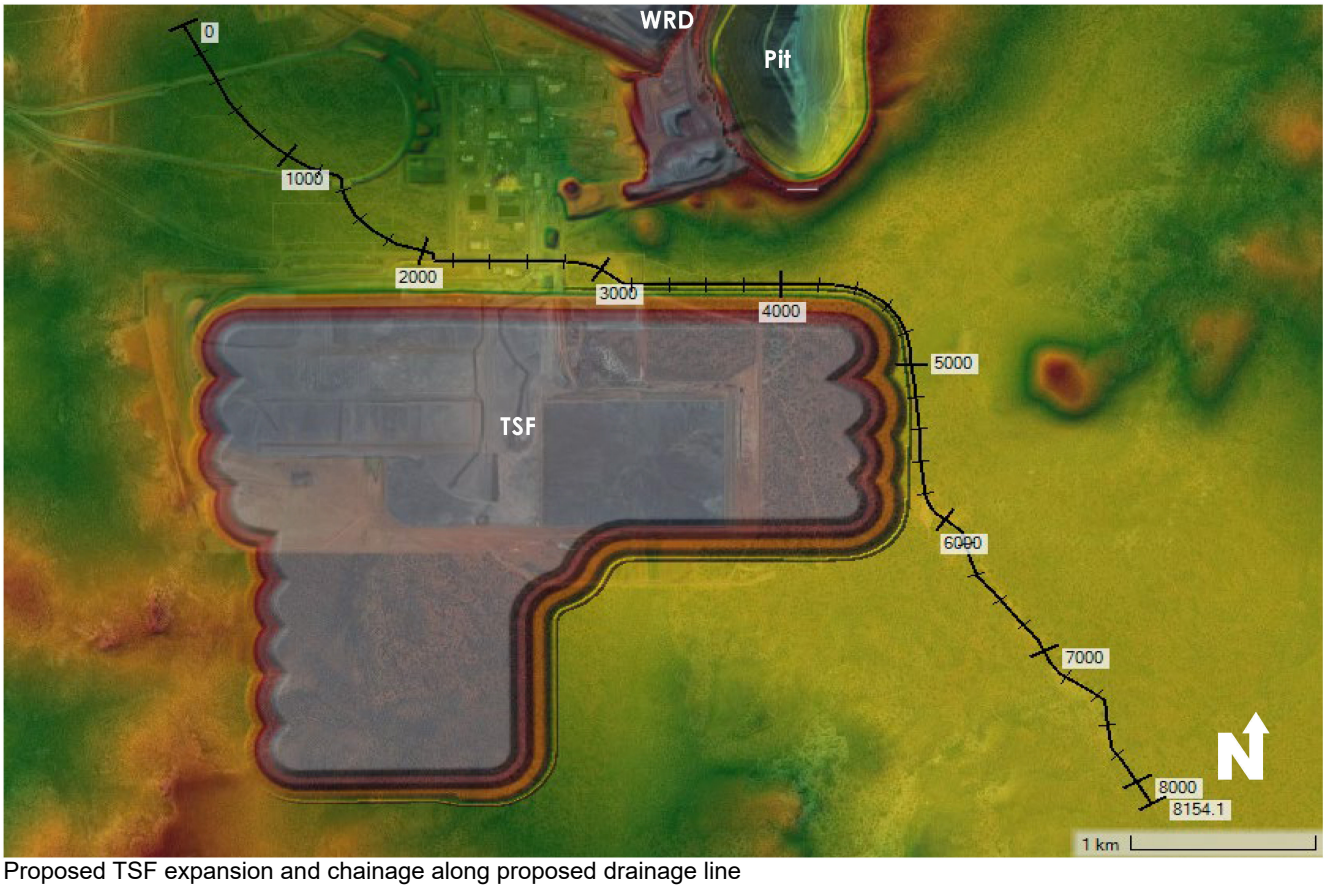



Current TSF and chainage along existing drainage line




Proposed TSF expansion and chainage along proposed drainage line

**FIGURE 8.4**

Changes to Drainage Line associated with TSF Expansion

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**Image Source:** Stantec (2024)

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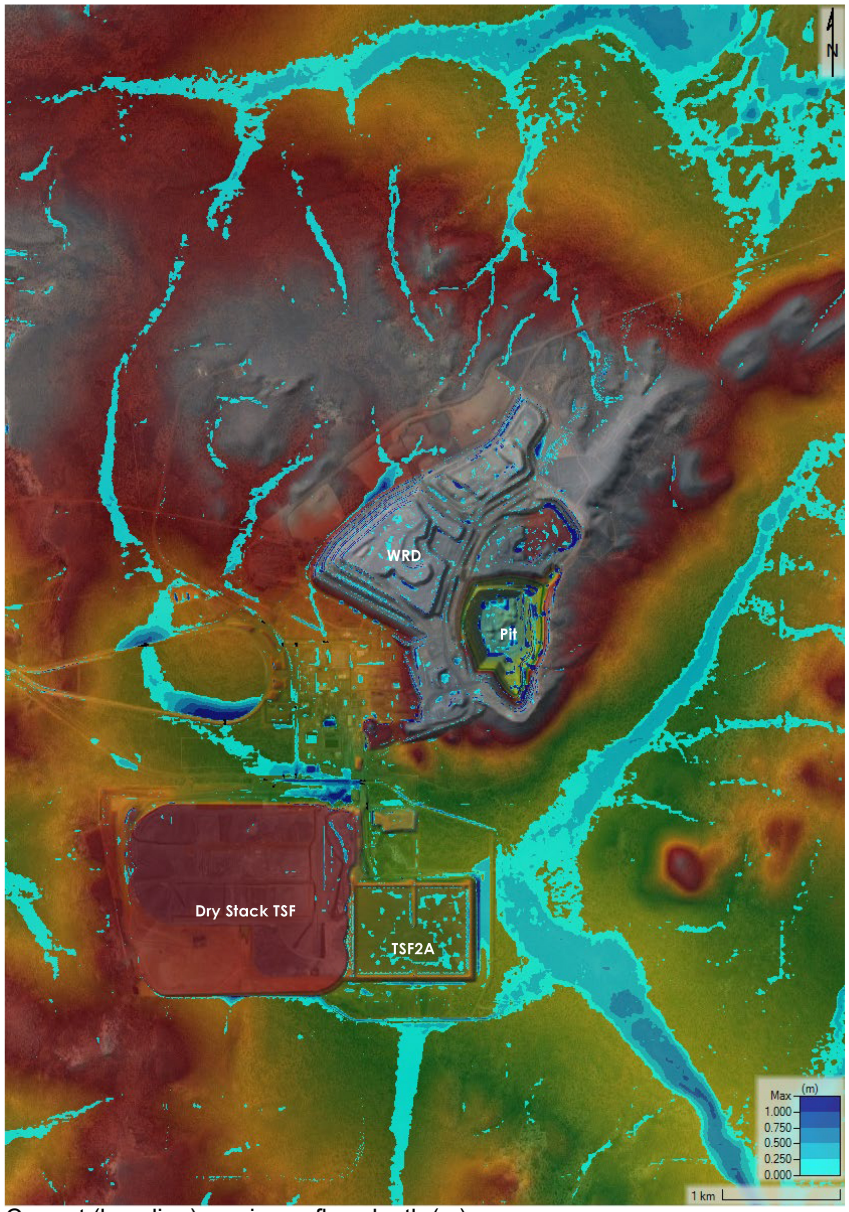
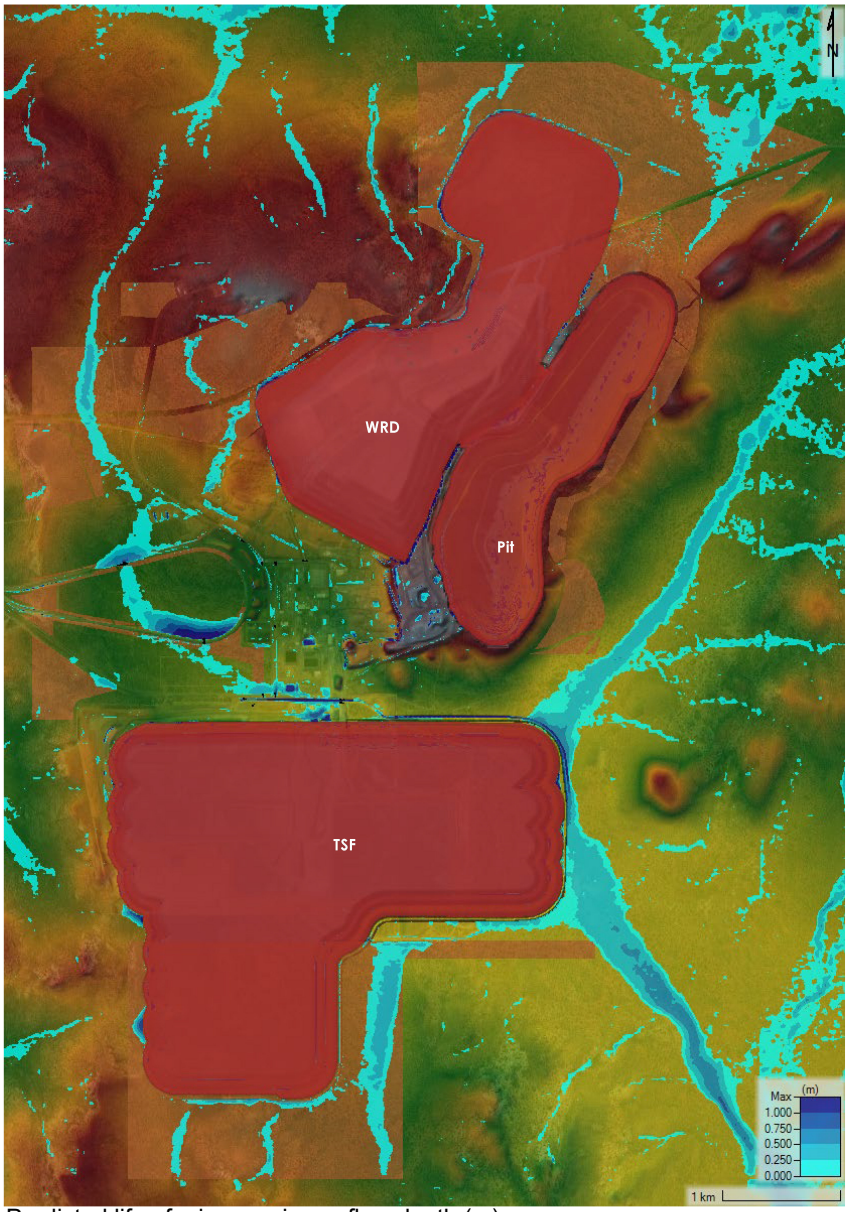



Current (baseline) maximum flow depth (m)




Predicted life of mine maximum flow depth (m)

**FIGURE 8.5**

Predicted Changes to Surface Water Flood Depth during 1% AEP – Mine Area

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**Image Source:** Stantec (2024)

## 8.6 Mitigation

The mitigation hierarchy of avoid, minimise, rehabilitate, and offset has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023b). The mitigation measures listed below are arranged according to the mitigation hierarchy.

The following measures will be implemented to **minimise** potential impacts to inland waters:

- Manage water abstraction from Karara mine site in accordance with *Karara Mining Limited Groundwater Licence Operating Strategy GWL171229 The Karara Iron Ore Project* (KML, 2025b), which includes:
    - The pit dewatering delivery system will be designed using best practice methods to minimise the likelihood of uncontrolled water loss
    - Water pipelines will be regularly inspected and maintained
    - In the event of any uncontrolled water loss, pumping to the affected area will cease until the bore or pipeline can be repaired and any water loss contained.
- Manage surface water in accordance with KML *Environmental Procedure – Surface Water* (CORP-EN-PRO-1011), which includes:
    - Water released from active mining and operations areas, including borrow pits, shall be discharged via sediment reduction controls such as sedimentation ponds
    - Post heavy rainfall events that generate major surface runoff (i.e. a storm event with rainfall totals of a 1 in 20 year average recurrence interval (ARI)) a site inspection will be conducted to identify any erosion and ensure all erosion and sediment control structures are intact
    - During clearing of undulating areas, windrows will be placed along contours to reduce the velocity of water flows and minimise the potential risk of erosion
    - No new watercourse crossings shall be constructed unless specific authorisation is provided via an authorised Ground Disturbance Permit, issued by the KML Environment Department
    - Culverts shall be placed under roads, embankments and formations to permit free flow of drainage water and to assist in water shedding.
    - Cleared vegetation and topsoil shall be stockpiled away from watercourses and in discrete stockpiles to minimise interference to surface flows.

The following measures will be implemented to **rehabilitate** potential impacts to inland waters:

- Pit dewater will be discharged into Terapod West pit, which will enable groundwater drawdown from mining of Terapod West pit to recover.

## 8.7 Assessment and Significance of Residual Impacts

There are not predicted to be any significant residual impacts from groundwater drawdown at the Karara mine site associated with the Proposal, as there are no significant groundwater-dependent environmental values within the predicted groundwater drawdown extent.

The KIOP MLE Proposal is not expected to result in any significant residual impacts to surface water, as the predicted impact will be only a small change in surface water flow depth in existing drainage lines south of the TSF.

## 8.8 Environmental Outcomes

**Table 8.4** details the proposed outcomes and outcomes-based conditions for inland waters, how outcomes can be assured, and proposed monitoring of outcomes.

The Proposal is a significant amendment to MS 805. When issued in 2009, MS 805 contained condition 7 relating to groundwater dependent vegetation. This condition was deleted in 2012 (see Ministerial Statement 895).

MS 805 condition 12-3 (and corresponding condition 11-3 in MS 806) requires the proponent to prepare a pit lake management plan within five years of cessation of mining. It is recommended that this condition be retained.

**Table 8.4 Proposed Outcomes for Inland Waters**

| Proposed Outcome | Is Proposed Outcome Consistent with EPA Objectives | How Proposed Outcome can be Assured | Proposed Outcome-based Condition | Proposed Monitoring of Outcomes |
|---|---|---|---|---|
| **Discharge of saline pit water is managed to ensure no impact to flora and vegetation health in the vicinity of the saline water disposal area.** | Yes | This is an environmental outcome in the most recent Mining Proposal (Reg ID 124340) approved in 2024 and will be regulated by DMPE. | Not required | Annual vegetation health monitoring undertaken in accordance with the KML *Environmental Plan – Flora and Vegetation Health Monitoring* (CORP-EN-PLN-1012) and reporting in Annual Environmental Report to DMPE. |
| **Tailings discharge and surface water at the TSF is managed to prevent spill of high-salinity water or tailings into the environment.** | Yes | This is an environmental outcome in the most recent Mining Proposal (Reg ID 124340) approved in 2024 and will be regulated by DMPE. | Not required | Daily inspection of the TSF discharge and return water pipelines, TSF toe drain and seepage collection sump to ensure integrity and freeboard are maintained. |

# 9.0 Subterranean Fauna

## 9.1 Subterranean Fauna Summary

Detailed surveys for troglofauna and stygofauna were conducted in 2007–2008 (Ecologia, 2008). A subterranean fauna desktop review and troglofauna sampling for the mine life extension was also completed in 2024 (Rockwater Pty Ltd, 2025). The subterranean fauna surveys completed are consistent with EPA Technical Guidance (EPA, 2021) requirements for a detailed survey and are adequate to inform the impact assessment. The low-intensity sampling in 2024 was undertaken within the Karara pit extent, but not extending to Terapod, where potential troglobitic specimen was identified by Ecologia 2008. However, the desktop study indicated that troglobitic Symphyla could potentially have a range of several kms up to at least 80 km weathered hematite/BIF habitats.

The proposed disturbance areas do not include any impacts to subterranean fauna. The dimensions of the Karara pit extent will remain unchanged from the original approval (MS 805). However, there will be a slight increase to the dewatering rates for the KIOP MLE Proposal. Potential changes to the dewatering zones were modelled for the Combined Proposal in 2024 (Rockwater Pty Ltd, 2024). The updated groundwater drawdown predicts a larger area of drawdown compared to earlier models.

The troglofauna surveys recorded six troglofauna specimens within the Combined Proposal life of mine pit extent from a total of 221 samples. The low density of troglofauna specimens recorded in the Combined Proposal impact area is not expected to be considered a significant troglofauna assemblage. The extent of the life of mine pit is not changing as part of the KIOP MLE Proposal compared to the approved extent in MS 805. Therefore, there are no changes to impact to troglofauna.

No stygofauna values have been recorded in the Combined Proposal impact areas (life of mine pit extent and updated predicted groundwater drawdown extent).

There are no significant subterranean fauna values at risk of impact from the Combined Proposal.

## 9.2 EPA Objective

The EPA objective for subterranean fauna is ‘To protect subterranean fauna so that biological diversity and ecological integrity are maintained’ (EPA, 2016c).

## 9.3 Relevant Policy and Guidance

**Table 9.1** lists the policy and guidance relevant to subterranean fauna and describes how they have been considered.

**Table 9.1 Policy and Guidance Relevant to Subterranean Fauna**

| Policy and Guidance | How the Policy and Guidance has been Considered |
|---|---|
| ***Environmental Factor Guideline – Subterranean Fauna*** **(EPA, 2016c)** | The guideline describes that impacts to subterranean fauna should consider changes to landform and inland waters including removal of habitat, groundwater drawdown, inundation and water quality changes. This assessment considers the relevant possible impacts to subterranean fauna are removal of habitat from open pit excavation, and groundwater drawdown from pit dewatering.<br>The guideline describes reasons why subterranean fauna species or assemblages might be considered significant. None of the troglofauna or stygofauna records from Proposal studies have recorded any subterranean fauna values that are expected to be considered significant. |
| ***Technical Guidance – Subterranean fauna surveys for environmental impact assessment*** **(EPA, 2021)** | The subterranean fauna surveys completed are consistent with the Technical Guidance (EPA, 2021) requirements for a detailed survey and are adequate to inform the impact assessment. |

## 9.4 Receiving Environment

This section describes the receiving environment for subterranean fauna including description of the supporting studies and assessment of adequacy to support the impact assessment (**Section 9.4.1**), troglofauna values recorded (**Section 9.4.2**) and stygofauna values recorded (**Section 9.4.3**).

### 9.4.1 Supporting Studies and Information

**Table 9.2** lists the supporting studies and information that informed the environment impact assessment for subterranean fauna, including comments regarding consistency with EPA Guidance. **Table 9.3** lists the EPA Technical Guidance (EPA, 2021) requirements for subterranean fauna survey type, techniques and design, and describes how the subterranean fauna surveys are consistent with the requirements. **Table 9.4** lists the EPA Technical Guidance (EPA, 2021) items to be considered in assessment of survey adequacy, and how these requirements have been met.

The subterranean fauna surveys completed are consistent with EPA Technical Guidance (EPA, 2021) requirements for a detailed survey and are adequate to inform the impact assessment.

**Table 9.2 Supporting Studies for Subterranean Fauna**

| Study Title | Timing | Study Methods | Consistent with EPA Guidance |
|---|---|---|---|
| Mt Karara Pit Extension Subterranean Fauna Desktop Assessment (Rockwater Pty Ltd, 2025)<br>**Appendix 9-1** | Troglofauna survey:<br>Sept 2024 | Desktop review of previous surveys, potential for suitable habitat for subterranean fauna, database review.<br><u>Troglofauna:</u><br>Net scrape followed by baited trap, traps left in place for 56 days. | **Survey met the requirements of a desktop and basic survey for subterranean fauna – see**<br>**Table 9.3** for assessment of how the studies align with the *Technical Guidance – Subterranean fauna surveys for environmental impact assessment* (EPA, 2021). |

| Study Title | Timing | Study Methods | Consistent with EPA Guidance |
|---|---|---|---|
| Greater Karara Iron Ore Project Subterranean Fauna Biological Report (Ecologia, 2008)<br>**Appendix 9-2** | Troglofauna surveys:<br>• 30 Oct – 1 Nov 2007<br>• 10–14 Dec 2007<br>• 29–31 Jan 2008<br>Stygofauna surveys:<br>• 19–24 Nov 2007<br>• 13–19 Feb 2008<br>• 5–9 May 2008 | Troglofauna:<br>Two traps deployed per drill hole, 20 m apart, with sterilised leaf litter added to traps. Traps left in place average of 49 days.<br>Stygofauna:<br>Net hauls. | **Survey met the requirements of a detailed survey for troglofauna and stygofauna – see**<br>**Table 9.3** for assessment of how the studies align with the *Technical Guidance – Subterranean fauna surveys for environmental impact assessment* (EPA, 2021). |

**Table 9.3 Subterranean Fauna Surveys Consistency with EPA Technical Guidance**

| Technical Guidance (EPA, 2021) Survey Requirements | How the Studies Align with Guidance |
|---|---|
| Survey type – a detailed survey is required for proposals where there is a high likelihood of subterranean fauna occurring, and there are likely impacts to subterranean fauna. | A detailed survey was undertaken to support the KIOP assessment in 2008, due to the potential for impact (open pits and dewatering) and potential for troglofauna. The survey program was approved by the Department of Environment and Conservation (Ecologia, 2008).<br>A desktop review and subsequent basic survey for troglofauna was undertaken to determine the requirement for further subterranean fauna survey to support the KIOP MLE Proposal (Rockwater Pty Ltd, 2025). |
| A detailed survey requires repeat sampling over at least three survey phases. | Three survey phases were undertaken (Ecologia, 2008). |
| Stygofauna sampling methods include haul nets, pumping, trapping, plankton nets and environmental DNA. | Net haul sampling method was used (Ecologia, 2008). |
| Troglofauna sampling methods include trapping, haul net scraping, direct collecting and environmental DNA. | Trapping and net haul and scrape sampling methods were used (Ecologia, 2008) (Rockwater Pty Ltd, 2025). |
| Site selection – for detailed surveys, sites should be selected across the spatial extent of impact and non-impact areas. | The detailed stygofauna and troglofauna survey included sites through the impact area (Combined Proposal proposed open pits and groundwater drawdown extent) and sites outside of impacts. |
| Sampling effort for stygofauna – allow six months after borehole development before sampling, allow three months between sampling phases, one of the sampling phases should be following significant rainfall. A minimum of ten impact sites is recommended, with at least as many samples in reference areas as within the impact area. | Bores were drilled in 2006–2007, allowing six months between bore installation and commencement of sampling in late 2007.<br>The sampling phases for stygofauna were three months apart.<br>The sampling phase in February 2008 followed a substantial rain event (Ecologia, 2008).<br>For the detailed survey, 17 of the survey sites were classed as being in the impact area and 23 sites outside of the impact area (Ecologia, 2008). |

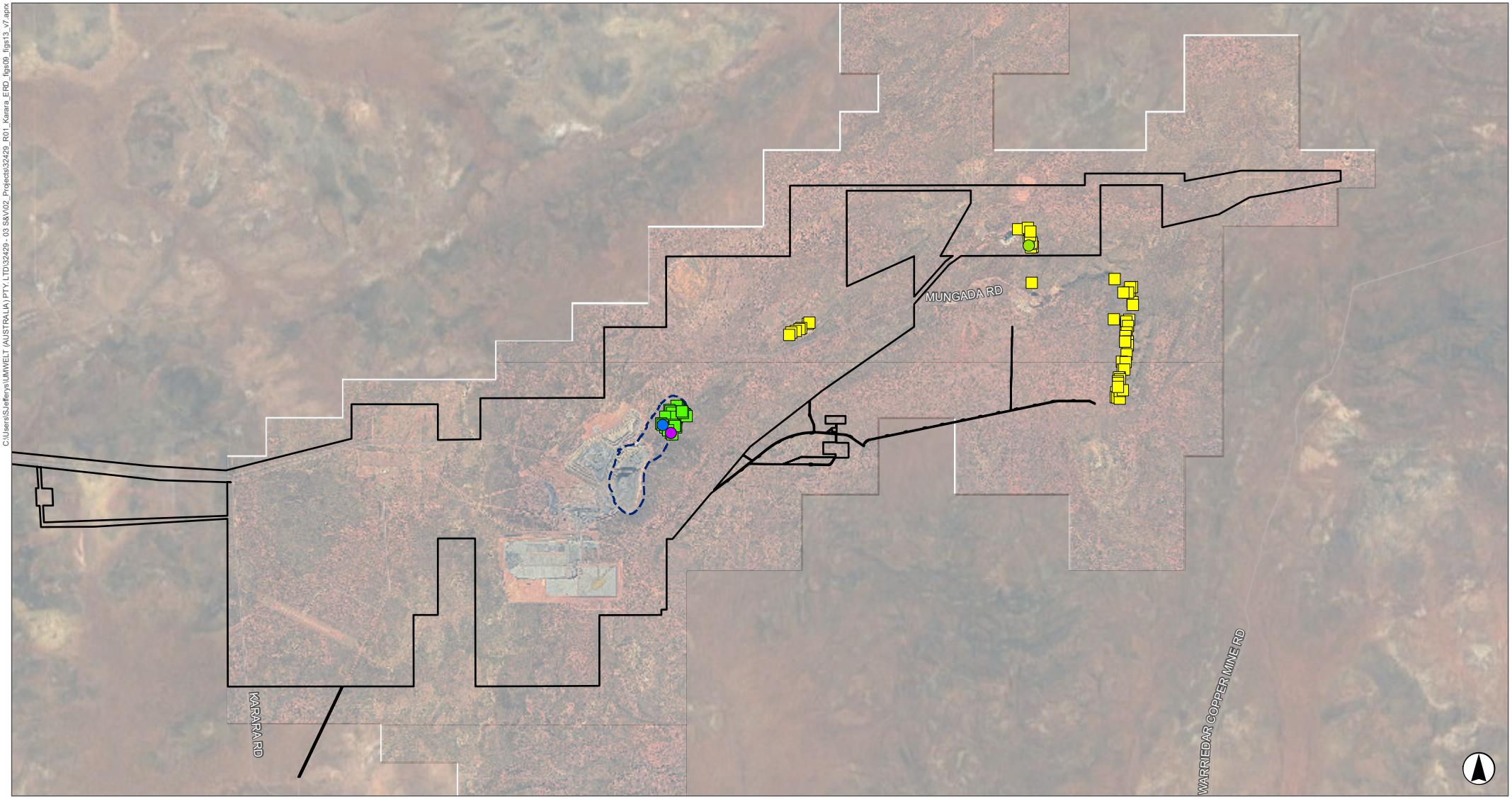
| Technical Guidance (EPA, 2021) Survey Requirements | How the Studies Align with Guidance |
|---|---|
| Sampling effort for troglofauna – allow one month after borehole development before sampling, allow three months between sampling phases, one of the sampling phases should be following significant rainfall. A minimum of 30 impact sites is recommended, with at least as many samples in reference areas as within the impact area. | Bores were drilled in 2006-2007, allowing at least three months between bore installation and commencement of sampling in late 2007.<br>The sampling phases for troglofauna were only one month apart.<br>The sampling phase in February 2008 followed a substantial rain event (Ecologia, 2008).<br>For the detailed survey, 30 of the survey sites were classed as being in the impact area and 26 sites outside of the impact area (Ecologia, 2008). |
| Habitat connectivity – should be informed by evaluation of physical and biological connectivity. | Habitat connectivity has not been assessed, as the habitat was assessed as having low potential to support subterranean fauna. |
| Identification should be to the lowest taxonomic level possible, using morphological or genetic tools as required. | Morphological identification methods were used for the detailed survey, which was the typical practice at the time. Specimens collected during the detailed survey in 2007-2008 would be too old to be successfully used for genetic analysis. |

**Table 9.4 Assessment of Subterranean Fauna Survey Adequacy**

| Technical Guidance (EPA, 2021) Considerations for Survey Adequacy | How the Studies Align with Guidance |
|---|---|
| The desktop study used contemporary and appropriate datasets and sources of information relevant for the proposal area. | Yes, the desktop study included literature review and database searches of Dandjoo, Western Australian Museum, DBCA protected ecological communities and Atlas of Living Australia. |
| The surveys follow contemporary guidance. | **Yes, the detailed and basic surveys align with the requirements of contemporary guidance (EPA, 2021) as described in**<br>**Table 9.3.** |
| The surveys are reflective of the scale and nature of the impacts of the current proposal. | **Yes, the detailed survey included adequate sites to assess the expected scale and nature of the impacts, as described in**<br>**Table 9.3.** |
| Targeted surveys have been used to increase sampling effort where early surveys were deficient. | Targeted surveys were not considered necessary due to poor quality subterranean fauna habitat and few specimens recorded within the impact areas. |
| All relevant impact areas have been sufficiently surveyed with a reasonable coverage and number of sites relative to the size of the impact areas and the habitats. | **Yes, the detailed survey included adequate sites to assess the expected scale and nature of the impacts, as described in**<br>**Table 9.3.** |
| The number and location of reference sites surveyed area adequate to provide context outside of the impact areas. | **Yes, the detailed survey included adequate sites outside of the impact areas, as described in**<br>**Table 9.3.** |

| Technical Guidance (EPA, 2021) Considerations for Survey Adequacy | How the Studies Align with Guidance |
|---|---|
| Knowledge gaps have been investigated and outstanding issues resolved, such as the application of genetics to resolve unidentified specimens or the use of targeted surveys to increase confidence in the predictions of species distributions. | Yes, a contemporary basic troglofauna survey was undertaken to confirm the outcomes of the desktop assessment and ascertain if troglofauna were likely to be present. |
| The distribution of singleton taxa can be confidently predicted using appropriate physical and biological evidence. | No, the distribution of singleton troglofauna taxa cannot be confirmed due to limited information. |
| The outcomes of the survey reflect the assumptions of habitat prospectivity, or where there are differences, the limitations and any reasons for them have been discussed. | Yes, the detailed and contemporary basic survey confirmed low prospectivity of subterranean fauna habitat for both stygofauna and troglofauna. |

The troglofauna sample sites and potential impact areas (life of mine pit) are shown in **Figure 9.1**. The stygofauna sample sites and potential impact areas (life of mine pit and Combined Proposal predicted groundwater drawdown) are shown in **Figure 9.2**.




**Legend**

- Combined Proposal Mitigated Development Envelope
- Life of Mine – Pit Extent
- Troglofauna Sample Sites (Rockwater, 2025)
- Troglofauna Sample Sites (Ecologia, 2008)

**Troglofauna Species Recorded (Rockwater, 2025)**

- Curculionidae
- Symphala sp.

**Troglofauna Species Recorded (Biota, 2007)**

- Pseudoscorpion specimen

Scale: 1:140,000 at A4, GDA2020 MGA Zone 50

# FIGURE 9.1
## Troglofauna Survey Sites and Records

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0 2.8 5.6 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Rockwater (2025), Ecologia (2008), Biota (2007)

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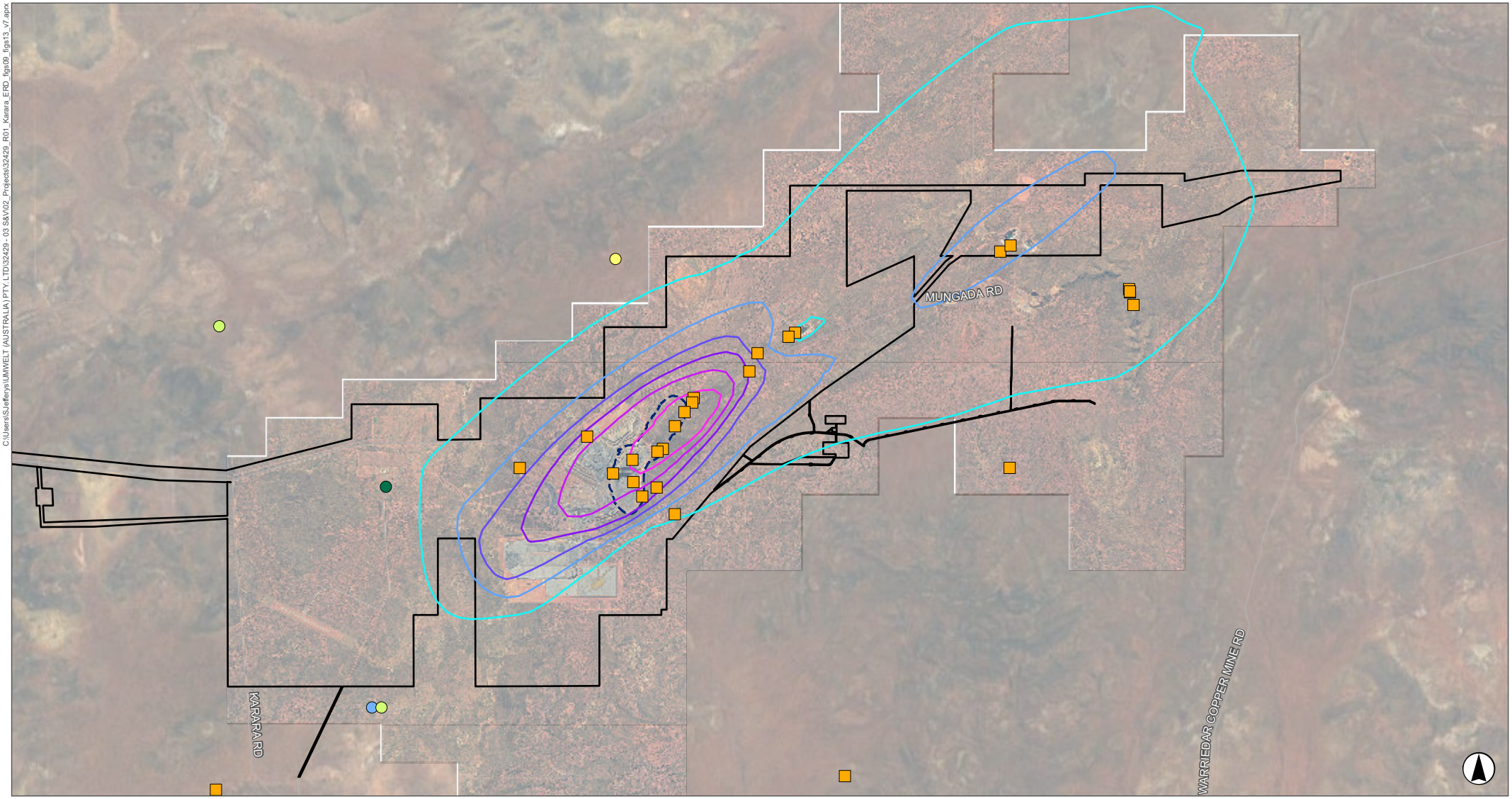


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Scale: 1:140,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Life of Mine – Pit Extent
- Stygofauna Samples Sites (Ecologia, 2008)

**Stygofauna Specimens Recorded**

- Copepoda (Calanoida)
- Copepoda (Harpacticoida)
- Isopoda
- Oligochaeta
- Ostracoda
- Syncarida

**Predicted Groundwater Drawdown Contours (Rockwater, 2024)**

- 1
- 10
- 20
- 30
- 40
- 50

# FIGURE 9.2
## Stygofauna Survey Sites and Records

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0 2.8 5.6 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Rockwater (2025), Ecologia (2008)

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### 9.4.2 Troglofauna

A three-phase detailed troglofauna survey was conducted in 2007 and 2008 (Ecologia, 2008). The results are summarised in **Table 9.5** and shown in **Figure 9.1**. The troglofauna survey collected 311 samples from traps, with 165 samples within the impact area. No troglofauna were recorded within or outside of impact areas (Ecologia, 2008).

A desktop review for troglofauna was completed in 2025 (Rockwater Pty Ltd, 2025). The desktop review included a literature review and database searches. The database search noted one troglobitic pseudoscorpion collected 8 km north-west of Karara pit from the Mummaloo Deposit but no other troglofauna records within 60 km of the Proposal (Rockwater Pty Ltd, 2025). The literature review noted that a single specimen of a new species of troglobitic pseudoscorpion and three potential troglophilic isopods were recorded within the area that has subsequently been mined for Terapod pits, as part of a preliminary sampling program of 36 samples undertaken in 2007 (Biota Environmental Sciences, 2007). No further details are available about the possible identifications of these specimens (Rockwater Pty Ltd, 2025). The subsequent detailed troglofauna survey did not record any further troglofauna specimens (Ecologia, 2008). Furthermore, the literature review noted that no troglofauna specimens were recorded in surveys completed at the Hinge Iron Ore Project, Blue Hills Mungada East Project or Shine Deposit, all of which are within 20–40 km of the Proposal (Rockwater Pty Ltd, 2025).

The desktop review included an updated analysis of habitat suitability for troglofauna. The suitability of habitat for troglofauna is summarised in **Table 9.5**. The desktop review concluded that there was potentially suitable habitat for troglofauna in the weathered hematite profile within the life of mine Karara pit.

**Table 9.5 Summary of Troglofauna Habitat and Records at the Proposal**

| Area | Troglofauna Habitat Suitability (Rockwater Pty Ltd, 2025) | Troglofauna Recorded (Ecologia, 2008) and (Rockwater Pty Ltd, 2025) |
|---|---|---|
| **Combined Proposal Life of Mine Karara Pit, including existing Blue Hills North and Terapod pits** | Review of geological cores from the developed Karara pit areas identified possibly suitable habitat for troglofauna in approximately half of the cores inspected, indicating that the weathered hematite profile in the life of mine pit might provide suitable habitat depending on the degree of weather and sediment infill. | Life of Mine Karara Pit:<br>• *Symphyla sp.*<br>• Curculionidae 'BC0272' (order Coleoptera)<br>Existing Terapod Pit:<br>• Troglobitic pseudoscorpion<br>• Three troglobitic isopod specimens |
| **Regional reference sites outside of impacts** | Not assessed. | None |

A single-phase basic troglofauna survey was conducted in 2024, which focused on sample sites within the life of mine Karara pit (undeveloped impact area) (Rockwater Pty Ltd, 2025). The survey collected 20 samples from net scrapes and traps. Two troglofauna and one amphibious subterranean fauna specimens were recovered, indicating the presence of a depauperate troglofauna community in the weathered surface geology (Rockwater Pty Ltd, 2025).

The preliminary sampling program, detailed troglofauna survey and contemporary basic troglofauna survey recorded six troglofauna specimens within the impact area from a total of 221 samples. The low density of troglofauna specimens recorded in the Combined Proposal impact area is not expected to be considered a significant troglofauna assemblage.

### 9.4.3 Stygofauna

A three-phase detailed stygofauna survey was conducted in 2007–2008 (Ecologia, 2008). The stygofauna survey collected 69 samples from net hauls. The results have been reviewed to determine if any of the recorded stygofauna occur in the Combined Proposal impact areas (life of mine open pit and predicted groundwater drawdown extent). The results are summarised in **Table 9.6** and shown in **Figure 9.2**. None of the sample sites within the Combined Proposal impact areas recorded any stygofauna.

A desktop review for stygofauna was completed in 2025 (Rockwater Pty Ltd, 2025). The desktop review included a literature review and database searches. The literature review and database search noted that no stygofauna records or priority ecological communities for subterranean fauna were recorded within 40 km of the Proposal, other than the records from the detailed survey completed for KML (Ecologia, 2008).

The desktop review included an updated analysis of habitat suitability for stygofauna. The suitability of habitat for stygofauna is summarised in **Table 9.6**. The desktop review concluded that there was no suitable habitat for stygofauna within the impact areas.

**Table 9.6 Summary of Stygofauna Habitat and Records at the Proposal**

| Area | Stygofauna Habitat Suitability (Rockwater Pty Ltd, 2025) | Stygofauna Recorded (Ecologia, 2008) |
|---|---|---|
| **Combined Proposal Life of Mine Karara Pit, including existing Blue Hills North and Terapod pits** | The Karara pit will mine the magnetite in the BIF ridge, which has a very tight formation with few voids or pores and is not considered suitable habitat for subterranean fauna. | None |
| **Combined Proposal predicted groundwater drawdown extent (area within 1 m predicted drawdown)** | Habitat within the predicted groundwater drawdown extent includes shallow alluvium (<5 m depth) overlying basalt. Few of the alluvium areas are saturated due to the naturally occurring depth to groundwater near Karara pit. | None |
| **Regional reference sites outside of impacts** | Habitat outside of the impact area includes unconfined alluvium aquifers that are expected to be locally widespread. The baseline depth to groundwater is shallower outside of the impact areas, which provides more potential for stygofauna to be present in the alluvium. | Copepoda (Harpacticoida and Calanoida), Isopoda, Oligochaeta, Ostracoda and Syncarida specimens |

No stygofauna values have been recorded in the Combined Proposal impact areas.

## 9.5 Potential Environmental Impacts

If present, troglofauna could be impacted by excavation of the life of mine pit. The extent of the life of mine pit (proposed excavation area) is not changing as part of the KIOP MLE Proposal compared to the approved extent in MS 805. The only proposed change related to the mine pit is to extend the location of the abandonment bund, which is a surface structure and will not impact on subterranean fauna. Therefore, there are no changes to impact to troglofauna.

The updated groundwater drawdown prediction (Rockwater Pty Ltd, 2024) has been considered to determine the potential impacts to stygofauna. Further details about the updated groundwater drawdown prediction are provided in **Section 8.0**. The potential impact areas in the updated groundwater drawdown prediction do not provide suitable habitat for stygofauna and no stygofauna specimens have been recorded in the impact area. Therefore, the Combined Proposal will not cause any significant impacts to stygofauna habitat or species.

## 9.6 Mitigation

No mitigation strategies are proposed for subterranean fauna, as there are no significant subterranean fauna values at risk of impact.

## 9.7 Assessment and Significance of Residual Impacts

The KIOP MLE Proposal activities do not include any changes to impacts for troglofauna, as the proposed pit excavation area will not change.

The Combined Proposal impacts to troglofauna include:

- Troglofauna pseudoscorpion (potentially new but unconfirmed taxa) and potential trolophilic isopod recorded within the area that has been developed as part of the Terapod pits.
- *Symphyla* sp. and Curculionidae 'BC0272' recorded within the area approved in MS 805 for Karara life of mine pit.

The very small number of troglofauna specimens collected from numerous surveys undertaken in the region indicate that the troglofauna community is depauperate.

The KIOP MLE Proposal activities do not include any changes to impacts for stygofauna, as the proposed pit excavation area will not change. However, the predicted extent of groundwater drawdown has been updated compared to the model that supported the KIOP assessment in 2009. The updated model includes calibration with operational groundwater monitoring data and models the life of mine Karara pit as well as existing Terapod and Blue Hills North pits (the Combined Proposal). The subterranean fauna impact assessment uses the updated groundwater drawdown prediction to determine potential impacts from the Combined Proposal. No stygofauna values have been recorded in the Combined Proposal impact areas.

There are no significant subterranean fauna values at risk of impact from the Combined Proposal.

## 9.8 Environmental Outcomes

No outcomes are proposed for subterranean fauna as there are no significant subterranean fauna values at risk of impact.

The Proposal is a significant amendment to MS 805. MS 805 does not include any conditions or limits relating to subterranean fauna. The KIOP MLE doesn't change the outcome to this factor.

# 10.0 Greenhouse Gas Emissions

## 10.1 Greenhouse Gas Emissions Summary

The Proposal is an extension of the ongoing operations at KIOP and will not substantially change the Scope 1 or Scope 2 peak annual greenhouse gas (GHG) emissions compared to the current operations.

Scope 1 emissions as considered by EPA includes:

- fuel use by light and heavy vehicles, generators, etc. (this is the Scope 1 emissions reported under NGER Act and considered by Safeguard Mechanism)
- diesel combustion by rail contractor for transport of concentrate to Geraldton Port
- land clearing (calculated based on additional 1,522 ha for MLE).

The base case peak annual EPA Scope 1 emissions are predicted to be 149,167 t carbon dioxide equivalent ($CO_2$-e) per annum. Only 88,287 t $CO_2$-e per annum Scope 1 emissions are considered under the *National Greenhouse and Energy Reporting Act 2007* (NGER Act). Therefore, the Proposal will not be regulated under the Safeguard Mechanism, which regulates facilities with more than 100,000 t $CO_2$-e per annum of Scope 1 emissions under the NGER Act. The base case peak annual Scope 2 emissions are predicted as 265,000 t $CO_2$-e per annum.

Mitigations will be applied to reduce EPA Scope 1 and Scope 2 emissions.

Avoid:

- rail haulage contractor switch from diesel powered trains to net zero emission trains in 2030.

Minimise:

- staged electrification of light and heavy vehicles
- optimise design of WRD to reduce fuel consumption
- approximately 80% of electricity sourced from renewable energy generator from 2031.

Offset:

- Estimated 30,483 t CO2-e required to be offset from 2050-2053 to achieve net zero Scope 1 emissions. KML proposes to purchase and surrender Australian Carbon Credit Units to meet offset requirements.

KML's targets and proposed outcomes for GHG emissions are:

- total EPA Scope 1 GHG emissions for remaining life of project: 1,722,936 t $CO_2$-e
- peak annual operational EPA Scope 1 emissions: 143,653 t $CO_2$-e per annum
- net zero Scope 1 GHG emissions from KIOP by 2050.

## 10.2 EPA Objective

The EPA objective for GHG emissions is 'To minimise the risk of environmental harm associated with climate change by reducing greenhouse gas emissions as far as practicable' (EPA, 2024a).

## 10.3 Relevant Policy and Guidance

GHG emissions are regulated at the Commonwealth level under the *National Greenhouse and Energy Reporting Act 2007* (NGER Act), which requires reporting of GHG emissions if the facility level emissions exceed 25,000 t $CO_2$-e in a reporting year. Under the NGER Act, a facility is a series of activities that form a single undertaking, are attributable to single industry sector and occur at a single site (CER, 2021). KML is required to report emissions under the NGER Act and commenced reporting in 2012–13.

The National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 requires facilities that emit over 100,000 t $CO_2$-e per annum to reduce their emissions. The KIOP does not currently trigger the Safeguard Mechanism requirement to reduce emissions.

**Table 10.1** lists the EPA and other policy and guidance relevant to GHG emissions and describes how the policy and guidance has been considered.

**Table 10.1 Policy and Guidance Relevant to GHG Emissions**

| Policy and Guidance | How the Policy and Guidance has Been Considered |
|---|---|
| ***Environmental Factor Guideline: Greenhouse Gas Emissions*** **(EPA, 2024a)** | The factor guideline indicates that EPA will consider GHG emissions from a proposal when the Scope 1 or Scope 2 emissions are predicted to exceed 100,000 t CO2-e per annum. For the Proposal, both Scope 1 (including land clearing and product transport) and Scope 2 emissions are predicted to exceed this threshold. Therefore, GHG emissions has been considered as a key environmental factor.<br>Information specified by the factor guideline has been presented in this section, including details on predicted Scope 1, 2 and 3 emissions, how emissions are proposed to be mitigated, consideration of best practice, emissions intensity and benchmarking information.<br>KML's commitment to achieve net zero Scope 1 GHG emissions by 2050 meets the expectation described in the factor guideline. |
| ***Template – Greenhouse Gas Environmental Management Plan*** (EPA, 2023d) | KML's GHG management plan includes all the contents specified in the template. The Executive Summary in KML's GHG management plan includes all items specified in Attachment 1 'GHG EMP executive summary' of the template. |
| ***Greenhouse Gas Emissions Policy for Major Projects*** **(Government of Western Australia, 2024)** | KML's commitment to achieve net zero Scope 1 GHG emissions by 2050 aligns with the expectation stated by the Government of Western Australia in the policy.<br>The policy states an expectation that the EPA should not regulate GHG emissions for proposals that would be subject to the Safeguard Mechanism. The Proposal is not expected to be regulated under the Safeguard Mechanism, as the NGER-covered emissions will be under 100,000 t CO2-e per annum, whereas the Scope 1 emissions as considered by EPA would be over this threshold. Therefore, it is expected that the EPA would regulate GHG emissions for this Proposal. |
| ***Western Australian Climate Policy*** **(Government of Western Australia, 2020)** | KML's commitment to achieve net zero Scope 1 GHG emissions by 2050 aligns with the expectation stated by the Government of Western Australia in the policy. |

## 10.4 Receiving Environment

The emission of GHG in one location contributes to the cumulative quantity of GHG in the global atmosphere. The receiving environment of GHG emissions from the Proposal is therefore the global atmosphere, although the scope of the EPA's obligations is the State of WA.

The receiving environmental context are the emissions and policies relating to GHG management at the federal and state level.

Australia contributes approximately 1.3% of global GHG emissions, which was 537 Mt $CO_2$-e in 2018 (Commonwealth of Australia, 2020; EPA, 2024a). Under the Paris Agreement, Australia has committed to reduce GHG emissions by 43% below 2005 levels by 2030 and to net zero by 2050 (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2022c). Furthermore, the *Intergovernmental Panel on Climate Change 2018 Special Report – Global Warming of 1.5$^0$C* indicated that global GHG emissions would need to fall by about 45 % from 2010 levels by 2030 and achieve net zero by 2050 to limit global warning to 1.5$^0$C (EPA, 2024a).

Western Australia contributed 91 Mt $CO_2$-e in 2018 (Commonwealth of Australia, 2020). This was 17% of Australia's emissions in 2018 and an increase in Western Australia's total emissions compared to 2017. The Western Australian *Greenhouse Gas Emissions Policy for Major Projects* (Government of Western Australia, 2024) affirms the Western Australian target of net zero GHG emissions by 2050. The *Western Australia Climate Policy* (Government of Western Australia, 2020) commits to actions to achieve the target of net zero emissions by 2050. The policy also recognises that reduction of GHG emissions must occur to mitigate potential impacts from climate change including extreme weather events, rising sea levels, changes to climate and loss of habitats.

The State *Greenhouse Gas Emissions Policy for Major Projects* and EPA *Environmental Factor Guideline for Greenhouse Gas Emissions* identify that proposals which expect to emit more than 100,000 tpa $CO_2$-e of Scope 1 emissions would be assessed for this environmental factor.

### 10.4.1 Supporting Studies and Information

**Table 10.2** lists the supporting studies and information that informed the environment impact assessment for GHG emissions.

**Table 10.2 Supporting Studies for GHG Emissions**

| Study Title | Timing | Study Methods | Consistent with EPA Guidance |
|---|---|---|---|
| ***Karara Iron Ore Project Life of Mine Extension GHG Management Plan V1.10* (Greenbase, 2025)** | GHG Management Plan completed in November 2024 | The GHG Management Plan includes:<br>• estimated Scope 1, 2 and 3 emissions<br>• GHG mitigations<br>• GHG emissions reduction trajectories<br>• benchmarking.<br>The GHG emission estimates were prepared in accordance with the NGER Determination, the Full Carbon Accounting Model (FullCAM) Guidelines (DCCEEW, 2020) and the *Corporate Value Chain (Scope 3) Accounting and Reporting Standard* (Greenhouse Gas Protocol, 2011). | KML's GHG management plan includes all the contents specified in the EPA template. The Executive Summary in KML's GHG management plan includes all items specified in Attachment 1 'GHG EMP executive summary' of the template. |

| Study Title | Timing | Study Methods | Consistent with EPA Guidance |
|---|---|---|---|
| **NGER corporate emissions and energy data (CER, 2025)** | Annual data for last five years, from 2019-20 to 2023-24 | Annual data reported by Karara Mining Limited for Scope 1 and Scope 2 emissions was sourced from the publicly available NGER data. | The NGER Scope 1 emissions does not correspond with Scope 1 emissions as considered by the EPA. However, it does provide a reliable measure of current emissions from the KIOP.<br>The EPA GHG Emissions Factor Guideline (EPA, 2024a) states that the EPA will assess changes to existing proposals in the context of the ongoing GHG emissions. |

## 10.5 Potential Environmental Impacts

The Proposal is an extension of the ongoing operations at KIOP. Therefore, there is no specific construction period or construction emissions. Emissions associated with land clearing for expansion of the WRD, TSF and open pit are included as part of operational emissions.

The predicted base case operational GHG emissions are summarised in **Table 10.3**. The data was sourced from the *Karara Iron Ore Project Life of Mine Extension GHG Management Plan* (Greenbase, 2025).

**Table 10.3 Predicted Operational GHG Emissions – Base Case**

| Component | Inclusions | Annual GHG Emissions (t $CO_2$-e per annum) | Total GHG Emissions 2024–2053 (t $CO_2$-e) |
|---|---|---|---|
| **Scope 1 (fuel)** | Diesel combustion by light and heavy vehicles, generators, pumps, lighting plants.<br>Mined material: max 41 Mtpa.<br>Concentrate production: max 8.2 Mtpa. | Average: 88,287<br>Peak: 88,294 (in 2024) | 2,569,143 |
| **Scope 1 (rail)** | Diesel combustion by rail contractor transporting concentrate from mine site to Geraldton Port. Not under operational control of KML but included in EPA Scope 1 emissions.<br>Diesel-powered trains to be replaced with zero emissions trains from 2030. | Average: 7,232<br>Peak: 29,959 (until 2030) | 209,714 |
| **Scope 1 (land clearing)** | Loss of sequestration and decomposition of organic matter. Calculated based on clearing of 1,522 ha of additional land for MLE. | Average: 8,114<br>Peak: 30,921 (2028-2031) | 235,308 |
| **Subtotal Scope 1** | | **Average: 103,632**<br>**Peak: 149,167 (2028-2030)** | **3,014,166** |
| **Scope 2** | Electricity purchased from the South West Interconnected System (SWIS) grid.<br>Electricity purchased through a Power Purchase Agreement (PPA) with a renewable energy generator and supplied via the grid infrastructure is expected to commence in 2031 and supply approximately 80% of electricity requirements each year.<br>Ore processed: max 21 Mtpa. | Average: 103,259<br>Peak: 265,000 (in 2024) | 3,001,920 |

| Component | Inclusions | Annual GHG Emissions (t $CO_2$-e per annum) | Total GHG Emissions 2024–2053 (t $CO_2$-e) |
|---|---|---|---|
| **Scope 3** | Components listed in order of contribution to emissions:<br>• processing of sold products (iron ore in steelmaking)<br>• downstream transport (rail and ship haulage to processing plants in China)<br>• purchased goods and services (mining equipment, vehicles, etc)<br>• fuel and energy related activities<br>• capital goods<br>• upstream transport<br>• employee commuting. | Average: 12,166,668<br>Peak: 12,198,198 | 354,061,796 |

## 10.6 Mitigation

KML has applied the mitigation hierarchy to avoid, minimise and offset GHG emissions including consideration of best practice options, as outlined in the below sections. Further details are available in the *Karara Iron Ore Project Life of Mine Extension GHG Management Plan V1.10* (Greenbase, 2025) (**Appendix 10-1**).

### 10.6.1 Scope 1 Emissions Mitigation

The following measures were adopted as part of the base case calculation to **avoid** Scope 1 GHG emissions:

- Rail haulage contractor intending to switch from diesel powered trains to net zero emission trains in 2030.

The following **best practice** measures have been adopted by KML to **minimise** Scope 1 GHG emissions (Greenbase, 2025):

- use of high-efficiency premium diesel to reduce fuel consumption – adopted in 2023, applied in base case
- regular maintenance of haul roads to ensure transport efficiency and minimise diesel consumption – adopted in base case
- optimising design of waste rock landforms to reduce fuel consumption – adopted in base case
- electrification of diesel light vehicle fleet and equipment owned by KML – staged from 2027
- electrification of mining fleet by main mining contractor – staged in five-year increments from 2032

KML will use offsets if required to achieve the target of net zero Scope 1 GHG emissions from 2050. The proposed **offsets** are:

- Estimated 30,483 t $CO_2$-e required to be offset from 2050-2053 to achieve net zero Scope 1 emissions. KML proposes to purchase and surrender Australian Carbon Credit Units to meet offset requirements.

### 10.6.2 Scope 2 Emissions Mitigation

The following measures were adopted as part of the base case calculation to **avoid** Scope 2 GHG emissions:

- approximately 80% of electricity needs sourced from renewable energy generator via PPA from 2031.

KML also evaluated the following **best practice** options (Greenbase, 2025):

- on-site wind farm – not considered feasible due to scale of wind farm required to meet demand
- on-site hybrid renewable power station – considered less beneficial than PPA
- small-scale renewable energy assets (e.g. alternative to back-up diesel generators) – feasibility assessment not yet complete.

### 10.6.3 Scope 3 Emissions Mitigation

The largest source of Scope 3 emissions is processing of iron ore in Chinese processing plants. China has published targets to achieve peak carbon dioxide emissions before 2030 and carbon neutrality (net zero) by 2060 (Climate Action Tracker, 2025). Therefore, Scope 3 emissions from iron ore use in steel production in China are expected to reduce over time.

KML will also adopt the following strategies to **minimise** Scope 3 GHG emissions (Greenbase, 2025):

- acquire goods and services from local communities, where possible
- reduce fuel consumption, which will reduce emissions associated with transport of fuel
- optimise operations at Geraldton Port to reduce diesel and electricity consumption
- encourage employees to commute by bus or carpool
- optimise bus commute between mine site and Geraldton.

## 10.7 Assessment and Significance of Residual Impact

This section presents the predicted GHG emissions per year for the remaining life of the Proposal (with best practice mitigations measures and offsets), the influence of the proposed amendment on GHG emissions for the KIOP, benchmarking of emissions against other Western Australian iron ore mines, and the targets and trajectories for GHG emissions per five-year cycle for the remaining life of the Proposal.

### 10.7.1 Predicted GHG Emissions – Best Case with Offsets

The predicted GHG emissions per year for the with adoption of best practice mitigation measures and offsets as described in **Section 10.6** is provided in **Table 10.4**. The mitigation measures will reduce Scope 1 emissions by an estimated 1,291,230 t $CO_2$-e over the remaining life of the project. The mitigation measures would result in a small increase in Scope 2 emissions of 282,801 t $CO_2$-e over the remaining life of the project as the haulage fleet would be electrified, leading to a decrease in diesel emissions but an increase in electricity consumption.

**Table 10.4 Predicted GHG Emissions per Year – Best Practice with Offsets**

| Year | Scope 1 (Fuel) | Scope 1 (Rail) | Scope 1 (Land Clearing) | Offsets | Sum Scope 1 | Scope 2 | Scope 3 | Total |
|---|---|---|---|---|---|---|---|---|
| **2024** | 88,094 | 29,959 | 0 | | 118,053 | 265,000 | 12,184,227 | 12,567,280 |
| **2025** | 88,086 | 29,959 | 0 | | 118,045 | 249,100 | 12,184,002 | 12,551,147 |
| **2026** | 88,086 | 29,959 | 0 | | 118,045 | 233,200 | 12,178,379 | 12,529,624 |
| **2027** | 85,429 | 29,959 | 23,191 | | 138,579 | 181,618 | 12,177,062 | 12,497,259 |
| **2028** | 82,773 | 29,959 | 30,921 | | 143,653 | 156,118 | 12,170,652 | 12,470,423 |
| **2029** | 80,115 | 29,959 | 30,921 | | 140,995 | 146,478 | 12,169,907 | 12,457,380 |
| **2030** | 74,801 | 29,959 | 30,921 | | 135,681 | 99,153 | 12,168,012 | 12,402,846 |
| **2031** | 72,144 | 0 | 30,921 | | 103,065 | 99,903 | 12,154,434 | 12,357,402 |
| **2032** | 69,488 | 0 | 23,191 | | 92,679 | 89,470 | 12,153,647 | 12,335,796 |
| **2033** | 58,858 | 0 | 18,553 | | 77,411 | 86,380 | 12,151,062 | 12,314,853 |
| **2034** | 56,201 | 0 | 7,730 | | 63,931 | 87,006 | 12,150,436 | 12,301,373 |
| **2035** | 53,544 | 0 | 7,730 | | 61,274 | 81,789 | 12,149,729 | 12,292,792 |
| **2036** | 50,888 | 0 | 7,730 | | 58,618 | 82,373 | 12,149,103 | 12,290,094 |
| **2037** | 48,230 | 0 | 7,730 | | 55,960 | 82,956 | 12,148,477 | 12,287,393 |
| **2038** | 40,259 | 0 | 7,730 | | 47,989 | 84,708 | 12,146,599 | 12,279,296 |
| **2039** | 37,602 | 0 | 8,039 | | 45,641 | 85,292 | 12,145,973 | 12,276,906 |
| **2040** | 34,946 | 0 | 0 | | 34,946 | 85,875 | 12,145,347 | 12,266,168 |
| **2041** | 32,288 | 0 | 0 | | 32,288 | 86,459 | 12,144,721 | 12,263,468 |
| **2042** | 29,631 | 0 | 0 | | 29,631 | 87,043 | 12,144,094 | 12,260,768 |
| **2043** | 21,660 | 0 | 0 | | 21,660 | 88,794 | 12,142,216 | 12,252,670 |
| **2044** | 19,004 | 0 | 0 | | 19,004 | 89,378 | 12,141,590 | 12,249,972 |
| **2045** | 16,346 | 0 | 0 | | 16,346 | 89,962 | 12,140,964 | 12,247,272 |
| **2046** | 13,689 | 0 | 0 | | 13,689 | 90,545 | 12,140,338 | 12,244,572 |
| **2047** | 13,689 | 0 | 0 | | 13,689 | 90,545 | 12,140,338 | 12,244,572 |
| **2048** | 11,033 | 0 | 0 | | 11,033 | 91,129 | 12,147,778 | 12,249,940 |
| **2049** | 11,031 | 0 | 0 | | 11,031 | 91,129 | 12,155,844 | 12,258,004 |
| **2050** | 8,374 | 0 | 0 | 8,374 | 0 | 91,713 | 12,163,284 | 12,254,997 |
| **2051** | 8,374 | 0 | 0 | 8,374 | 0 | 91,713 | 12,171,350 | 12,263,063 |
| **2052** | 8,376 | 0 | 0 | 8,376 | 0 | 91,713 | 12,179,416 | 12,271,129 |
| **2053** | 5,359 | 0 | 0 | 5,359 | 0 | 8,179 | 1,227,617 | 1,235,796 |
| **TOTAL** | **1,308,398** | **209,713** | **235,308** | **30,483** | **1,722,936** | **3,284,721** | **353,766,598** | **358,774,255** |

## 10.7.2 Proposed Amendment – Influence on GHG Emissions

The influence on GHG emissions due to the proposed amendment have been estimated. The predicted peak annual emissions for the Combined Proposal were compared to reported NGER emissions for current operations from the last five years (**Table 10.5**).

The predicted peak annual Scope 1 (NGER) emissions are not expected to change compared to the highest reported data from the last five years of operations. The Scope 2 emissions for the Combined Proposal are predicted to be approximately 142,300 t $CO_2$-e per annum lower than the highest reported data from the last five years of operations. The predicted Scope 2 emissions are comparable to the average reported data from the last two years (270,000 t $CO_2$-e per annum for 2023 and 260,000 t $CO_2$-e per annum for 2024).

The Proposal will not substantially change the Scope 1 or Scope 2 peak annual emissions compared to the current KIOP operations. However, the mitigation measures that will be regulated due to the assessment of the proposed amendment will reduce Scope 1 emissions by an estimated 1,291,230 t $CO_2$-e over the remaining life of the project.

**Table 10.5 Predicted Peak Annual Combined GHG Emissions (NGER Scope Definition)**

| GHG Emissions (t $CO_2$-e per annum) | Current Operations (NGERS reported annual data, last five years from 2019-2020 to 2023-24) | Proposed Change | Combined Proposal |
|---|---|---|---|
| **Scope 1** (on site fuel use only, excludes land clearing and off-site transport, not reported as Scope 1 under NGERS) | Average: 79,657<br>Maximum: 88,098 | <100 compared to maximum | 88,094 |
| **Scope 2** | Average: 332,543<br>Maximum: 407,302 | Decrease by 142,300 compared to maximum | 265,000 |

## 10.7.3 Benchmarking

The best practice Scope 1 GHG emissions intensity for the Proposal have been calculated and benchmarked against the Safeguard Mechanism emissions intensity values and other Western Australian iron ore proposals, where relevant information could be sourced.

The *Safeguard Mechanism: Prescribed production variables and default emissions intensities* (DCCEEW, 2024b) (Safeguard Mechanism Document) defines the emissions intensity constituents for iron ore:

- The production variable is tonnes of run-of-mine (ROM) ore (wet basis) that is suitable for, or has been through, primary crushing, but has not been through beneficiation or concentrating.
- The Scope 1 GHG emissions from drilling, blasting, mining, separate or ore from waste, and transport within the facility are included.
- The emissions from on-site electricity generation and processes that do not occur within the facility are excluded.
- The default and best practice emissions intensities are published in the Safeguard Mechanism Document and included in **Table 10.6**.

The emissions intensity was calculated for the KIOP MLE Proposal (period 2024–2053, to match the predicted emissions in the GHG Management Plan). Publicly available data was also used to calculate the emissions intensity for other magnetite proposals. The calculated emissions intensities and key data are provided in **Table 10.6**. The table also includes the default and best practice emissions intensity for iron ore mines published in the Safeguard Mechanism Document, and the published emissions-intensity determinations for a selection of operating iron ore mines in WA.

**Table 10.6 Scope 1 GHG Emissions Intensity Benchmarking**

| Proposal (year of data) | Life of Proposal (years) | Included Scope 1 GHG Emissions (t $CO_2$-e total) | ROM ore (t total over life of proposal) | Emissions Intensity (t $CO_2$-e per tonne of ROM ore) |
|---|---|---|---|---|
| **Safeguard Mechanism – iron ore – default (2024)[1]** | | | | 0.00476 |
| **Safeguard Mechanism – iron ore – best practice (2024)[1]** | | | | 0.00188 |
| **Safeguard Determination – Hope Downs 1 (2024)[2]** | | | | 0.00507 |
| **Safeguard Determination – Koolyanobbing Iron Ore Operations (2024)[2]** | | | | 0.01339 |
| **Safeguard Determination – Roy Hill Mine (2024)[2]** | | | | 0.00357 |
| **Yogi Magnetite Project (2022)[3]** | 21 | 1,688,066 | 388,500,000 | 0.00435 |
| **Southdown Magnetite (2023)[4]** | 28 | 2,983,424 | 1,260,000,000 | 0.00237 |
| **KIOP MLE Proposal (Scope 1 best practice with offsets)** | 29 (period of predicted GHG emissions) | 1,308,398 | 580,000,000 | 0.00226 |

Sources:

[1] *Safeguard Mechanism: Prescribed production variables and default emissions intensities* (DCCEEW, 2024b)

[2] Safeguard Emissions-intensity determination data: https://cer.gov.au/markets/reports-and-data/safeguard-data/emissions-intensity-determination-data

[3] Yogi Magnetite Project Environmental Review Document – Appendix B-6 Material Characterisation Assessment (total ore tonnes) and Appendix I GHG Management Plan (Scope 1 emissions for mining ore and waste rock movement), excludes on site electricity generation: https://www.epa.wa.gov.au/proposals/yogi-magnetite-project

[4] Southdown Magnetite Project Referral – Proposal Content Document (ore mining rate and life of mine) and Supporting Document (Scope 1 emissions for operations, comprising diesel consumption, excludes electricity generation): https://www.epa.wa.gov.au/proposals/southdown-magnetite-project

The emissions intensity of the KIOP MLE Proposal (Scope 1 best practice with offsets) is better than the Safeguard Mechanism default emissions intensity, the Safeguard Mechanism Determination for Hope Downs 1, Koolyanobbing and Roy Hill, and the predicted emissions for Yogi Magnetite Project and Southdown Magnetite.

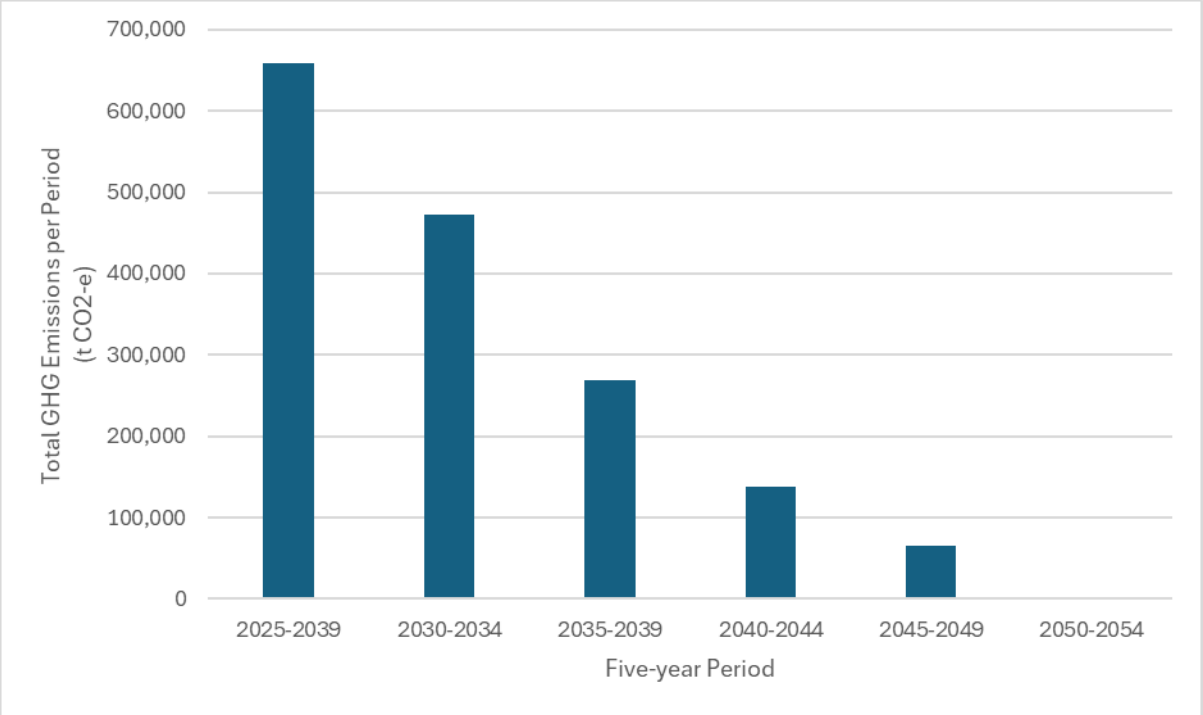
### 10.7.4 Targets and Trajectories

The target GHG emissions (peak annual and total per period) for five-year cycles and trajectories of emissions for the remaining life of mine are presented in this section.

The EPA Scope 1 GHG emissions targets (**Table 10.7**) and trajectory (**Graph 10.1**) will decrease along a linear trajectory for the remaining life of mine, reaching net zero by 2050.

**Table 10.7 EPA Scope 1 GHG Emissions Targets per Five-year Cycle**

| Five-year Period | Peak Annual GHG Emissions (fuel) | Peak Annual GHG Emissions (rail) | Peak Annual GHG Emissions (land clearing) | EPA Scope 1 Peak Annual GHG Emissions | Total GHG Emissions Per Period |
|---|---|---|---|---|---|
| | (t CO2-e per annum) | (t CO2-e per annum) | (t CO2-e per annum) | (t CO2-e per annum) | (t CO2-e) |
| **2024** | 88,094 | 29,959 | 0 | 118,054 | 118,054 |
| **2025–2029** | 88,086 | 29,959 | 30,921 | 148,966 | 659,317 |
| **2030–2034** | 74,801 | 29,959 | 30,921 | 135,681 | 472,766 |
| **2035–2039** | 53,544 | 0 | 8,039 | 61,584 | 269,484 |
| **2040–2044** | 34,946 | 0 | 0 | 34,946 | 137,528 |
| **2045–2049** | 16,346 | 0 | 0 | 16,346 | 65,787 |
| **2050–2054** | 0 | 0 | 0 | 0 | 0 |
| | | | | **TOTAL** | **1,722,936** |

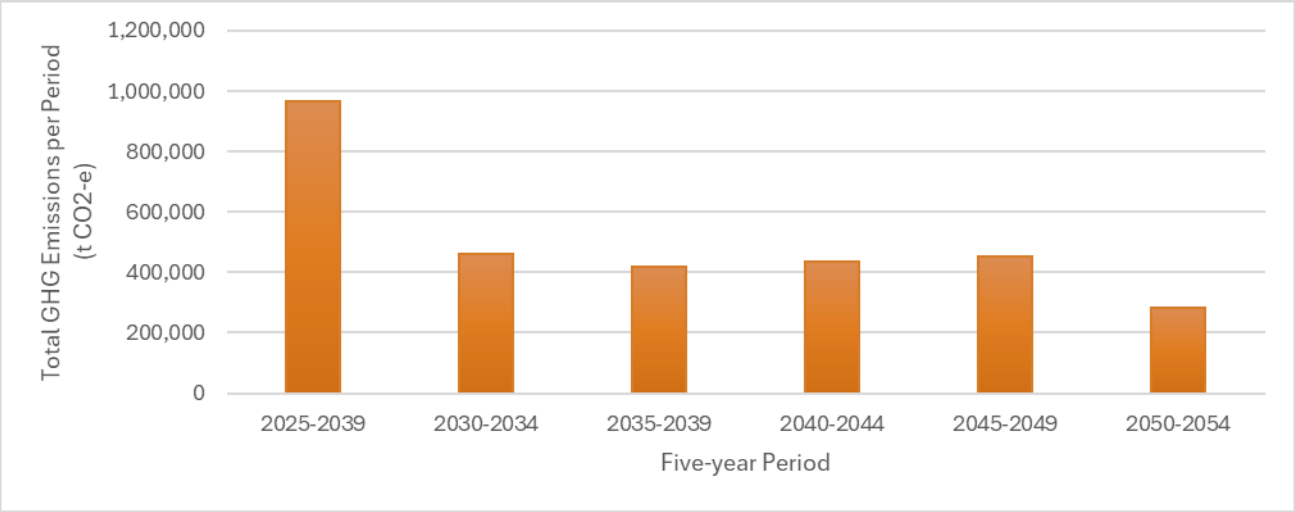



**Graph 10.1 EPA Scope 1 GHG Emissions Trajectory – Total Emissions per Five-year Cycle**

The EPA Scope 2 GHG emissions target (**Table 10.8**) and trajectory (**Graph 10.2**) will reduce substantially in approximately 2030 but then are expected to plateau.

**Table 10.8 EPA Scope 2 GHG Emissions Target per Five-year Cycle**

| Five-year Period | Peak Annual GHG Emissions (fuel) (t $CO_2$-e per annum) | Total GHG Emissions Per Period (t $CO_2$-e) |
|---|---|---|
| **2024** | 265,000 | 265,000 |
| **2025–2029** | 249,100 | 966,514 |
| **2030–2034** | 99,903 | 461,912 |
| **2035–2039** | 85,292 | 417,117 |
| **2040–2044** | 89,378 | 437,549 |
| **2045–2049** | 91,129 | 453,311 |
| **2050–2054** | 91,713 | 283,318 |
| | **TOTAL** | **3,284,721** |

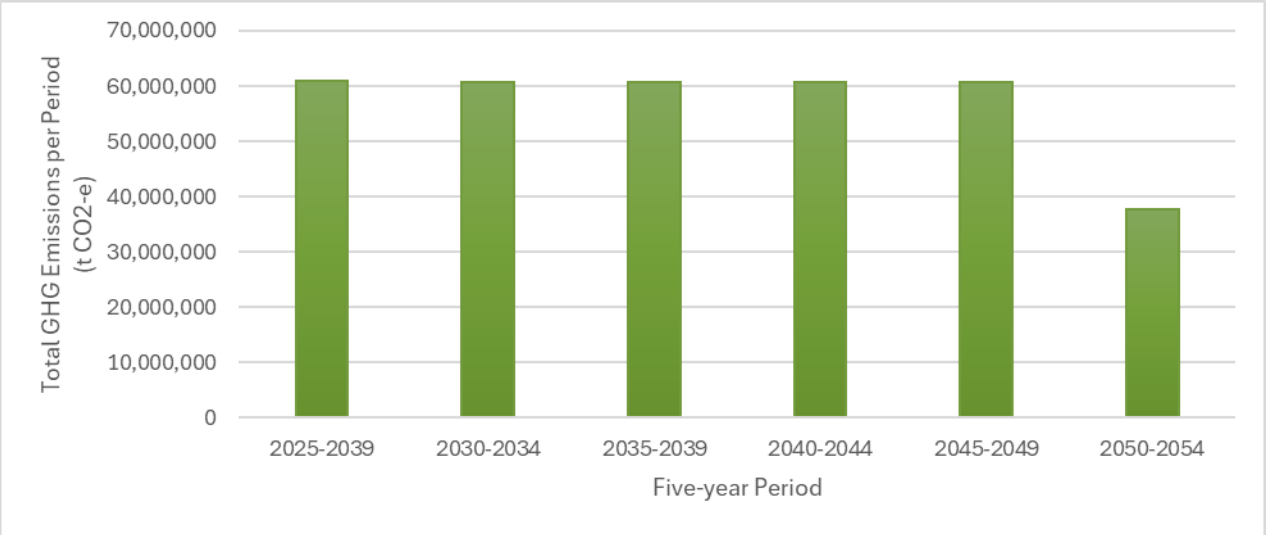



**Graph 10.2 EPA Scope 2 GHG Emissions Trajectory – Total Emissions per Five-year Cycle**

The EPA Scope 3 GHG emissions target (**Table 10.9**) and trajectory (**Graph 10.3**) are expected to remain relatively consistent over the life of the project, as the main source of emissions is production of steel from iron ore.

**Table 10.9 EPA Scope 3 GHG Emissions Target per Five-year Cycle**

| Five-year Period | Peak Annual GHG Emissions (fuel) (t $CO_2$-e per annum) | Total GHG Emissions Per Period (t $CO_2$-e) |
|---|---|---|
| **2024** | 12,184,227 | 12,184,227 |
| **2025–2029** | 12,184,002 | 60,880,002 |
| **2030–2034** | 12,168,012 | 60,777,591 |
| **2035–2039** | 12,149,729 | 60,739,881 |
| **2040–2044** | 12,145,347 | 60,717,968 |
| **2045–2049** | 12,155,844 | 60,725,262 |
| **2050–2054** | 12,179,416 | 37,741,666 |
| | **TOTAL** | **353,766,597** |




**Graph 10.3 EPA Scope 3 GHG Emissions Trajectory – Total Emissions per Five-year Cycle**

## 10.8 Environmental Outcomes

**Table 10.10** details the proposed outcomes and outcomes-based conditions for GHG emissions, how outcomes can be assured, and proposed monitoring of outcomes.

The Proposal is a significant amendment to MS 805. MS 805 does not include any conditions or limits on GHG emissions. It is recommended that the conditions in MS 805 should be reviewed to include relevant outcomes-based conditions relating to GHG emissions.

**Table 10.10 Proposed Outcomes for GHG Emissions**

| Proposed Outcome | Is Proposed Outcome Consistent with EPA Objectives | How Proposed Outcome can be Assured | Proposed Outcome-based Condition | Proposed Monitoring of Outcomes |
|---|---|---|---|---|
| **Net zero Scope 1 GHG emissions from KIOP by 2050** | Yes – Scope 1 emissions are predicted to reduce to net zero by 2050 (with offsets from 2050) along a linear trajectory | Outcome-based condition | Net Scope 1 GHG emissions per five-year cycle shall not exceed the total values as provided in **Table 10.7** | Predicted Scope 1 emissions considered by EPA are largely NGER-covered Scope 1 emissions. KML reports NGER-covered Scope 1 emissions annually and this data is made publicly available on the Commonwealth Clean Energy Regulator website |

# 11.0 Social Surroundings

## 11.1 Social Surroundings Summary

The Aboriginal Cultural Heritage Inquiry System (ACHIS) was searched in July 2025 and identified 19 registered and 108 lodged Aboriginal heritage sites within 3 km of the Project. Of relevance to the Proposal, there are nine registered and 39 lodged Aboriginal heritage sites within the Combined Proposal DE.

To date, Aboriginal cultural heritage surveys have been completed over 24,752.9 ha, which encompass 59% of the Combined Proposal DE and 97% of the KIOP MLE mitigated DF. The most recent survey predominantly targeted locations proposed for disturbance, including proposed waste WRD and TSF expansion areas. Seven newly identified Aboriginal heritage sites have been recorded in the Combined Proposal DE (Horizon Heritage Management, 2020).

One of the registered sites within the Combined Proposal DE, Haul Road Stone Arrangement (DPLH ID 26059), will be avoided completely. The Combined Proposal DF has been designed to avoid impact to six of the newly identified Aboriginal heritage sites.

Eight registered sites identified within the Combined Proposal DE are within the Combined Proposal DF. KML holds section 18 consents for disturbance of these registered sites. Seven of these registered sites are within the KIOP and MIOP approved disturbance footprints. One additional registered site will be impacted by the proposed MLE disturbance footprint. One newly identified Aboriginal heritage site (Karara South CMT) is located within the proposed MLE disturbance footprint. This site is a culturally modified tree that will be salvaged and relocated at the request of the Widi Mob Traditional Owners.

Potential impacts to Aboriginal heritage are managed via existing section 18 consents, the Karara Mining Limited Aboriginal Heritage Management Plan (KML, 2025a) and the KML Approvals Request and Ground Disturbance Procedure (CORP-EN-PRO-1004).

## 11.2 EPA Objective

The EPA objective for social surroundings is *'To protect social surroundings from significant harm'* (EPA, 2023a).

For social surroundings to be considered in an environmental impact assessment under the EP Act, there must be a clear direct link between a Proposal's impact on the physical or biological environment, and the subsequent effect on social surroundings. Furthermore, for the EPA to consider social surroundings as a key factor, there must be a significant effect on social surroundings.

Social surroundings include aesthetic, cultural, economic and other social surroundings. Aboriginal cultural heritage is part of social surroundings.

## 11.3 Policy and Guidance

Commonwealth and State laws and regulations relevant to the consideration of social surroundings include:

- *Native Title Act 1993* (Cth)
- *Aboriginal Torres Strait Islander Heritage Protection Act 1984* (Cth)
- *Environment Protection and Biodiversity Conservation Act* (Cth) (EPBC Act)
- *Aboriginal Heritage Act 1972* (WA) (AHA)
- Aboriginal Heritage Regulations 1974 (WA)
- *Heritage Act 2018* (WA).

Guidelines relevant to the consideration of social surroundings are detailed in **Table 11.1** below.

**Table 11.1 Policy and Guidance Relevant to Social Surroundings**

| Policy / Guidance | How Policy / Guidance has Been Considered |
|---|---|
| *Environmental Factor Guideline: Social Surroundings* (EPA 2023a) | The factor guideline has been considered throughout the development of the ERD, including during consultations with Traditional Owners and survey investigations undertaken to date, as well as the assessment of potential impacts and development of associated mitigation measures.<br>Information specified by the factor guideline has been presented in this section on social surroundings. |
| *Technical Guidance: Environmental impact assessment of Social Surroundings – Aboriginal cultural heritage* (EPA, 2023c) | Has been considered during the planning and design of relevant surveys and investigations, as well as all consultation undertaken to date for the Proposal. |
| *Aboriginal Heritage Act 1972 Guidelines* (DPLH, 2023a) | Considered in the determination of whether consent is required for Proposal activities that might impact Aboriginal heritage sites. |
| *Consultation policy for section 18 applications* (DPLH, 2023c) | Considered in the assessment of whether Proposal activities are likely to harm Aboriginal cultural heritage, how meaningful consultation and engagement with Traditional Owners should be conducted, and whether section 18 consents under the AHA would be required. |
| *Engage Early Guidance for proponents on best practice Indigenous engagement for environmental assessments under the EPBC Act* (Department of the Environment, 2015) | Considered as guidance during engagement with Traditional Owners. |

## 11.4 Supporting Studies

### 11.4.1 Consultation with Traditional Owners

The Proposal is located within the greater Mid-West region, on the traditional lands of native title rights holders the Yamatji Nation (WCD2020/001). The Yamatji Nation are made up of the Yamatji Nation, Southern Yamatji, Hutt River, Mullewa Wadjari and Widi Mob native title claimant groups.

The Combined Proposal DE is predominantly covered by the Yamatji Nation Indigenous Land Use Agreement (Yamatji Nation ILUA), which recognises the Yamatji Nation's traditional connection to the land and waters within the 48,000 km$^2$ agreement area, as well as native title rights and interests which exist in parts of the Yamatji Nation ILUA area. A small section of the Combined Proposal DE is located outside of the Yamatji Nation ILUA, at the eastern-most extent of the DE (**Figure 11.1**). No Native Title rights exist at this location.

KML and heritage consultants have used the National Native Title Tribunal Registers, as well as nominations from Traditional Owner groups to identify Traditional Owners and Aboriginal knowledge holders at the Proposal. In order to meet its commitment to Aboriginal Heritage, KML has primarily sought input from representatives of the Widi Mob Native Title claimants for the majority of the Combined Proposal DE, given their non-exclusive rights under the Yamatji Nation ILUA. KML has also consulted with representatives of the Binyardi and Badimia peoples Native Title claimants, who despite not possessing active native title rights still maintain their right to consultation under the AHA.

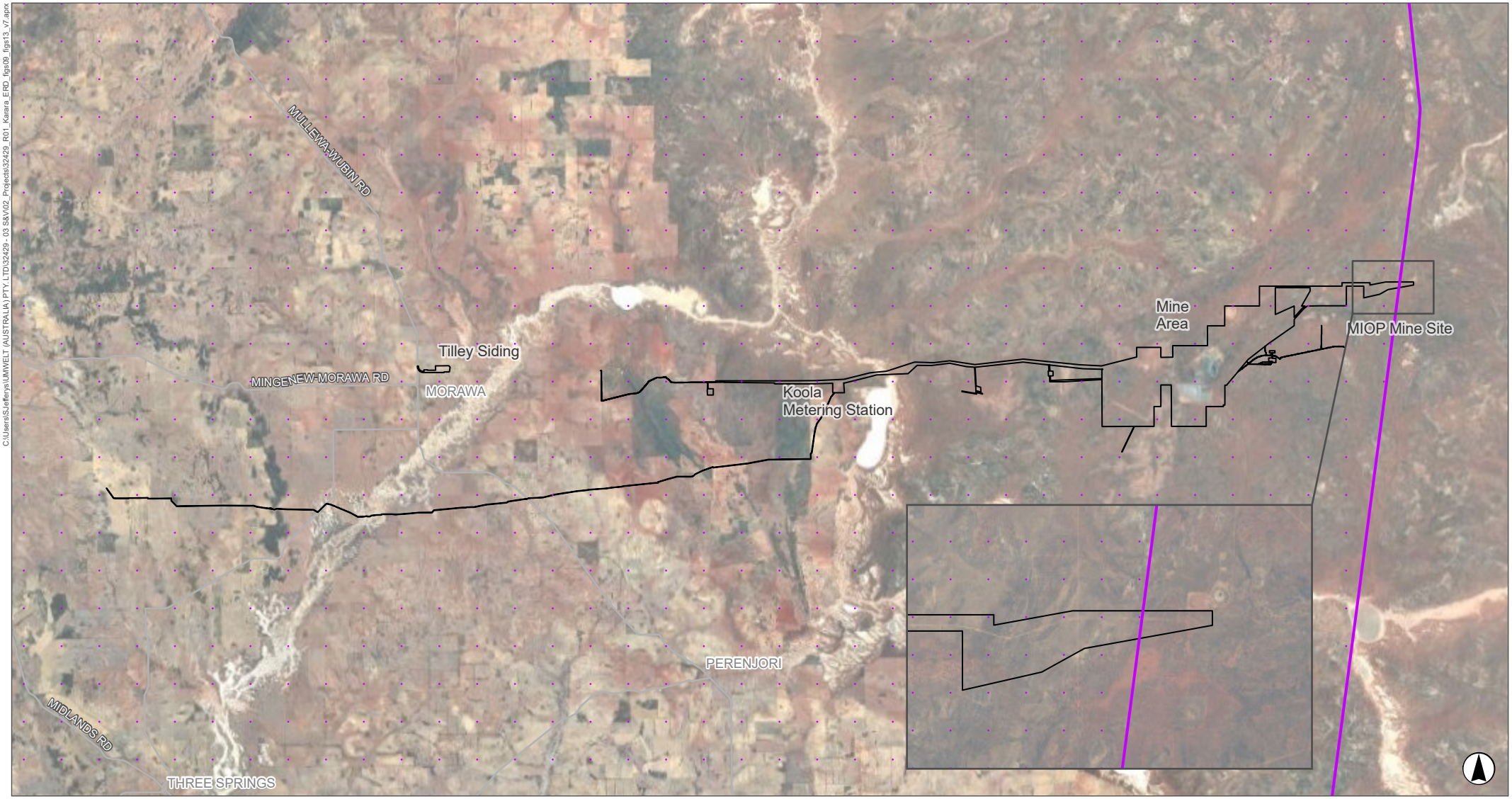
Consultations between KML and the Yamatji Nation have sought to identify any heritage concerns arising from discussions with the Yamatji Nation claimant groups. These were often raised during fieldwork and surveys for the Project, where Traditional Owners were invited to express any concerns about the Project, provide information on areas investigated by Heritage consultants, and discuss any identified archaeological or ethnographic values. Concerns raised during field surveys were recorded by heritage consultants and included comments on survey methods and any identified heritage places, as well as discussions on suitable mitigation strategies and recommendations for heritage management of these sites. Outcomes of the heritage research were regularly provided to Traditional Owners for review prior to dissemination of results to KML, ensuring culturally sensitive information is appropriately indicated, and the recommendations discussed amongst the heritage team are made in accordance with the Traditional Owners' suggestions.

Throughout development of the Proposal KML has provided regular updates to the Yamatiji Southern Regional Corporation (YSRC), the regional entity responsible for the management of the Yamatji Nation ILUA. These updates have typically been provided biannually over the past few years and have included status updates on both current operations at the KIOP as well as on development of the Proposal, identified needs for surveys for potential impacts to Aboriginal heritage, and other associated heritage matters (refer to **Section 3.0**).

During engagement activities and other interactions undertaken for the Proposal, the Yamatji Nation have indicated that all identified Aboriginal heritage places, regardless of their significance, require protection through registration under the AHA and avoidance from impact by developers, as they are evidence of their connection to country and to do otherwise would undermine their role as custodians of the land (Horizon Heritage Management, 2020). Where possible, KML has ensured the Proposal avoids impacts to Aboriginal heritage (refer **Section 11.7**).

Specific concerns raised by the Yamatji Nation during both historic consultations and for the Proposal include:

- Direct and indirect disturbance to the registered Aboriginal places such as Mount Karara, Mongers Lake Waterway, Koolanooka Hills, Lizard Granites, and other places with cultural significance.
- Impacts to the cultural significance linked to the intrinsic association between water sources (i.e. gnamma holes) and granite features (i.e. grinding and artefact scatters). This connection has resulted from the travel of Traditional Owner ancestors through the landscape, which was largely dictated by water availability. This association has resulted in a higher concentration of heritage sites near water sources, which typically historically display more intensive occupation by Traditional Owners.
- Impacts to flora and fauna species of cultural significance, such as Malleefowl (*Leipoa ocellata*), echidna (*Tachyglossus aculeatus*) and their environment (i.e. Malleefowl nests), where these impacts affect the ongoing significance of these resources in traditional and contemporary life.
- Site disturbance impacting not only heritage value but also the integrity of the immediate cultural landscape. Aboriginal heritage sites identified during surveys undertaken for the Proposal equate to tangible evidence of Traditional Owner ancestors using resources found on their traditional lands, caring for Country, and passing on information specific to the location and resource to future generations. During a recent Aboriginal heritage survey for the Proposal, a Widi Mob Traditional Owner Elder stated, '*Karara* (KML) *have to respect the purpose for which we have identified these sites as being relevant culturally, historically and traditionally and then make every effort not to damage them*.'
- Site disturbance resulting in detrimental health and wellbeing impacts on Traditional Owners that identify with the area and impacts to Aboriginal sites should be limited to the practical extent possible if impacted at all.
- Existing infrastructure within the region has already disturbed the essence of the land surrounding the Project, and KML should prioritise using existing historical exploration drill lines, tracks and pastoral tracks for access in the proposed expansion areas.
- Ochre sources located within the wider area are important for ceremonial practice and a valuable resource requiring protection.

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Scale: 1:500,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Main Road
- Yamatji Nation Agreement

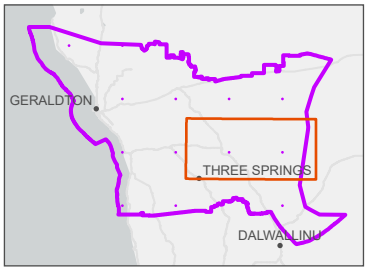


**FIGURE 11.1**

Yamatji Nation ILUA Coverage over the Proposal Area

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**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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### 11.4.2 Heritage Studies Undertaken

Numerous heritage surveys have been completed over the Project since its inception. The most recent study, targeting the KIOP MLE, was undertaken in 2020 by Horizon Heritage Management. Surveys for Aboriginal heritage have varied across different stages or locations or proposals, and have included reconnaissance, ethnographic and archaeological assessments, work area clearances, site avoidance and site identification surveys, all conducted in accordance with requirements of the Department of Planning, Lands and Heritage (DPLH) (formerly the Department of Aboriginal Affairs (DAA)). KML has always tried to avoid Aboriginal heritage sites were possible, however where disturbance was required, consent was sought and received under section 18 of the AHA to disturb these sites.

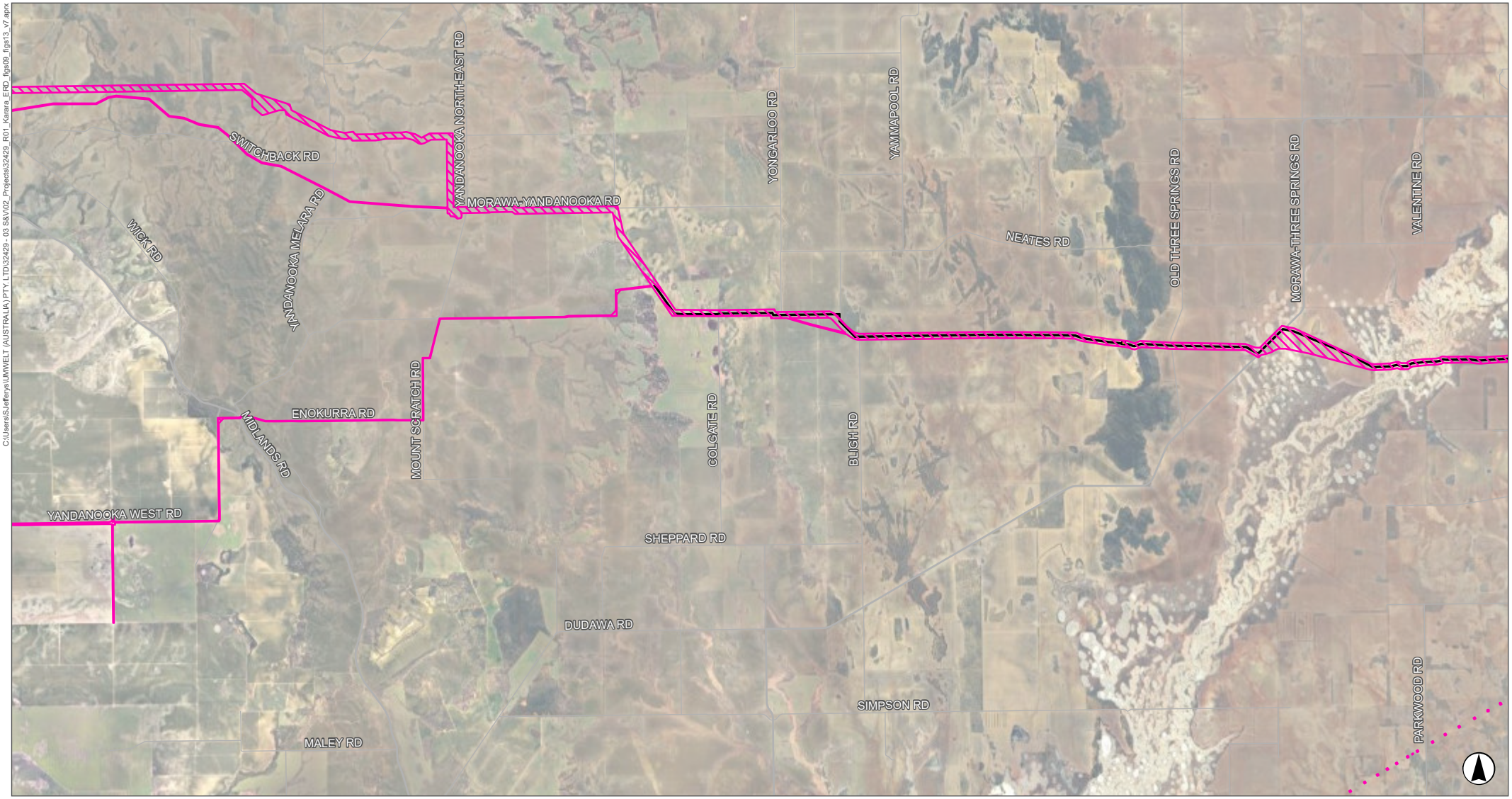
To date, Aboriginal cultural heritage surveys have been completed over 24,752.9 ha. The surveys encompass 7,953 ha (59%) of the Combined Proposal DE and 1,148 ha (97%) of the KIOP MLE mitigated DF. **Figure 11.2** shows the total survey coverage of the Combined Proposal DE by Karara heritage surveys, while **Figure 11.3** and **Table 11.1** detail survey reports of relevance to the assessment of Aboriginal Heritage at the Proposal.

Previous heritage surveys undertaken for the Proposal are extensive and have identified a large number of previously recorded archaeological sites in KML tenements, with most sites in the area identified as artefact scatters, gnamma holes, and granites generally focused on water availability. Given the size of the Combined Proposal DE, there are areas in which surveys have not been completed. Studies and surveys that have been completed over the Combined Proposal DE to 2013 have been included in **Appendix 11-1**. Numerous older Aboriginal Heritage reports exist, however prior to 2003 these were written according to outdated standards and are therefore not included in **Appendix 11-1**. Due to the broad scope of the development (both functionally and geographically) at the Project, an Aboriginal Heritage Management Plan (AHMP) has been implemented for the Combined Proposal DE (**Appendix 11-2**).

Aboriginal heritage survey reporting assessed and included in the ERD has focused on investigations of defined development footprints for the KIOP and MIOP, as well as for specific infrastructure (i.e. proposed maintenance for the Syncline Turner haul road) and areas in which the Proposal expansion would occur (refer to **Section 1.0**).

Widi Mob have advised that these reports are all confidential, and therefore they have not been included in the ERD or released for public comment.

As noted above, the Proposal has largely been surveyed however 41% of the Combined Proposal DE and 3% of the KIOP MLE Proposal DF have not been covered by surveys of Aboriginal heritage. The most recent survey predominantly targeted locations proposed for disturbance, including proposed WRD and TSF extensions. Surveys for Aboriginal heritage for the Proposal have also identified an intrinsic association between water sources and Aboriginal heritage sites, and water sources have been targeted during surveys.

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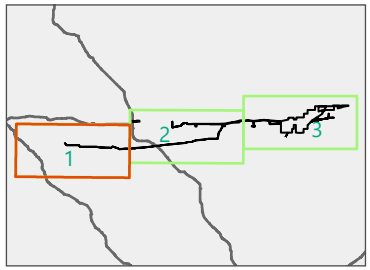
Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Karara Heritage Survey Areas
- Main Road
- Minor Road




# FIGURE 11.2

Aboriginal Heritage Survey Coverage over the Proposal Area – Sheet 1

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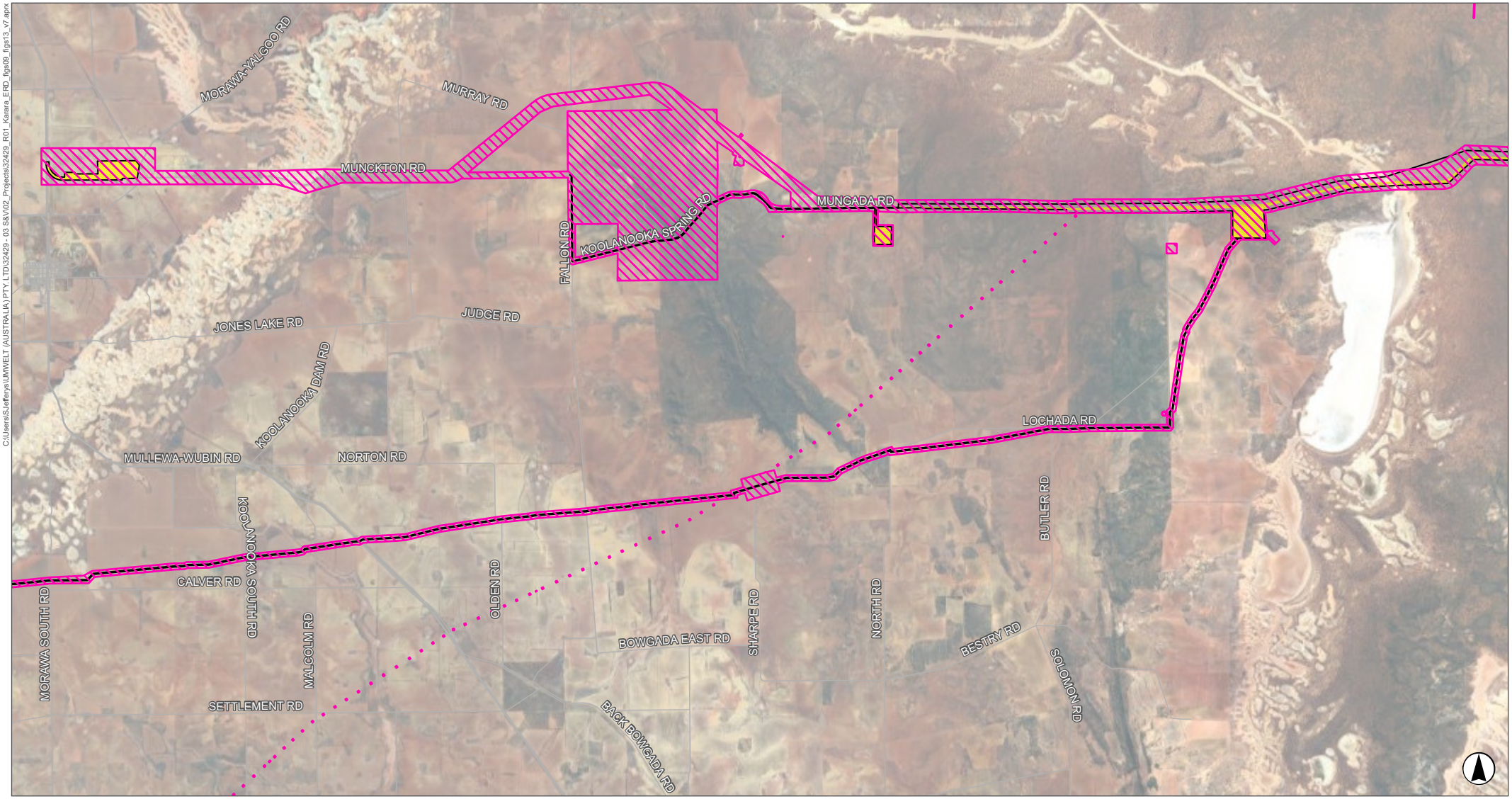
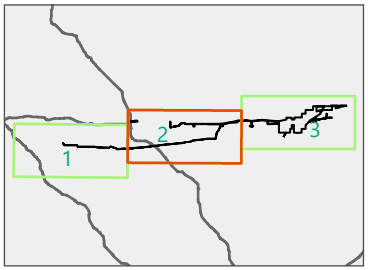



Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Karara Heritage Survey Areas
- Main Road
- Minor Road




# FIGURE 11.2

## Aboriginal Heritage Survey Coverage over the Proposal Area – Sheet 2

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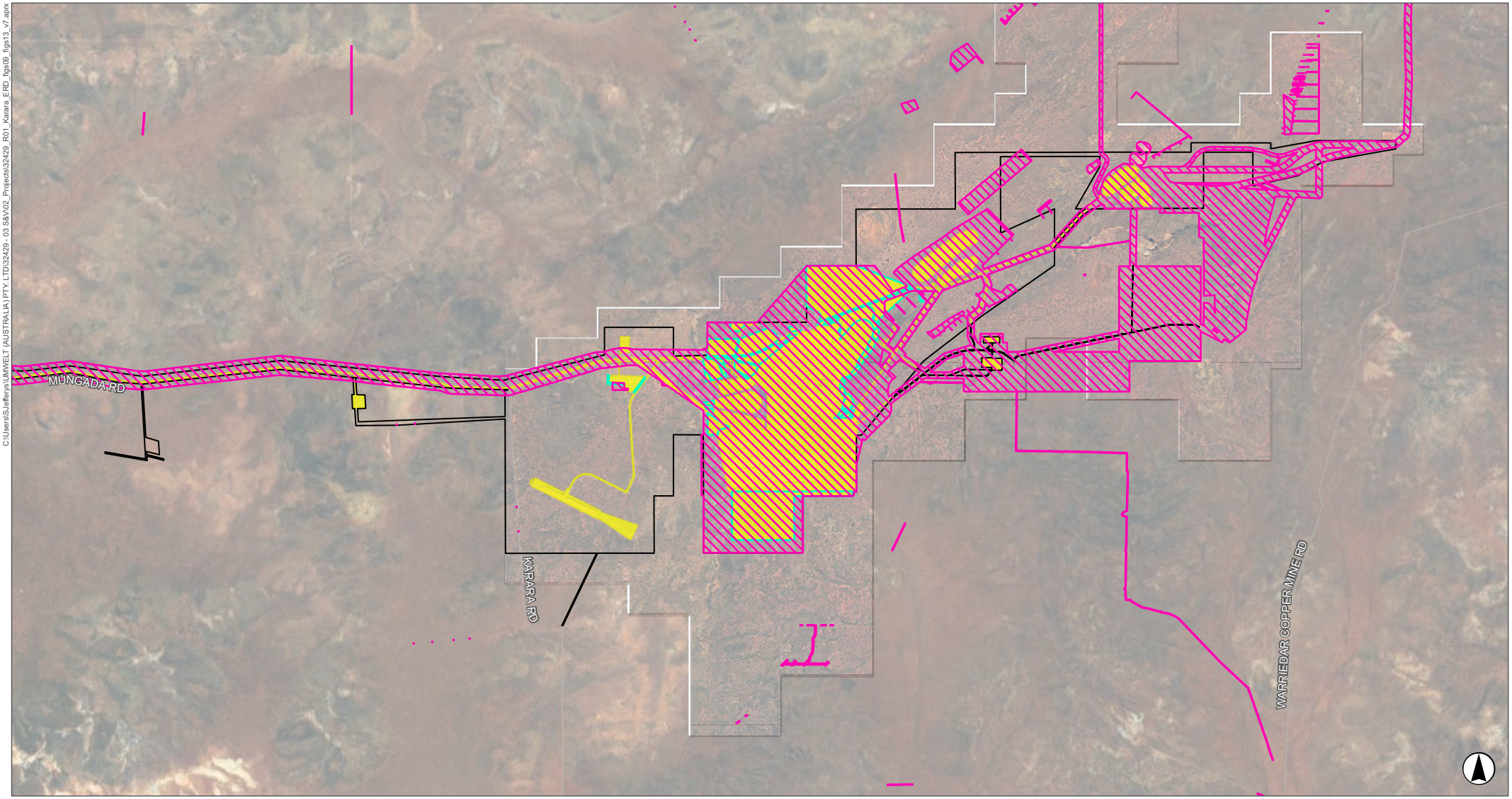


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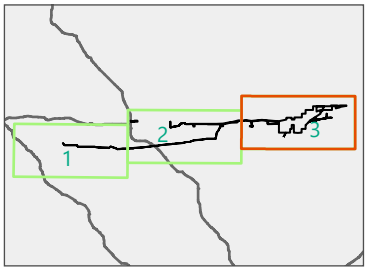
Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Karara Heritage Survey Areas
- Minor Road




# FIGURE 11.2

Aboriginal Heritage Survey Coverage over the Proposal Area – Sheet 3

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**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025)

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Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Main Road
- Minor Road

# FIGURE 11.3

## Aboriginal Heritage Survey Reports Relevant to the Proposal Area – Sheet 1

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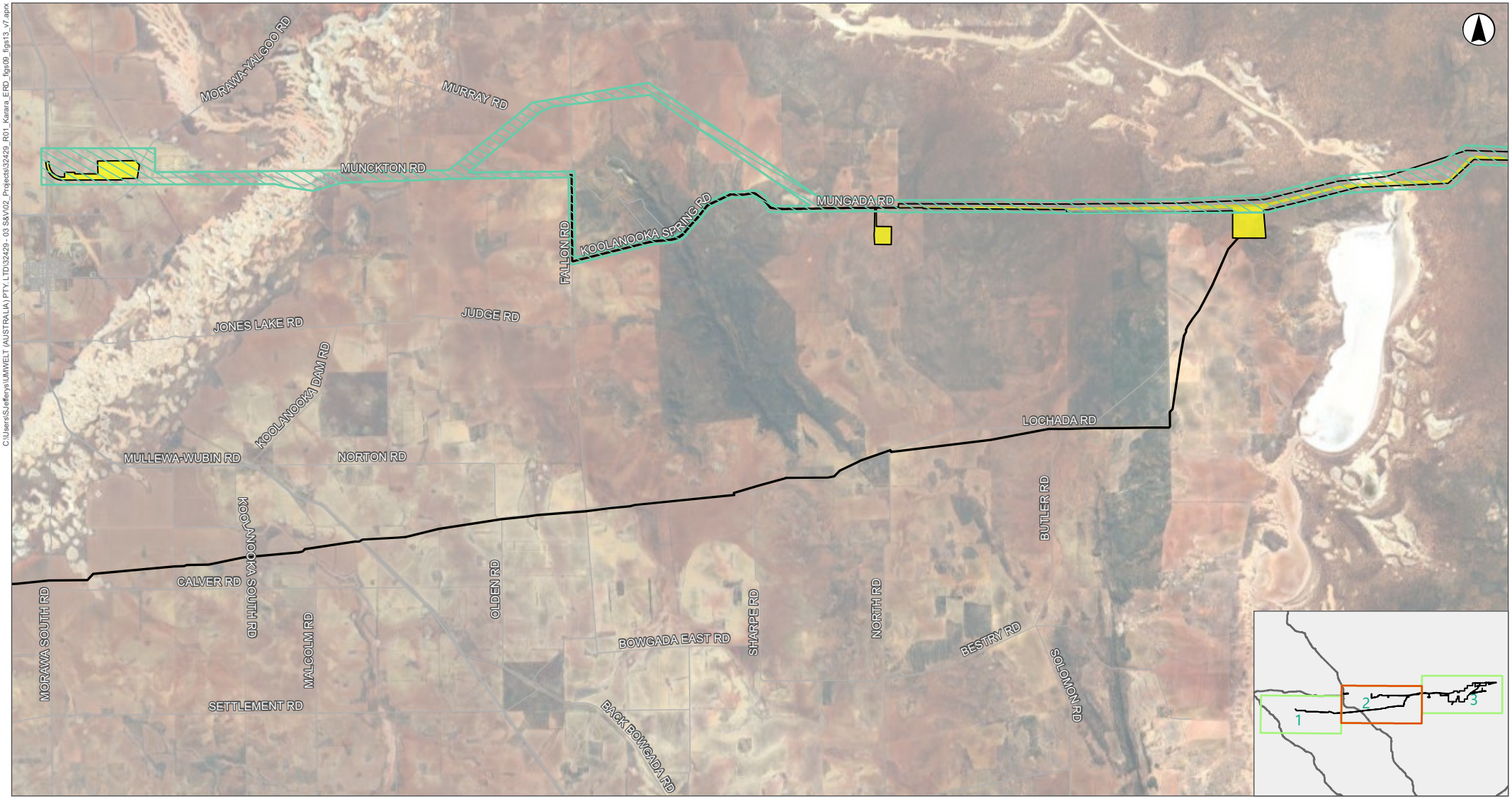
**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), DPLH (2025)




Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Main Road
- Minor Road

**Relevant Aboriginal Surveys**

- Site Identification and Work Area Clearance Heritage Survey Report of the Mungada Iron Ore Project at Karara, Western Australia

# FIGURE 11.3

## Aboriginal Heritage Survey Reports Relevant to the Proposal Area – Sheet 2

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**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), DPLH (2025)

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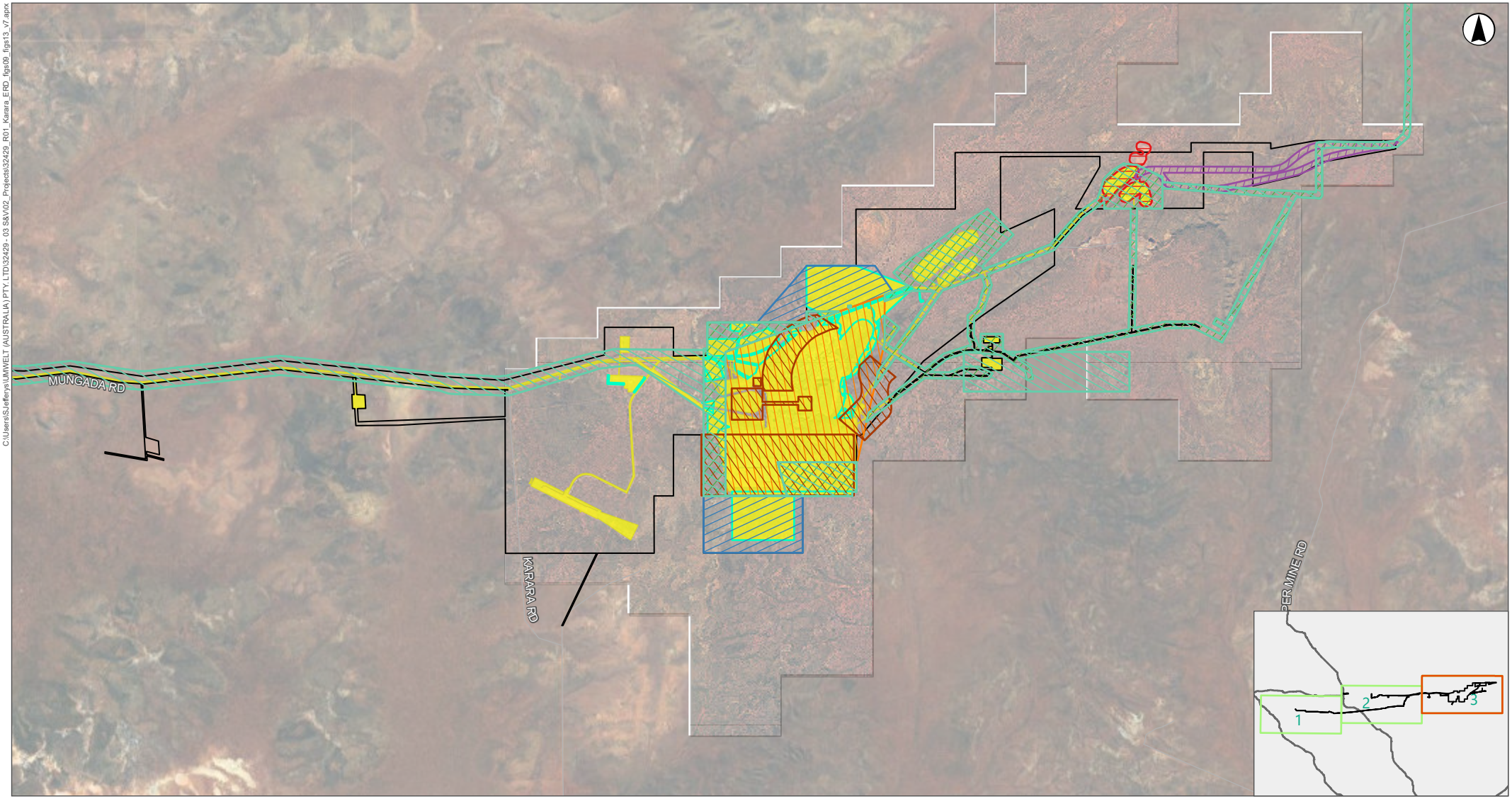


Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

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

**Relevant Aboriginal Surveys**

- A Section 18 Report of the Archaeological Surveys at Terapod, near Mt Karara, Western Australia
- Aboriginal Heritage Survey Report with the Widi Mob at the Karara Iron Ore Mine – Long Term Mine Planning survey areas, for Karara Mining Limited, Western Australia
- An Archaeological Survey Report of Karara Mining Ltd's Mungada Iron Ore Project at Mt Karara near Morawa, Western Australia
- Heritage Survey of the Shine Development Area and Haul Road
- Section 18 Report for Proposed Magnetite Mine and Infrastructure at Mt Karara, East of Morawa, Western Australia
- Site Identification Survey of the Proposed Gindalbie Metals Mt Karara Magnetite Project, Western Australia
- Site Identification and Work Area Clearance Heritage Survey Report of the Mungada Iron Ore Project at Karara, Western Australia

# FIGURE 11.3

## Aboriginal Heritage Survey Reports Relevant to the Proposal Area – Sheet 3

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**Table 11.2 Survey Reports Covering the Combined Proposal DE**

| Reference | Survey Timing | Survey Area | Survey Methods / Effort |
|---|---|---|---|
| **Site Identification Survey of the Proposed Gindalbie Metals Mt Karara Magnetite Project, Western Australia (AIC, 2006)** | August 2006 | Areas proposed for Project infrastructure: i.e. magnetite crusher, plant, tailings areas, WRDs (overburden storage areas) etc.<br>Some targeted surveys of landscape features (i.e. creeks and hills). | Desktop Survey<br>A search of the Department of Indigenous Affairs (DIA) Register of Aboriginal Sites database was conducted to identify the number and nature of sites known at the survey area.<br>Recorded sites were analysed to provide background to both the archaeological and ethnographic sites in the survey area as well as an indication of the nature and frequency of surveys under the Act.<br>Results of survey established the heritage context from which the potential impact of proposed works and the likelihood of identifying further sites or heritage issues may be assessed.<br>Ethnographic Survey<br>Areas proposed for Project infrastructure were walked by the survey team.<br>Proposed WRDs were viewed from nearby roads and hills.<br>Ethnographic sites were identified and discussed by Traditional Owners.<br>Elders drove around the entire magnetite and hematite project areas as an overview of previous surveys and proposed works.<br>Archaeological Survey<br>Vehicular survey and pedestrian transects of approximately 70% of the proposed infrastructure and approximately 30% of the proposed dump sites considered to provide a representative sample of the larger area that encompasses the proposed mining development.<br>Surveys targeted creeks and hills within the survey area as flat plains were generally found to be poor in terms of their archaeological potential. |
| **Section 18 Report for Proposed Magnetite Mine and Infrastructure at Mt Karara, East of Morawa, Western Australia (AIC, 2007)** | July 2007 & November 2007 | An Area of approx. 22,000 $m^2$ on Mining Tenements M59/644, M59/645, E59/817 and E59/1210, which covered the majority of infrastructure at the KIOP mine site. | Desktop Survey<br>Search of the DIA database and identification of registered sites to provide context for archaeological and ethnographic sites in the survey area, potential impacts of proposed works and likelihood of identifying further Aboriginal heritage.<br>Ethnographic Survey<br>Involved consultation with relevant TO groups (Widi Mob and Widi Binyardi) to identify individuals and groups that have a connection with and knowledge of the survey area<br>Consultation and field inspection of the survey area with relevant TO groups. |

| Reference | Survey Timing | Survey Area | Survey Methods / Effort |
|---|---|---|---|
| | | | Archaeological Survey<br>Involved pedestrian transects of locations proposed for Project infrastructure. Transects were selected to provide a targeted sample of the areas in question and included particular focus on areas with greater archaeological potential (gullies, soaks and ephemeral water sources).<br>Vehicular transects were used at areas inaccessible for pedestrian transects dependant on terrain. |
| **A Section 18 Report of the Archaeological Surveys at Terapod, near Mt Karara, Western Australia (DIA, 2009)** | January & February 2009 | The Terapod and Terapod West areas within the greater KIOP Project area. | Desktop Survey<br>A desktop survey of the DIA database was conducted prior to the commencement of the physical survey to inform the Survey Team of the location and nature of any previously recorded sites in, or in close proximity to the Survey Area.<br>Archaeological Survey<br>Involved in-situ field inspections via pedestrian transect surveys of the Terapod and Terapod West survey areas.<br>Included revisits to established sites to redefine site boundaries and sample present archaeological material. |
| **Site Identification and Work Area Clearance Heritage Survey Report of the Mungada Iron Ore Project at Karara, Western Australia (Volumes 1, 2, 3) (AIC, 2009a, 2009b, 2009c)** | October – December 2008 | The Mungada Iron Ore Project (MIOP) | Desktop Survey<br>Archival research consisting of a desktop review of the DIA database and previously recorded sites and surveys, as well as from other sources (i.e. survey reports) to establish a heritage context for the survey area.<br>Ethnographic Survey<br>Included the identification and pre-consultation with Aboriginal people and groups with a connection to, and knowledge of, the MIOP area.<br>Involved field inspections and ethnographic information collection via group discussion on country with survey participants.<br>Archaeological Survey<br>A systematic search and archaeological survey of the proposed MIOP area, inspected via pedestrian transects spaced approx. 50 m apart.<br>Interesting or high potential features (such as rocky outcrops and creek lines) were purposively investigated and areas considered more likely to contain sites were rigorously examined. |

| Reference | Survey Timing | Survey Area | Survey Methods / Effort |
|---|---|---|---|
| **An Archaeological Survey Report of Karara Mining Ltd.'s Mungada Iron Ore Project at Mt Karara near Morawa, Western Australia (DIA, 2009)** | July 2008 | Mungada Iron Ore Project (MIOP) corridors for roads and other infrastructure developments surrounding the KIOP mine site. | Desktop Survey<br>Archival research consisting of a desktop review of the DIA database.<br>Archaeological Survey<br>An archaeological survey with representatives from the Widi Binyardi and West Badimia People, including pedestrian and vehicular inspection of the survey area, including:<br>• Targeted searches of all ridge lines and potential ephemeral water sources.<br>• 100 m meter transects across flat wash areas and more open areas.<br>• Broad scale sampling, pedestrian or vehicular where feasible of areas identified as of low potential and/or extremely hard to access i.e. heavily vegetated ridgelines.<br>Any sites identified were recorded to a basic level to enable a site avoidance strategy to be implemented by the Proponent. |
| **Heritage Survey of the Shine Development Area and Haul Road (and Addendum) (Terra Rosa, 2011)** | June – July 2011 & July 2012 | A 5.9 $km^2$ area (the Shine development area) and two Syncline Haul Road alignment options totalling 3.2 $km^2$ (July 2011).<br>One modified (extended) alignment of the northern Syncline Haul Road option (July, 2012)<br>A single corridor of approximately 6.8 km, with a maximum width of 100 m. | Desktop<br>Review of the AHIS for Aboriginal heritage sites or other heritage places within the survey area.<br>Ethnographic<br>Identification and pre-consultation with Aboriginal people and groups with a connection to, and knowledge of, the Shine Development area and haul road alignment options.<br>Field inspections and discussions on the ethnographic significance of sites visited on country with survey participants.<br>Archaeological<br>Pedestrian transects were conducted with participants spaced approximately 30 m apart due to the dense vegetation.<br>Surveys were conducted to determine areas of archaeological or ethnographic significance, and involved pedestrian transects spaced 30 m apart due to the dense vegetation. |

| Reference | Survey Timing | Survey Area | Survey Methods / Effort |
|---|---|---|---|
| **Aboriginal Heritage Survey Report with the Widi Mob at the Karara Iron Ore Mine – Long Term Mine Planning survey areas, for Karara Mining Limited, Western Australia (Horizon Heritage Management, 2020) (Appendix 11-3)** | May/June 2020 | Two Survey Areas:<br>Northern expansion area – 488 ha.<br>Southern expansion area – 600 ha. | Desktop assessment of the DPLH Aboriginal Cultural Heritage Inquiry System (ACHIS) and available heritage reports provided by KML.<br>Background research and pre-consultation with the Widi Mob.<br>Site identification survey with the Widi Mob, via walked transects spaced between 15–25 m apart for systematic assessment and recording of identified sites. |

## 11.5 Receiving Environment

### 11.5.1 Aboriginal Heritage Values

The following terms are used for Aboriginal heritage values:

- Registered or lodged sites, determined as meeting criteria under the AHA (i.e. is of importance and significance to Aboriginal people) and has been entered onto the Register of Aboriginal Sites maintained by DPLH.
- Other Heritage Places (OHPs) are heritage places catalogued by DPLH however not included on the Register of Aboriginal Sites given:
    - Information about the OHP has been lodged and is pending assessment by the Aboriginal Cultural Heritage Committee (ACHC) (formerly the Aboriginal Cultural Material Committee), or
    - The ACHC assessed the OHP and considered it did not to meet the evaluation criteria for inclusion on the Register of Sites.

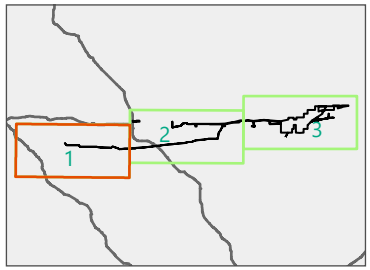
#### 11.5.1.1 Registered and Lodged Sites

A search of ACHIS in July 2025 identified 19 registered and 108 lodged Aboriginal heritage sites within 3 km of the Proposal. Of relevance to the Proposal, there are nine registered and 39 lodged Aboriginal heritage sites within the Combined Proposal DE. Registered and lodged sites intersecting with the Combined Proposal DE are shows in **Figure 11.4** and **Figure 11.5**, and listed **Table 11.3** and **Table 11.4** respectively. One of the registered sites within the Combined Proposal DE, Haul Road Stone Arrangement (DPLH ID 26059), will be avoided completely. KML already has consent under section 18 of the AHA for potential disturbance of the remaining eight registered sites.

Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Main Road
- Minor Road
- Registered Aboriginal Sites




# FIGURE 11.4

Registered Aboriginal Sites Intersecting with the Combined Proposal Development Envelope – Sheet 1

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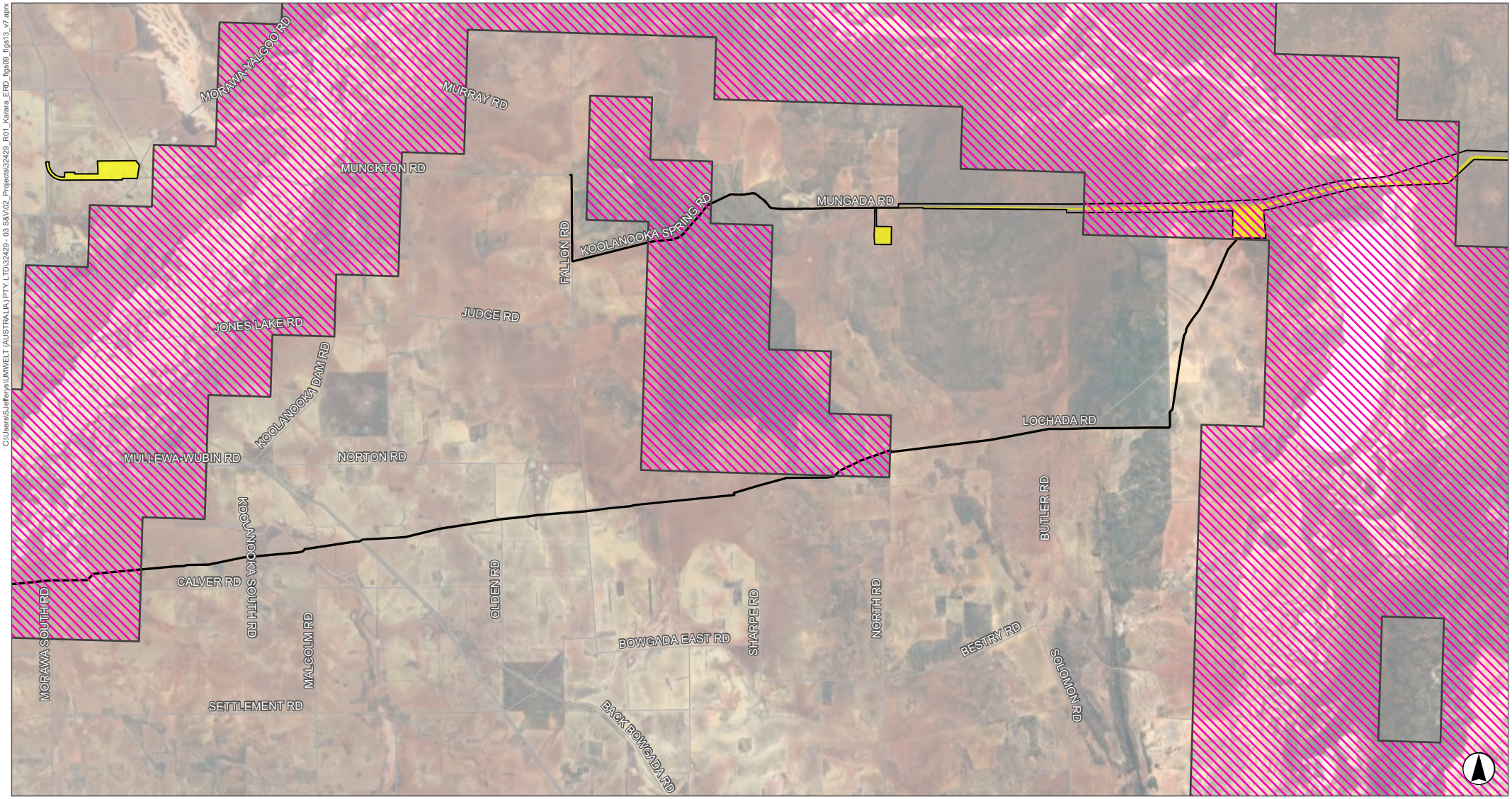
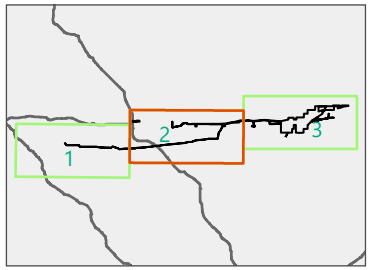



Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Main Road
- Minor Road
- Registered Aboriginal Sites




# FIGURE 11.4

Registered Aboriginal Sites Intersecting with the Combined Proposal Development Envelope – Sheet 2

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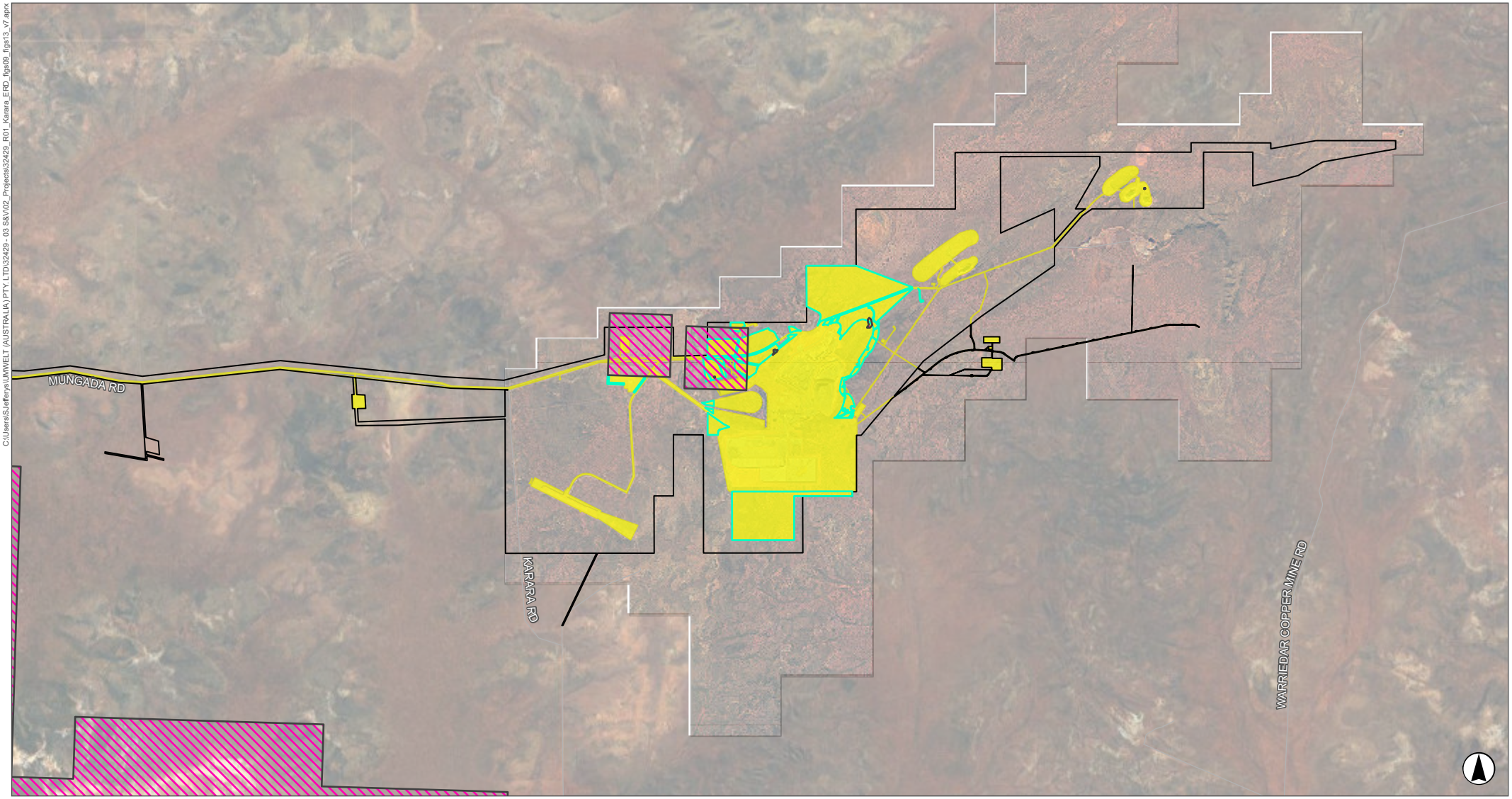
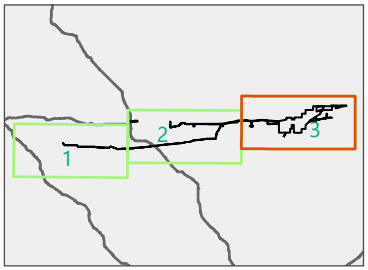



Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint
- Minor Road
- Registered Aboriginal Sites




# FIGURE 11.4

Registered Aboriginal Sites Intersecting with the Combined Proposal Development Envelope – Sheet 3

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**Table 11.3 Registered Aboriginal Sites Intersecting with the Combined Proposal DE**

| Name (Place ID) | Type | Gender Restrictions | Comments | S18 Requirements |
|---|---|---|---|---|
| **Koolanooka Hills (4496)** | Ritual / Ceremonial; Creation / Dreaming Narrative; Traditional Structure | No Gender / Initiation Restrictions | Intersects with the MIOP haul road and water pipeline. | Under section 18 reference No. 34-11449, Aboriginal monitoring is required for ground disturbance of this site. |
| **Mongers Lake Waterway (24380)** | Creation / Dreaming Narrative; Landscape / Seascape Feature | No Gender / Initiation Restrictions | Intersects with:<br>• KIOP haul road and water pipeline.<br>• MIOP haul road and power transmission corridor. | Under section 18 reference Nos. 25-05668, 25-09042, 25-11859, 34-11189, and 34-11426; management of this site includes:<br>• Implementation of an AHMP in conjunction with the Yamatji Nation to the satisfaction of the Registrar that includes monitoring and management (i.e. physical barriers) to protect significant components.<br>• All ground disturbance works occurring within the boundary of the site and where the works are located on previously undisturbed ground, must be monitored by members of the relevant Native Title claimant groups.<br>• If artefacts are located at the site, an archaeologist is required to assist Native Title claimant groups to make decisions in relation to salvage and monitoring requirements.<br>• Artefact salvage in consultation with the Native Title claimant groups and an archaeologist, notifying the Registrar of their location.<br>• Provision of all reporting/publications resulting from the above to the Registrar. |
| **Lizard Granites (23324)** | Historical, Man-Made Structure, Mythological, Hunting Place, Natural Feature, Water Source | No Gender / Initiation Restrictions | Intersects with:<br>• MIOP haul road and power transmission corridor.<br>• KIOP wastewater spray field, pipelines and roads to the mine and accommodation village. | Under section 18 reference Nos. 25-05668 and 25-09042; management of this site includes:<br>• Implementation of an AHMP in conjunction with the Yamatji Nation to the satisfaction of the Registrar that includes monitoring and management (i.e. physical barriers) to protect significant components.<br>• Fencing or physical barriers to ensure protection of the site. |

| Name (Place ID) | Type | Gender Restrictions | Comments | S18 Requirements |
|---|---|---|---|---|
| | | | | • All ground disturbance works occurring within the boundary of the site and where the works are located on previously undisturbed ground, must be monitored by members of the relevant Native Title claimant groups. Provision of all reporting/publications resulting from the above to the Registrar. |
| **MIOP32 (Terapod Gnamma 01) (28481)** | Mythological, Water Source | No Gender / Initiation Restrictions | Intersects with the MIOP Terapod pit. | Under section 18 reference No. 34-11552, management of this site includes:<br>• Implementation of an AHMP in conjunction with the Yamatji Nation to the satisfaction of the Registrar that includes monitoring and management (i.e. physical barriers) to protect significant components.<br>• Provide to the Registrar a copy of the final report recording the mitigative salvage of the site upon completion.<br>• Immediately cease works if human skeletal remains are found and report the matter to the WA Police and the Registrar. Remains must be undisturbed until a decision on how to proceed is identified.<br>• Provide a written report advising the Registrar whether and to what extent works have impacted on all or any Sites or Objects to the Registrar annually, or upon completion of works. |
| **Granite Pavement with Rock Hole (20860)** | Artefacts / Scatter, Natural Feature, Water Source | No Gender / Initiation Restrictions | Intersects with:<br>• MIOP internal and external haul roads and power transmission corridor<br>• KIOP mine site and haul roads and landfill.<br>• Newly proposed disturbance areas. | Under section 18 reference Nos. 25-05668 and 25-13333, management of this site includes:<br>• Implementation of management (i.e. physical barriers) to protect significant components.<br>• All ground disturbance works occurring within the boundary of the site and where the works are located on previously undisturbed ground, must be monitored by members of the relevant Native Title claimant groups. If artefacts are located at the site, an archaeologist is required to assist Aboriginal consultants to make decisions in relation to salvage and monitoring requirements.<br>• Artefact salvage in consultation with the NTC consultants and archaeologist, notifying the Registrar of their location. |

| Name (Place ID) | Type | Gender Restrictions | Comments | S18 Requirements |
|---|---|---|---|---|
| | | | | • Provision of all reporting/publications resulting from the above to the Registrar. |
| **Karara 08 (24668)** | Artefacts / Scatter, Quarry | No Gender / Initiation Restrictions | Intersects with the approved KIOP disturbance footprint and newly proposed disturbance areas. | Under section 18 reference Nos. 25-08081, management of this site includes:<br>• All ground disturbance works occurring within the boundary of the site and where the works are located on previously undisturbed ground, must be monitored by members of the relevant Native Title claimant groups. If artefacts are located at the site, an archaeologist is required to assist Native Title claimant groups to make decisions in relation to salvage and monitoring requirements.<br>• Artefact salvage in consultation with Native Title claimant groups and an archaeologist, notifying the Registrar of their location.<br>• Provision of all reporting/publications resulting from the above to the Registrar. |
| **Karara 10 (24670)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Intersects with the approved KIOP disturbance footprint and newly proposed disturbance areas. | Under section 18 reference No. 25-08081, management of this site includes:<br>• All ground disturbance works occurring within the boundary of the site and where the works are located on previously undisturbed ground, must be monitored by members of the relevant Native Title claimant groups. If artefacts are located at the site, an archaeologist is required to assist Native Title claimant groups to make decisions in relation to salvage and monitoring requirements.<br>• Artefact salvage in consultation with the Native Title claimant groups and an archaeologist, notifying the Registrar of their location.<br>• Provision of all reporting/publications resulting from the above to the Registrar. |
| **KML PIC Artefacts 02 (25979)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Intersects with newly proposed disturbance areas. | Under section 18 reference Nos. 25-08081 and 25-13333 management of this site includes:<br>• Implementation of management (i.e. physical barriers) to protect significant components. |

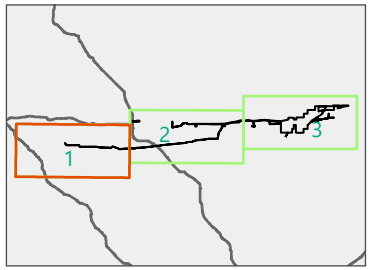
| Name (Place ID) | Type | Gender Restrictions | Comments | S18 Requirements |
|---|---|---|---|---|
| | | | | • All ground disturbance works occurring within the boundary of the site and where the works are located on previously undisturbed ground, must be monitored by members of the relevant Native Title claimant groups. If artefacts are located at the site, an archaeologist is required to assist Native Title claimant groups to make decisions in relation to salvage and monitoring requirements.<br>• Artefact salvage in consultation with the Native Title claimant groups and an archaeologist, notifying the Registrar of their location.<br>• Provision of all reporting/publications resulting from the above to the Registrar. |
| **Haul Road Stone Arrangement (26060)** | Sub surface cultural material; Hunting Place; Traditional Structure | No Gender / Initiation Restrictions | Intersects with the MIOP power transmission corridor. | Site has been avoided. |

Mount Karara (DPLH 21374 KARARA/02) is a women's only Ceremonial site located at the southern end of Mt Karara. The site played a ritual role in the cultural lives of Widi Aboriginal women as an initiation ground where women were taught and put through the law. Representatives of the Widi Mob considered this site of high importance and of special significance to their cultural heritage and ceremonial link with the past ritual and ceremonial lives of their ancestors. Ethnographic information collected during heritage surveys have indicated that this site was considered dangerous to men and is a place for women only. Due to the culturally sensitive nature of this information and the site itself the Widi representatives have not been prepared to divulge any further information about this site. Mt Karara has been assessed under section 5 of the AHA and been determined as stored data 'not a site'. This place has not been afforded protection under the AHA and has been destroyed by mining activities.

Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Main Road
- Minor Road




# FIGURE 11.5

Lodged Sites Intersecting with the Combined Proposal Development Envelope – Sheet 1

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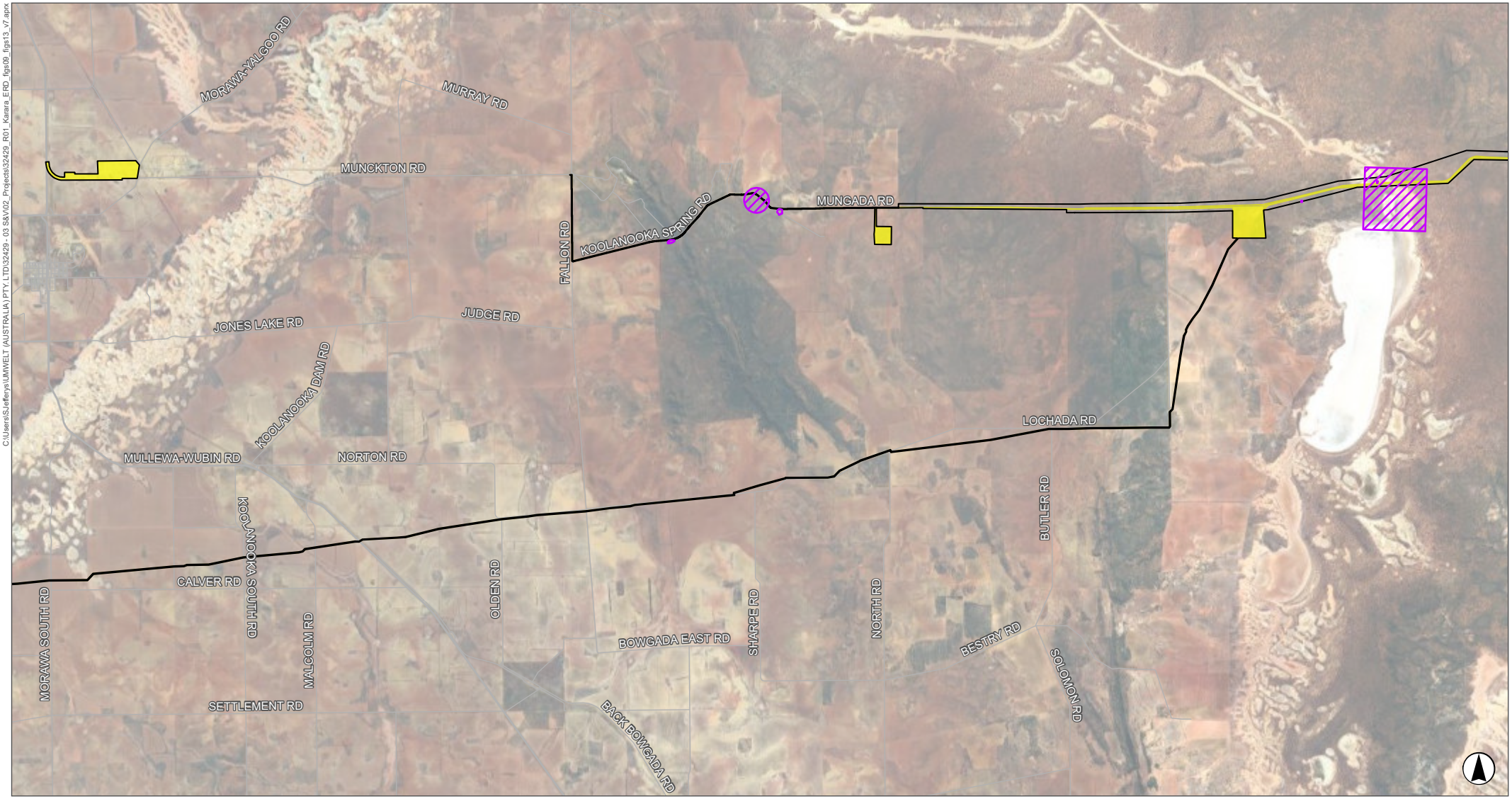


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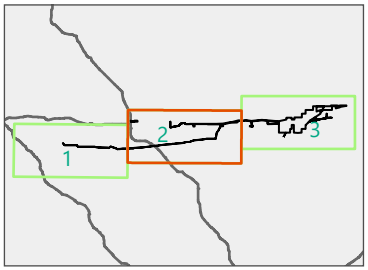
Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Main Road
- Minor Road
- Aboriginal Cultural Heritage Sites – Lodged




# FIGURE 11.5

Lodged Sites Intersecting with the Combined Proposal Development Envelope – Sheet 2

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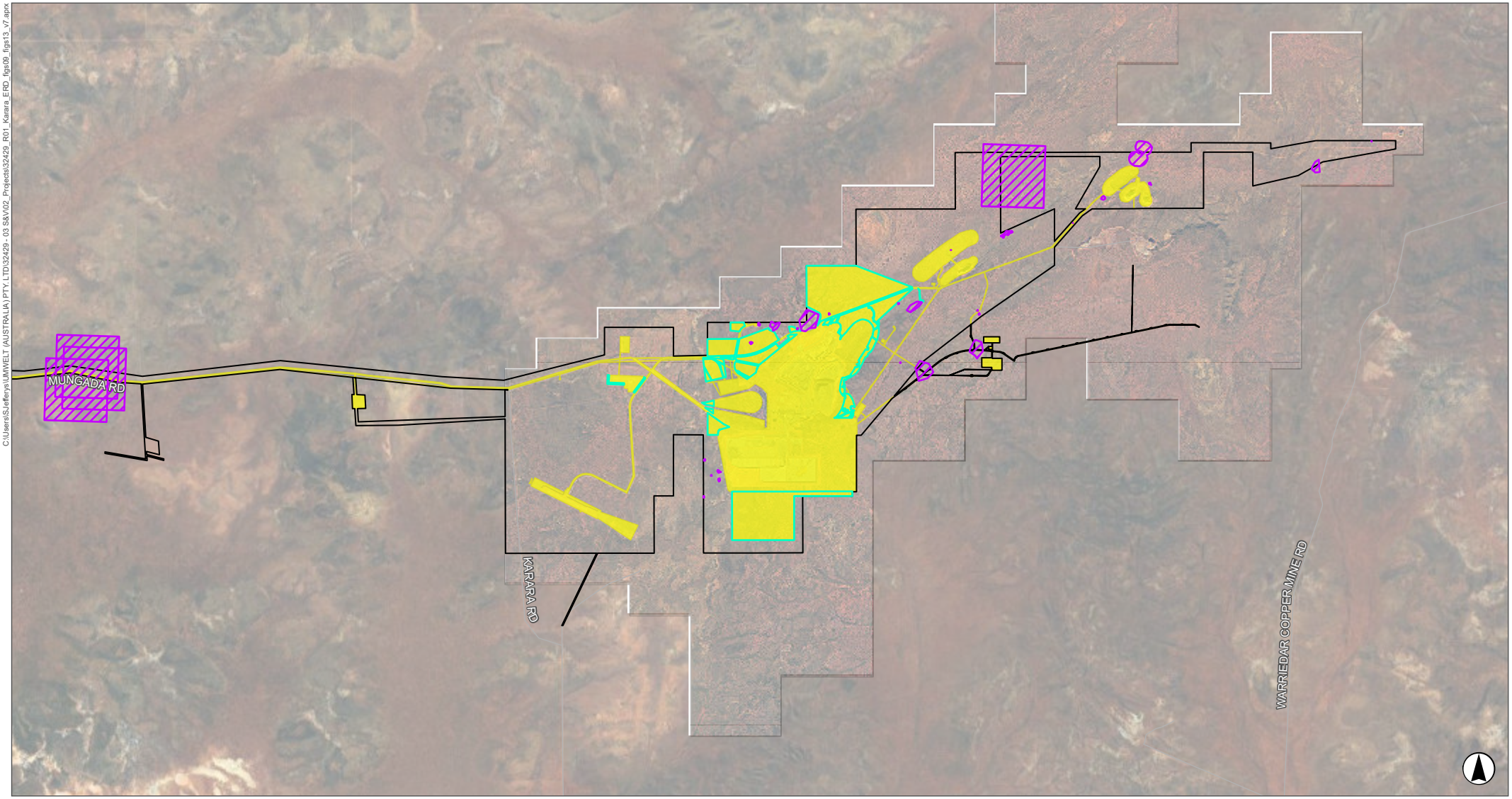
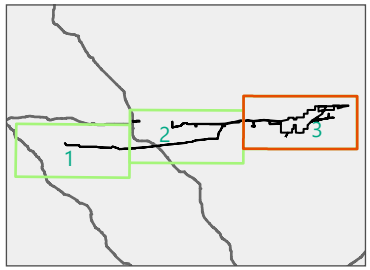



Scale: 1:175,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- Minor Road
- Aboriginal Cultural Heritage Sites – Lodged
- KIOP MLE Mitigated Disturbance Footprint




# FIGURE 11.5

## Lodged Sites Intersecting with the Combined Proposal Development Envelope – Sheet 3

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0 3.5 7 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), DPLH (2025)

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**Table 11.4 Other Heritage Places Intersecting with the Combined Proposal DE**

| Name (Place ID) | Type | Gender Restrictions | Comments |
|---|---|---|---|
| **Causeway 1 (5406)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Intersects with the Combined Proposal DF:<br>KIOP haul road (Mungada Road).<br>MIOP water pipeline and power transmission corridor. |
| **Koolanooka Spring. (5508)** | Ritual / Ceremonial; Other | No Gender / Initiation Restrictions | Intersects with the Combined Proposal DF (Mungada Road haul road). |
| **Gindalbie Trees (23326)** | Camp; Modified Tree | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **Midwest Claypan (24145)** | Artefacts / Scatter; Creation / Dreaming Narrative; Water Source | No Gender / Initiation Restrictions | Is partially located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **Karara 12 (24672)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Intersects with the Combined Proposal DF:<br>KIOP mine site and roads.<br>Expansion area. |
| **KML PIC Stone Arrangement 202 (25980)** | Creation / Dreaming Narrative; Hunting Place; Traditional Structure; Water Source | Men's Only Site | Intersects with the Combined Proposal DF:<br>KIOP haul road (Mungada Road).<br>MIOP water pipeline and power transmission corridor. |
| **KML PIC Artefacts 204 (25981)** | Artefacts / Scatter; Creation / Dreaming Narrative; Hunting Place; Water Source | Men's Only Site | Intersects with the Combined Proposal DF:<br>KIOP haul road (Mungada Road).<br>MIOP water pipeline and power transmission corridor. |
| **Weelhamby Rocky Outcrop (26058)** | Ritual / Ceremonial; Creation / Dreaming Narrative; Landscape / Seascape Feature; Water Source | Men's Only Site | Intersects with the Combined Proposal DF:<br>KIOP haul road and water pipeline.<br>MIOP haul road and power transmission corridor. |
| **Haul Road Stone Arrangement Two (26061)** | Sub surface cultural material; Traditional Structure | No Gender / Initiation Restrictions | Intersects with the Combined Proposal DF:<br>KIOP haul road and water pipeline.<br>MIOP haul road and power transmission corridor. |
| **Extensive Granites (26062)** | Artefacts / Scatter; Creation / Dreaming Narrative; Grinding areas / Grooves; Hunting Place; Traditional Structure; Plant Resource; Water Source | Men's Only Site | Intersects with the Combined Proposal DF:<br>KIOP haul road and water pipeline.<br>MIOP haul road and power transmission corridor. |

| Name (Place ID) | Type | Gender Restrictions | Comments |
|---|---|---|---|
| **KML PIC Artefacts 402 (26072)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Intersects with the Combined Proposal DF:<br>KIOP haul road (Mungada Road).<br>MIOP water pipeline and power transmission corridor. |
| **KML PIC Artefacts 406 (26076)** | Artefacts / Scatter; Other | No Gender / Initiation Restrictions | Intersects with the Combined Proposal DF (Mungada Road haul road). |
| **MIOP02 (Euro Bore Quarry 01) (26480)** | Artefacts / Scatter; Quarry | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP03 (Johnny's Prospect Artefacts 01) (26481)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP04 (Johnny's Prospect Artefacts 02) (26482)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP05 (Euro Bore Artefacts 01) (26483)** | Artefacts / Scatter; Historical; Water Source | No Gender / Initiation Restrictions | Intersects with the KIOP internal access and haul roads. |
| **MIOP07 (Karara East Grinding Base 01) (26484)** | Grinding areas / Grooves | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP09 (Terapod Artefacts 02) (26486)** | Artefacts / Scatter; Grinding areas / Grooves | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP06 (Blue Hills North Quarry 01) (26487)** | Artefacts / Scatter; Quarry | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP10 (Karara North Artefacts 01) (26488)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Is located within the expansion area but is avoided by the Combined Proposal DF. |

| Name (Place ID) | Type | Gender Restrictions | Comments |
|---|---|---|---|
| **MIOP11 (Karara North Artefacts 02) (26489)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP12 (Karara West Artefacts 03) (26490)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP14 (Karara West Grind Base 01) (26491)** | Artefacts / Scatter; Grinding areas / Grooves | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP16 (Karara North Site Complex) (26492)** | Sub surface cultural material; Artefacts / Scatter; Landscape / Seascape Feature; Rock Shelter; Water Source | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP17 (Karara West Gnamma 01) (26493)** | Grinding areas / Grooves; Landscape / Seascape Feature; Water Source | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP18 (Karara West Gnamma 02) (26494)** | Landscape / Seascape Feature; Water Source | No Gender / Initiation Restrictions | Is located within the expansion area but is completely avoided by the Combined Proposal DF. |
| **MIOP19 (Karara West Artefacts 01) (26495)** | Artefacts / Scatter; Quarry | No Gender / Initiation Restrictions | Is located within the expansion area but is completely avoided by the Combined Proposal DF. |
| **MIOP20 (Blue Hills North Quarry 02) (26496)** | Artefacts / Scatter; Quarry | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP21 (Blue Hills North Quarry 03) (26497)** | Artefacts / Scatter; Quarry | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP22 (Blue Hills North Quarry 04) (26498)** | Artefacts / Scatter; Quarry | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |

| Name (Place ID) | Type | Gender Restrictions | Comments |
|---|---|---|---|
| **MIOP23 (Blue Hills North Quarry 05) (26499)** | Artefacts / Scatter; Quarry | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP26 (Silverstone Artefacts 03) (26500)** | Artefacts / Scatter | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP25 (Silverstone Artefacts 02) (26800)** | Artefacts / Scatter; Water Source | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP01 (Karara Well Artefacts 01) (26806)** | Artefacts / Scatter; Camp; Hunting Place; Water Source | No Gender / Initiation Restrictions | Intersects with the KIOP internal access and haul roads, and utilities infrastructure. |
| **MIOP13 (Karara Well Artefacts 02) (26807)** | Artefacts / Scatter; Grinding areas / Grooves; Landscape / Seascape Feature; Plant Resource; Water Source | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **MIOP15 (Karara North Site Complex 01) (26808)** | Sub surface cultural material; Artefacts / Scatter; Camp; Grinding areas / Grooves; Landscape / Seascape Feature; Quarry; Rock Shelter; Water Source | No Gender / Initiation Restrictions | Is located within the expansion Area but is completely avoided by the Proposal disturbance footprint. |
| **Terapod and Blue Hills Isolated Artefacts (29693)** | Other | No Gender / Initiation Restrictions | Intersects with the MIOP WRD. |
| **Blue Hills Isolated Finds (31408)** | Other | No Gender / Initiation Restrictions | Intersects with a MIOP internal access road. |
| **TEQU12-01 (33310)** | Artefacts / Scatter; Quarry | No Gender / Initiation Restrictions | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |

#### 11.5.1.2 Newly Identified Aboriginal Heritage Sites

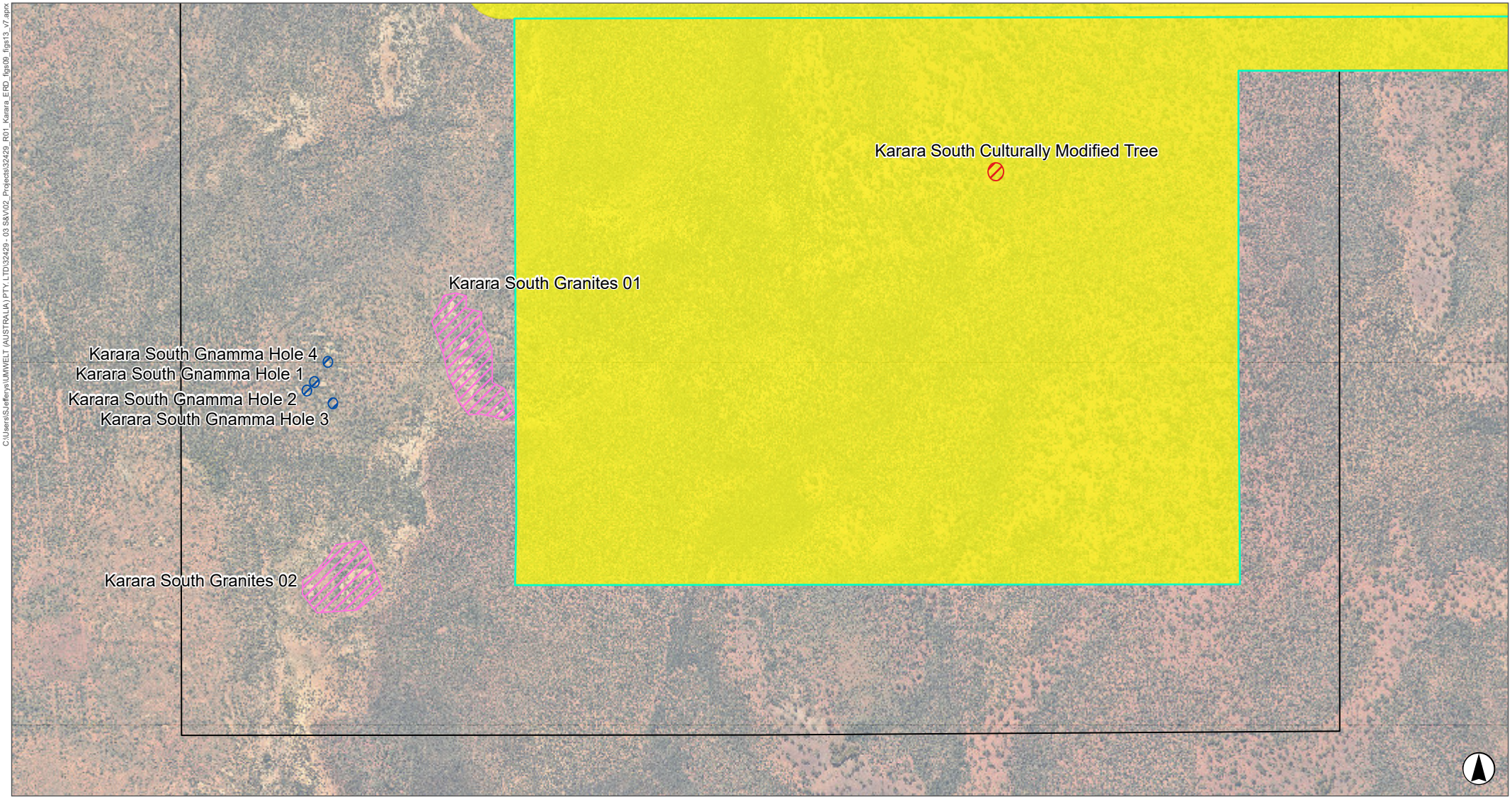
In 2020 an Aboriginal Heritage Survey for the identification of archaeological and ethnographic sites at the KIOP MLE proposed disturbance footprint was undertaken with the Widi Mob (Horizon Heritage Management, 2020). The survey identified seven new sites/places and confirmed three previously identified OHPs that were partially located within the KIOP MLE proposed disturbance footprint (**Table 11.5** and **Figure 11.6**).

**Table 11.5 New Aboriginal Sites Identified at the Proposal (Horizon Heritage Management, 2020)**

| Name (Place ID) | Type | Comments |
|---|---|---|
| **Karara South Granites 01** | Camp, Water Source, Grinding, Gnamma Holes, Artefacts / Scatter | Is located within the Combined Proposal DE but is completely avoided by the Combined Proposal DF. |
| **Karara South Granites 02** | Camp, Water Source, Grinding, Gnamma Holes, Artefacts / Scatter | |
| **Karara South CMT** | Culturally Modified Tree | Is located within the Combined Proposal DF but will be salvaged and relocated at the request of the Widi Mob Traditional Owners. |
| **Karara South Gnamma Hole 1** | Water Source, Natural Feature | Is located within the Proposal DE but is completely avoided by the proposed disturbance footprint. |
| **Karara South Gnamma Hole 2** | Water Source, Natural Feature | |
| **Karara South Gnamma Hole 3** | Water Source, Natural Feature | |
| **Karara South Gnamma Hole 4** | Water Source, Natural Feature | |

One newly identified heritage site, a single culturally modified (scarred) tree (Karara South CMT) is located within the KIOP MLE proposed disturbance footprint and would be impacted by the expansion of the TSF under the Proposal (**Figure 11.6**). The tree features a single scar corresponding with the historic removal of a section of bark, likely for the manufacture of a carrying implement generally known as a Coolamon (**Plate 1**). The tree is absent of foliage and no longer living, however the main trunk has not sufficiently deteriorated. KML has consulted with the Widi Mob Traditional Owners (as the Yamatji Nation claimant group for the land on which the tree is located) who have advised that the Widi Mob are satisfied to undertake salvage and relocation of the Karara South CMT as an acceptable site management conservation and protection strategy.

As noted in **Section 11.4.1**, Widi Mob Traditional Owners have advised that the remaining newly identified sites provide evidence of the Widi Mob's connection to Country. These sites, regardless of their significance, require protection through registration under the AHA and impacts must be avoided by KML as to do otherwise would undermine the Widi Mob's role as custodians of the land. KML has committed to avoiding the six newly identified sites in accordance with advice received from the Widi Mob, and no impacts will occur to these sites as a result of the Proposal.

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Scale: 1:15,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Combined Proposal Mitigated Disturbance Footprint
- KIOP MLE Mitigated Disturbance Footprint

**Newly Identified Sites**

- Culturally Modified Tree
- Gnamma Hole
- Granite

## FIGURE 11.6

Newly Identified Aboriginal Heritage Sites (Horizon Heritage Management 2020)

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0 300 600 m

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), Horizon Heritage Management (2020)

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**Plate 1 The Karara South Culturally Modified Tree**

Except for the Karara South CMT, newly identified heritage sites are considered to demonstrate potential to be deemed as sites under section 5 of the AHA. KML is committed to avoiding these sites to prevent any breaches of section 17 of the AHA, and will continue to consult with the Yamatji Nation on any appropriate site management strategies about mitigation, conservation, protection and any further research requirements under a section 16 permit or section 18 consent under the AHA.

## 11.5.2 Traditional Land Uses

### 11.5.2.1 Water Sources

Surveys for Aboriginal heritage for the Proposal has identified an intrinsic association between water sources and granite features such as artefact scatters, granites, and rock shelters (Horizon Heritage Management, 2020). These sites have predominantly been identified to be focused around potential water sources, including seepages around granite landforms, occasional springs, rock pools, gnamma holes, claypans and major rivers when salinity was low (Terra Rosa, 2011). Aboriginal heritage surveys suggest structured use of all available water sources and 'rain chasing' behaviour, or the passage of Traditional Owner's ancestors through the arid landscape which was largely dictated by water availability. This opportunistic resource utilisation strategy would have resulted in prioritisation of more ephemeral water supplies first, followed by a gradual retreat towards the more permanent water sources as supply diminished. Where water sources were replenished following rainfall events, these were exploited when available, resulting in a general pattern of a number of large, internally complex archaeological sites located near more permanent water sources and a greater number of sparser, smaller sites associated with more ephemeral water sources (Horizon Heritage Management, 2020).

#### 11.5.2.2 Ethnographic and Ethnobiological Values

Consultations with Yamatji Nation representatives during ethnographic surveys have identified the area surrounding the Proposal to be likely rich in food and medicinal resources (AIC, 2009a, 2009b, 2009c). Plant-based bush tucker including wild tomato, bimba (an edible gum), Mulga and Currara trees (the roots of which contain bardi or witchetty grubs) as well as medicine bush were identified during surveys for the Project's Shine Development Area and Haul Road options (Terra Rosa, 2011). Eggs harvested from malleefowl and emu nests identified proximal to the Project once used as sources bush tucker (Horizon Heritage Management, 2020). Echidnas, known to occur within the region hold importance for the Yamatji Nation claimant groups, and demonstrate totemic significance. Echidnas could not be eaten due to being considered as brothers of ancestors of the West Badimia people (Terra Rosa, 2011). The concern all Aboriginal representatives expressed for the flora and fauna of the area is directly related to the ongoing significance of these resources in traditional and contemporary life.

Special purpose sites, such as stone quarries and oche sources, have been identified during surveys for the Project where these specific resources were available (AIC, 2007).

Historic consultations with the Yamatji Nation have also identified concerns that development could impact detrimentally on the ecology and spirituality of the Karara/Blue Hills area, which is part of a traditional Aboriginal network of communication routes. Aboriginal people passed through and camped in this area when travelling from the coast and the western desert region. The communication routes and occupation sites are associated with and created by Dreamtime beings, especially the Beeramma (also known as the Creation Snake and Rainbow Serpent) as well as the spirits of the ancestors (AIC, 2009a, 2009b, 2009c). The Dreamtime beings are at the core of spiritual life for Aboriginal people, connecting them with the land and its resources.

### 11.5.3 Historic Heritage

No sites on the National Heritage or Commonwealth Heritage lists are within or near the Combined Proposal DE.

### 11.5.4 Current Land Uses, Economic and Community Values, Other Receptors

The Proposal Mine Area lies within Karara Rangeland Park, which comprises of a pastoral station that have been acquired by DBCA and are now part of the DBCA estate. The land at the Mine Area is predominantly unallocated crown land, and land surrounding the mine is predominantly crown reserves for the purpose of conservation or common use (see further details regarding conservation areas in the below section). Land and groundwater of the wider area surrounding the Proposal Mine Area is predominantly utilised by pastoral leases, such as the Mellenbye, Wanarra, Ninghan, Bunnawarra, Badja and Muralgarra pastoral leases (**Figure 11.7**).

The Proposal's linear infrastructure extending to the Yandanooka Borefield in the west is predominantly located on freehold land.

Townships located within proximity to the Proposal include:

- Yandanooka is located immediately adjacent to the Yandanooka Borefield expansion area, at the Proposal's westernmost extent.
- Morewa is located approx. 3 km south from the MIOP rail siding.

- Koolanooka is located approx. 3 km north of the KIOP water pipeline.
- Bowgada is located approx. 4.7 km south of the KIOP water pipeline.
- Rothsay is located approx. 12 km southeast of the KIOP mine site.

Homesteads within proximity to the Proposal include:

  - Within the DE:
    - Old Karara homestead is approx. 3 km northwest of the Proposal airstrip
    - Old Lochada homestead is approx. 2.3 km south of the KIOP haul road and water pipeline, and MIOP power transmission corridor.
  - Outside the DE
    - Karara homestead is approx. 3 km southeast of the Proposal airstrip
    - Karinya homestead is approx. 1.3 km north of the KIOP water pipeline
    - Dingle Dell homestead is approx. 700 m south of the KIOP haul road (Mungada Road)
    - Linders Fern homestead is approx. 3.1 km north of the KIOP water pipeline
    - Dalgooka homestead is approx. 600 m south of the KIOP water pipeline
    - Moscell homestead is approx. 2.4 km north of the KIOP water pipeline.

## 11.5.5 Conservation Areas

As described in **Section 1.6.1**, the Proposal is located within the Karara Rangelands Park and an enclave of Karara Conservation Park (**Figure 11.8**). The Mungada Ridge National Park is also adjacent to the Combined Proposal Development Envelope. Further information about these conservation areas is provided below.

### 11.5.5.1 Karara Rangelands Park

Karara Rangelands Park is a 560,672 ha area and comprises six former pastoral stations managed by DBCA that lie within the Southwest Australia International Biodiversity Hotspot. As outlined in the Karara Rangeland Park Visitor Guide the park hosts a diversity of landscapes and habitats including:

- Granite outcrops, basalt hills and banded iron formations.
- Wetlands, drainage lines and lakes including Mongers Lake, which stretches some 200 km around the park and can be either a vast shallow lake or white gypsum claypan depending on recent rainfall. Mongers Lake Waterway is a registered Aboriginal heritage site for its creation by the Bimurra creator being. At the closest point, the Mongers Lake system is approximately 12 km south of the Karara Mine Area.
- Thundelarra Lignum Swamp is possibly the largest lignum swamp in Australia's south-west spanning more than 13,500 ha. While often dry, it is listed as a Wetland of National Importance due to its significance for waterbirds following rain. This is located on ex-Thundelarra Station, at least 30 km northeast of the Karara Mine Area.
- Vegetation in the park is largely intact with 883 native plant species identified. Native fauna records include 19 mammals, 122 birds, 53 reptiles, six amphibians and 104 invertebrates.

- Kangaroos, red-tailed black cockatoos and mulga parrots are all commonly sighted in the area.
- Recognised as important to Yamatji Nation and Badimia people with significant Aboriginal sites in the park include artwork, rock holes, quartz and ochre quarries, artefact scatters, rock shelters, lizard traps, stone arrangements and grinding bases.

The Karara Rangelands Park provides opportunities for recreational activities including sightseeing, birdwatching, camping and four-wheel driving. There are six areas in Karara Rangeland Park where camping is permitted providing no or minimal facilities.

A Management Plan for the Karara Rangelands Park was not available.

#### 11.5.5.2 Karara Conservation Park

Karara Conservation Park is part of Western Australia's conservation estate and protects regionally significant rangeland landscapes and biodiversity values. The park was established through the Yamatji Nation Indigenous Land Use Agreement (executed February 2020) and a Class C nature reserve jointly managed by DBCA and Yamatji Aboriginal Corporation. The Karara Mine Area mining tenure was specifically excluded from the Conservation Park as part of the agreement.

The park supports native vegetation communities and provides habitat for a range of conservation-significant flora and fauna. The park is also valued for its landscape character and ecological connectivity with adjacent conservation reserves, including Mungada Ridge National Park.

Karara Conservation Park contributes to public conservation outcomes through its role in protecting natural landscapes, supporting visitation and nature-based recreation, and maintaining visual amenity within the regional setting.

A Management Plan for the Karara Conservation Park was not available.

#### 11.5.5.3 Mungada Ridge National Park

Mungada Ridge National Park spans 1000 ha and is a Class A national park within Western Australia's conservation estate. It is jointly vested with DBCA and Bundi Yamatji Aboriginal Corporation. Mungada Ridge National Park was declared a National Park in 2022, following rehabilitation of exploration activities by KML on Mungada Ridge and relinquishment of tenement M59/650 as part of an ecological offset associated with the original Karara Iron Ore Project.

The Mungada Ridge National Park provides protection for an intact Banded Iron Formation (BIF) landform that forms part of the regionally significant Blue Hills Range System as well as an array of species including threatened species (*Acacia woodmaniorum* and Malleefowl).

The BIF ranges in the Midwest are recognised as having very high biodiversity value and are known to support endemic and conservation-significant flora and fauna, including threatened and priority species associated with rocky uplands and specialised habitats. Despite historic exploration disturbance, the majority of the Mungada Ridge landform remains largely intact, with vegetation in excellent condition.

The Park is focussed on conservation and is understood to offer limited public access and no recreational use.

A Management Plan was not identified as available for Mungada Ridge National Park.

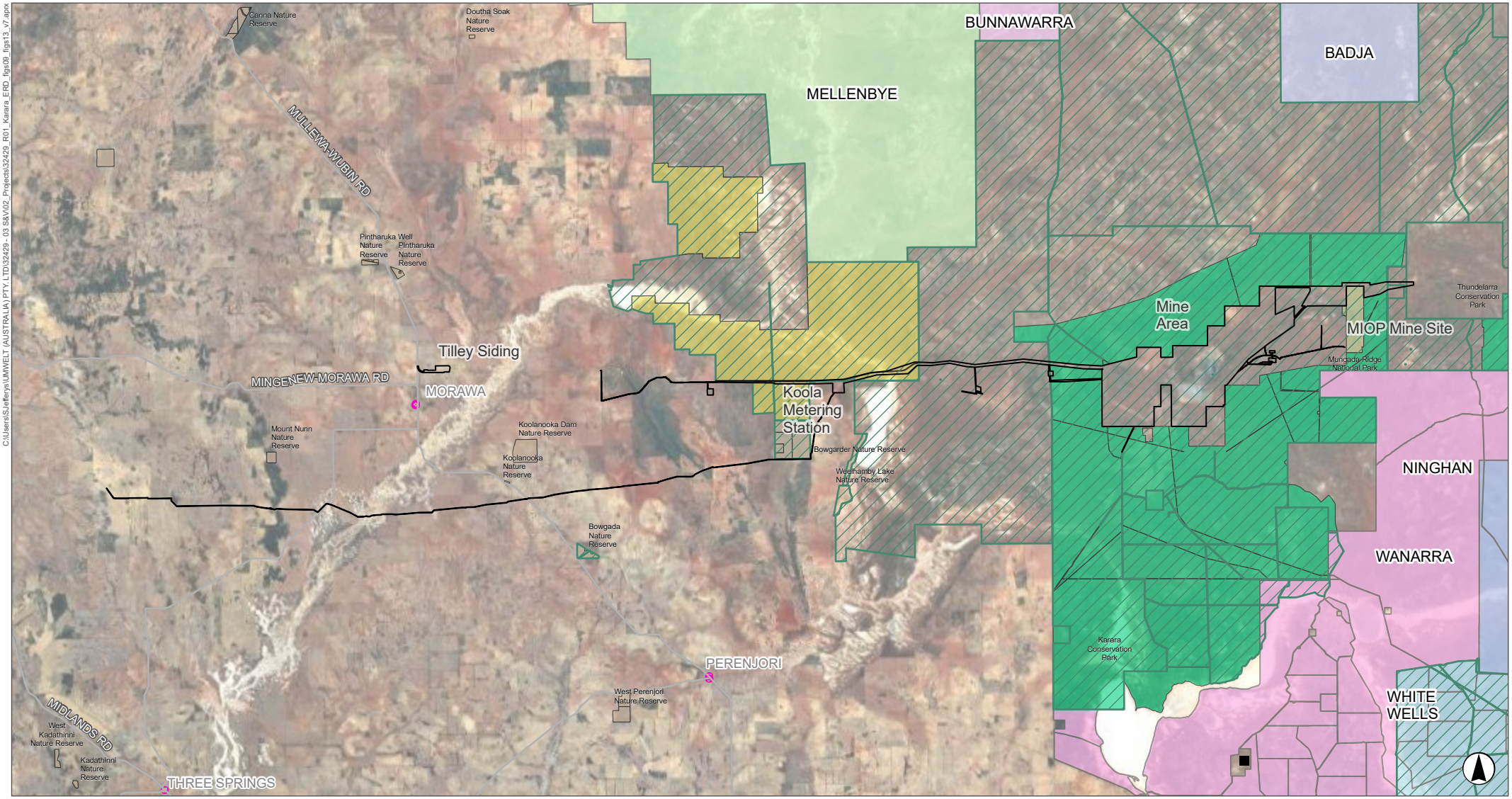
### 11.5.5.4 Proximity to Conservation Reserves

The Proposal mitigated disturbance footprint is located wholly outside of the defined boundaries of Karara Conservation Park and Mungada Ridge National Park. Some northern portions of the mitigated disturbance footprint for infrastructure are located immediately adjacent the Karara Conservation Park boundary as shown in **Figure 11.8**. Disturbance and activities associated with the Project will occur wholly within the mitigated disturbance footprint. A summary of the distance between key features of the proposal and Karara Conservation Park and Mungada Ridge National Park are outlined in **Table 11.6**.

The closest recreational features within Karara Rangeland Park to the Proposal are Damperwah Camp Zone and John Forrest Lookout which are located approximately 8-9 km from the mitigated disturbance footprint.

**Table 11.6 Distance from Proposed Disturbance Areas to Conservation Reserves**

| Proposed Disturbance Areas | Distance to Karara Conservation Park | Distance to Mungada Ridge National Park |
|---|---|---|
| **Mitigated Disturbance Footprint** | The Proposal is in an enclave / excluded from the Karara Conservation Park. The mitigated disturbance footprint is immediately adjacent along some parts of the northern boundary. | Approximately 9.6 km from eastern boundary of the mitigated disturbance footprint to the boundary of Mungada Ridge National Park.<br>An existing access road also traverses immediately to the north of the Mungada Ridge National Park. |
| **WRD** | Approximately 200 m at the closest point of the proposed WRD expansion to the boundary of Karara Conservation Park. | N/A<br>Greater distance than the mitigated disturbance footprint noted above. |
| **TSF** | Approximately 700 m from southern boundary of the TSF expansion to the boundary of Karara Conservation Park. | N/A<br>Greater distance than the mitigated disturbance footprint noted above. |
| **Approved Karara Pit** | Approximately 1.3 km from the approved pit to the boundary of Karara Conservation Park. No expansion to the open pit is proposed. | N/A<br>Greater distance than the mitigated disturbance footprint noted above. |
| **Infrastructure** | Immediately adjacent along some parts of Karara Conservation Park boundary. | N/A<br>Greater distance than the mitigated disturbance footprint noted above. No changes to infrastructure within 9.6 km of the National Park. |

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Scale: 1:500,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Main Road
- Pastoral Station Homestead
- Heritage Council – State Register
- Karara Rangeland Park
- National Park
- Nature Reserve
- Conservation Park
- Timber Reserve

**Station Name**

- BADJA
- BUNNAWARRA
- MELLENBYE
- NINGHAN
- WANARRA
- WHITE WELLS

# FIGURE 11.7

## Pastoral Stations and Conservation Reserves near the Proposal Area

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0 10 20 km

**Image Source:** ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), KML (2025), DPLH (2025), DBCA (2025), GA (2006)

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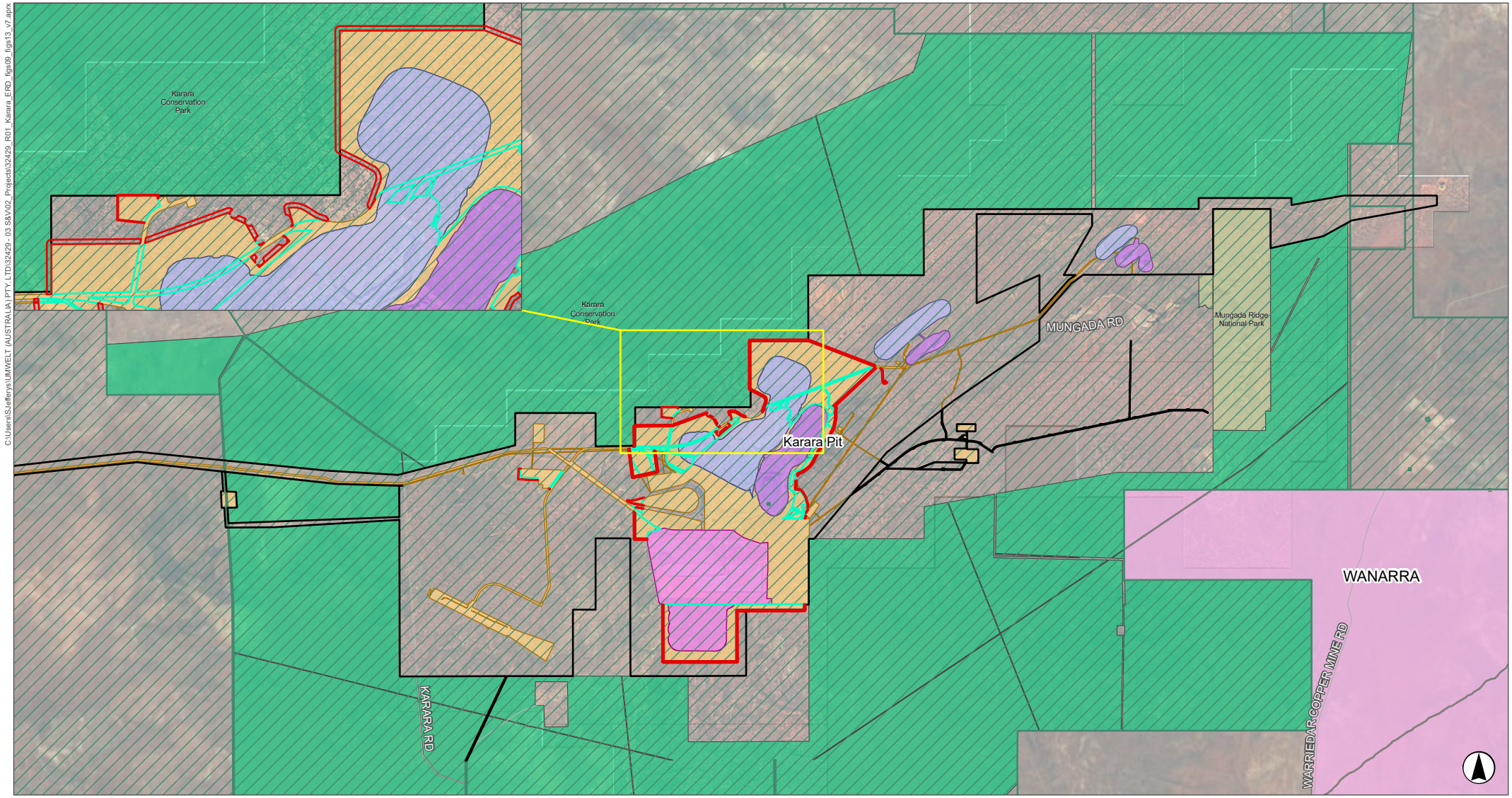


Scale: 1:150,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- KIOP MLE Mitigated Disturbance Footprint
- Combined Proposal Mitigated Indirect Impact Zone
- Minor Road
- Karara Rangeland Park

**Combined Proposal Mitigated Disturbance Footprint**

- Infrastructure
- Pit
- TSF
- WRD

- National Park
- Conservation Park

**Station Name**

- WANARRA

**FIGURE 11.8**

Proximity of Proposed Disturbance to Conservation Reserves

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**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), DBCA (2025), DPLH (2025), KML (2025)

## 11.6 Potential Impacts

This section lists the Proposal activities that might feasibly impact on social surroundings, as a direct result of the Proposal's impact to the physical or biological environment.

### 11.6.1 Potential Impacts to Aboriginal Heritage Values

The potential impacts to Aboriginal cultural heritage values are outlined in **Table 11.7** and **Table 11.8**. No impacts to historic heritage are expected, given no historic heritage values have been identified within proximity to the Proposal.

**Table 11.7 Potential Impacts to Aboriginal Heritage Values Likely to be Subject to AHA Processes**

| Proposal Activity | Potential Direct Impact to Physical or Biological Environment | Feasible Impact to Potential Aboriginal Heritage |
|---|---|---|
| **Construction and establishment of new infrastructure**<br>Access roads, drainage infrastructure and relocation of existing production bores and associated infrastructure surrounding the WRD and TSF expansion areas. | Land clearance, establishment of new infrastructure, construction activities. | Disturbance of heritage values or registered or lodged sites within the Combined Proposal DE. |
| **Expansion of existing infrastructure**<br>Karara Pit footprint for access to the ore body and to accommodate the required alignment of the abandonment bund.<br>WRD, to allow for storage of an additional 245 Mt of waste material, and associated haul roads, topsoil and overburden stockpiles.<br>TSF, to accommodate tailings generation for a further 30 years (i.e. until approximately 2055). | Land clearance, expansion of existing infrastructure, Proposal activities. | |
| **Maintenance of existing infrastructure**<br>Maintenance of the existing linear infrastructure corridor, Karara rail loop, western section of Yandanooka water pipeline, Syncline Turner haul road. | Land clearance and use for Proposal activities. | |

**Table 11.8 Potential Impacts to Aboriginal Heritage Values Unlikely to be Considered by AHA Processes**

| Proposal Activity | Potential Direct Impact to Physical or Biological Environment | Feasible Impact to Potential Aboriginal Heritage |
|---|---|---|
| **Construction and establishment of new infrastructure**<br>Access roads, drainage infrastructure and relocation of existing production bores and associated infrastructure surrounding the WRD and TSF expansion areas. | Land clearance, establishment of new infrastructure, construction activities. | Disturbance of cultural material, potential cultural material, or a possible unknown Aboriginal heritage site.<br>Loss or interference with culturally significant flora and terrestrial fauna species (i.e. Malleefowl, echidna). |

| Proposal Activity | Potential Direct Impact to Physical or Biological Environment | Feasible Impact to Potential Aboriginal Heritage |
|---|---|---|
| **Expansion of existing infrastructure**<br>Karara Pit footprint for access to the ore body and to accommodate the required alignment of the abandonment bund.<br>That is, at the WRD, to allow for storage of an additional 245 Mt of waste material, and associated haul roads, topsoil and overburden stockpiles.<br>I.e. at the TSF, to accommodate tailings generation for a further 30 years until approximately 2055. | Land clearance, expansion of existing infrastructure, Proposal activities.<br>• Impacts to the cultural significance linked to this connection has resulted from the travel of Traditional Owner ancestors through the landscape, which was largely dictated by water availability. This association has resulted in a higher concentration of heritage sites near water sources, which typically historically display more intensive occupation by Traditional Owners. | Detrimental impacts on the intrinsic association between water sources and Aboriginal heritage, and the spirituality of traditional Aboriginal network of communication routes that are associated with and created by Dreamtime beings, such as the Beeramma (Creation Snake/Rainbow Serpent) and the spirits of ancestors.<br>Loss or interference of access to land within Combined Proposal DE used for cultural activities. |
| **Maintenance of existing infrastructure**<br>Maintenance of the existing linear infrastructure corridor, Karara rail loop, western section of Yandanooka water pipeline, Syncline Turner haul road. | Land clearance and use for Proposal activities. | Detrimental impacts on the spirituality of traditional Aboriginal network of communication routes that are associated with and created by Dreamtime beings, such as the Beeramma (Creation Snake/Rainbow Serpent) and the spirits of ancestors. |

## 11.6.2 Potential Impacts to Conservation Reserves

### 11.6.2.1 Direct Impacts

Direct impacts upon environmental and social values of Karara Conservation Park and Mungada Ridge National Park are not expected given the disturbance footprint is located outside these conservation areas.

### 11.6.2.2 Indirect Impacts

The Proposal includes the continuation of existing activities alongside additional activities and associated new disturbance within proximity of Karara Conservation Park. There is potential for indirect impacts to environmental and social values within Karara Conservation Park and Mungada Ridge National Park, which may include:

- Dust, noise and light spill generated during by the Proposal construction and operational phases including use and maintenance of existing and proposed infrastructure and access tracks and the operational activities including use of the WRD and TSF.
- Pollution including accidental spills during construction and operation and contamination from use of the WRD and TSF.

- Indirect impacts to flora and vegetation including:
  - 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 conservation 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.
- Indirect impacts to terrestrial fauna including:
  - vibration, noise, light and dust impacts
  - 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 fauna habitats
  - fragmentation and reduced connectivity between fauna habitats
  - fauna becoming trapped in excavations
  - vehicle strike
  - habitat degradation due to weed invasion
  - increase in the numbers of scavengers and/or non-native fauna, resulting in increased competition for native fauna and predation by feral fauna
  - seepage from wet TSFs or leaking from pumping of wet tailings resulting in soil and water contamination
  - spillage of hydrocarbons and other chemicals.
- Changes to hydrological conditions.
  - Groundwater drawdown from Karara pit dewatering (approved activity) will extend into Karara Conservation Park see **Figure 8.2**.
  - Small changes to surface water flow depth will occur to the south of the proposed TSF expansion – see **Figure 8.5**
- Indirect impacts to Aboriginal cultural values and recreational values including:
  - dust, water and sediment run off
  - noise and light spill
  - changes in visual amenity due to introduction of additional changes to the landscape

These impacts may also result in changes to and impacts upon the visual amenity, public access and visitation of Karara Rangeland Park and Mungada Ridge National Park. Due to the distance between activities associated with the Proposal and the closest publicly accessible areas of Karara Rangeland Park impacts upon recreational use of the Park is considered unlikely.

Any existing indirect impacts will continue to occur alongside new impacts associated with the Proposal. These impacts are not anticipated to increase however will occur over a longer period due to the mine life extension.

An indirect impact zone has been defined as a buffer of 50 m surrounding the proposed mitigated disturbance footprint, where indirect impacts may occur. This buffer accounts for edge effects such as dust emissions, saline water impacts from dust suppression, weeds and accidental land clearing. The mitigated indirect impact zone is 127.4 ha and intersects with Karara Conservation Park as shown in **Figure 11.8**.

## 11.7 Mitigation

This section describes the mitigation measures that have been applied during design of the Proposal and the mitigation measures that will be applied during detailed design, construction, and operations, to minimise the Proposal's impact on social surroundings.

The mitigation hierarchy of avoid, minimise, rehabilitate, and offset has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023b). The mitigation measures listed below are arranged according to the mitigation hierarchy.

The following measures have been implemented to **avoid** potential impacts to social surroundings:

- The Combined Proposal's DE and DF has been designed to avoid known Registered sites and OHPs, and other culturally significant features (i.e. waterways/water sources) where practicable. As the Combined Proposal DE is predominantly covered by Yamatji Nation ILUA, all Aboriginal heritage surveys will be facilitated by KML to include involvement of the relevant Yamatji Nation claimant groups. At the request of YSRC, any disturbance at areas that have not been surveyed for the Proposal will be monitored by representatives of the Yamatji Nation.
- An AHMP has been implemented for the Proposal, and outlines management measures and a procedural framework for the avoidance of existing and potential unidentified Aboriginal sites and materials during Proposal works (i.e. construction, mining).
- KML's Approvals Request and Ground Disturbance (AR/GD) system establishes a formal process for the protection of all recorded and unrecorded Aboriginal heritage sites, during all phases of development planning and execution of disturbance activities. The AR/GD system includes:
    - Spatial mapping and delineation of all proposed ground disturbance activities, including a desktop review against the DPLH database and KML's internal GIS records to identify known Aboriginal heritage sites.
    - Crosschecking proposed ground disturbance against conditions of relevant regulatory approvals and legislative conditions, including those under the AHA, are met prior to the commencement of disturbance.
    - Informing all relevant company and contractor personnel involved in ground disturbance works of requirements under the AR/GD and ground disturbance process prior to commencement of disturbance (i.e. through mandatory training and induction sessions).

- Engaging Yamatji Nation governing body (e.g. Yamatji Southern Regional Corporation (YSRC)) prior to the proposed disturbance to determine whether surveys are needed, and where identified to be required, completion of these surveys via qualified heritage consultants then in collaboration with Yamatji Nation representatives. Survey findings are incorporated into KML's internal GIS system for future planning.
- Supervision of ground disturbance activities occurring proximal to heritage sites (i.e. within 20 m) to ensure no disturbance occurs. Traditional Owners may also be engaged to monitor initial ground-disturbing activities at these locations.
- Providing a process for the systematic documentation of cultural heritage obligations in a register, subject to regular audits.

The following measures have been implemented to **minimise** potential impacts to social surroundings.

- Any new Aboriginal heritage or cultural values identified from surveys will be avoided where feasible, however where avoidance is not possible, the Aboriginal Heritage Management Plan includes measures for the minimisation of potential impacts:
  - All Aboriginal heritage surveys will be facilitated by KML to include involvement of the YSRC.
  - Following the discovery of cultural material, potential cultural material, or a possible Aboriginal heritage site, contingency procedures include the immediate cessation of related works and the triggering of a formal response that includes assessment of the site by qualified heritage consultants, Yamatji Nation Traditional Owners and DPLH, and the subsequent development of suitable management strategies.
  - Reporting of all potential Aboriginal heritage site (not previously identified) discovered during the Proposal works to DPLH in accordance with compulsory reporting requirements under section 15 of the AHA.
- For any impacts to Aboriginal heritage or cultural values that cannot be avoided:
  - Disturbance of Aboriginal heritage sites at the Proposal may require consent under section 18 of the AHA and will be discussed and agreed upon with the relevant Traditional Owners prior to undertaking any activities that could cause impacts. Disturbance to OHPs will be discussed with relevant Traditional Owners prior to undertaking any activities that could cause impacts.
- The management of any Aboriginal heritage and cultural values identified by the Yamatji Nation that are at risk of disturbance will be managed in collaboration between KML and the relevant Native Title claimant group.
- Where possible, the Yamatji Nation will not be excluded from traditional land use practises or land use areas unless there is a safety implication.
- KML will continue to consult with and maintain a strong working relationship with the Yamatji Nation throughout the life of the Proposal, including closure. Consultation will be conducted in accordance with the existing Yamatji Proponent Standard Heritage Agreement (YPSHA) between KML and the Yamatji Nation, as well as in accordance with engagement procedures outlined in KML's Stakeholder Engagement Plan, which specifies consultation procedures for the Yamatji Nation and Widi Mob.
- Mitigation measures as defined for other environmental factors will mitigate the impacts to conservation reserves.

These measures are outlined in the Project's AHMP, which directs the respective measures during various phases of the Proposal (i.e. during design, construction, operations etc.).

Mitigation measures as defined for other environmental factors will mitigate the impacts to conservation reserves.

## 11.8 Residual Impacts

### 11.8.1 Aboriginal Heritage Values Subject to AHA Processes

As noted in **Section 11.6.2**, the Combined Proposal DF and locations of Proposal infrastructure (i.e. the TSF) have predominantly been designed to completely avoid newly identified heritage sites. One site, the Karara South CMT, will be salvaged and relocated outside of the Combined Proposal DF. Approval under section 18 of the AHA will be sought for the removal of the Karara South CMT, and the Widi Mob has advised their satisfaction with the relocation of the tree as an acceptable site management conservation and protection strategy.

KML has already received consent under section 18 of the AHA for disturbance of registered Aboriginal heritage sites within the Combined Proposal DE. KML will continue to implement measures and procedures detailed in both the AHMP as well as management conditions outlined in the Proposal's ground disturbance permit to ensure compliance with section 18 consents. Where additional disturbance is found to be required at these sites, consent will be sought under section 18 of the AHA in consultation with the Yamatji Nation.

Where avoidance is not possible at OHPs, the Proposal's AHMP includes measures for the minimisation of potential impacts that includes consultations with the YSRC prior to undertaking any activities that could cause disturbance. Impacts to OHPs are not expected to be significant and would be minimised as far as reasonably practicable through consultation with Traditional Owners.

### 11.8.2 Aboriginal Heritage Values Not Subject to AHA Processes

#### 11.8.2.1 Unknown Aboriginal Heritage Values

Disturbance of Aboriginal heritage is unlikely to occur as a result of the Proposal. As discussed in **Section 11.4.2**, historic Aboriginal heritage surveys have covered 59.1% of the Combined Proposal DE and 94.5% of the Combined Proposal DF and have historically targeted defined development footprints for the KIOP and MIOP infrastructure.

In the unlikely event that cultural material, potential cultural material, or a possible unknown Aboriginal heritage site are identified as a result of Proposal activities, the AHMP includes contingency measures for the minimisation of potential impacts to unknown heritage. These measures largely involve the immediate cessation of related works and trigger response procedures centred upon the assessment of newly discovered heritage with Yamatji Nation Traditional Owners, and compulsory reporting to DPLH in accordance with the AHA. It's expected that these measures will ensure that potential impacts to unknown Aboriginal heritage at the Proposal will be minimised to the extent that is reasonably achievable, and associated impacts are unlikely to be significant.

#### 11.8.2.2 Water Sources

Sites that hold water ephemerally are important for Yamatji Nation claimant groups, as these locations predominantly dictated the travel through the landscape by Traditional Owners ancestors dependant on water availability. Consultations with the Yamatji Nation for the Proposal has identified cultural and spiritual significance in the intrinsic association between ephemeral water sources and Aboriginal heritage sites, especially where granite features and gnamma holes are closely associated. Potential disturbance to these sites risks impacts Aboriginal cultural integrity at the site itself as well as the broader cultural landscape, and Traditional Owners have stressed the need for protection to ensure the cultural, historical, and traditional relevance of these sites is maintained.

No impacts to water sources are expected to occur as a result of the Proposal. The Proposal has been designed to avoid newly identified Aboriginal heritage sites, including gnamma holes.

#### 11.8.2.3 Ethnographic and Ethnobiological Values

The Proposal has been designed to avoid impacts to existing Aboriginal heritage, as well as six newly identified Aboriginal heritage sites located in the expansion area. A culturally modified tree (Karara South CMT) will be salvaged at the request of the Yamatji Nation claimant group Widi Mob, who consider the relocation of this tree to be an acceptable site management conservation and protection strategy for this site.

Potential impacts to flora/fauna species are outlined in **Section 5.0 – Flora and Vegetation**, a **Section 6.0 – Terrestrial Fauna** respectively.

### 11.8.3 Conservation Reserves

The potential indirect impacts of the Proposal to Karara Conservation Park and Mungada Ridge National Park are summarised and assessed in **Table 11.9**.

The impact assessment for each environmental factor also assesses indirect impacts that might extend into the conservation reserves. Those assessments have been considered here.

The risk of indirect impacts to the conservation reserves is rated very low to low.

**Table 11.9 Risk of Indirect Impacts to Conservation Reserves**

| Indirect Impact | Impacted Aspects | Likelihood of Impact | Consequence of Impact | Impact Level | Basis of Assessment |
|---|---|---|---|---|---|
| **Generation of dust or noise impacting surrounding conservation areas** | Flora and Vegetation<br>Terrestrial Fauna<br>Social Surroundings | Possible | Minor | Low | Assessment of the Proposal has determined that the generation of dust and noise are likely. However, with the implementation of mitigation measures the potential impact to offsite areas including surrounding conservation areas is low. Dust mitigation and management actions are described in **Section 12.2**.<br>Potential for offsite impacts is greater for activities undertaken in locations immediately adjacent to conservation areas. These will primarily comprise topsoil stockpiling and similar activities, which will be intermittent in nature. |
| **Light spill into offsite areas** | Flora and Vegetation<br>Terrestrial Fauna<br>Social Surroundings | Possible | Minor | Low | The potential for light spill is possible. However, the proposed activities will be only 300 m closer to Karara Conservation Park than the approved KIOP activities. Therefore, the potential increased light spill is low. |
| **Pollution events impacting offsite aspects** | Flora and Vegetation<br>Terrestrial Fauna<br>Inland Waters<br>Social Surroundings | Unlikely | Moderate | Low | Pollution events could occur during construction or operational activities however with the implementation of incident response and corrective actions it is unlikely to impact offsite areas including surrounding conservation areas.<br>Potential for offsite impacts is greater for activities undertaken in locations immediately adjacent to conservation areas, which includes the WRD and TSF. The WRD and TSF will be assessed and managed by DMPE to meet the following outcomes:<br>• Mined and processed materials are managed to ensure any seepage and drainage is contained or controlled so that environmental values are protected.<br>• All environmentally hazardous chemicals, rubbish and materials are removed from site or stored in a manner that prevents detrimental impacts to the surrounding environment.<br>• Mined and processed material stockpiles are managed to be safe and geotechnically stable. |

| Indirect Impact | Impacted Aspects | Likelihood of Impact | Consequence of Impact | Impact Level | Basis of Assessment |
|---|---|---|---|---|---|
| | | | | | • Mining activities are managed to prevent erosion and sedimentation leading to detrimental impacts to the surrounding environment. |
| **Hydrological changes impacting offsite areas** | Flora and Vegetation<br>Terrestrial Fauna<br>Inland Waters<br>Subterranean Fauna<br>Social Surroundings | Unlikely | Moderate | Low | There are no predicted significant residual impacts from groundwater drawdown from the Karara open pit, as there are no significant groundwater-dependent environmental values within the predicted groundwater drawdown extent.<br>The KIOP MLE Proposal is not expected to result in any significant residual impacts to surface water, as the predicted impact will be only a small change in surface water flow depth in existing drainage lines south of the TSF.<br>Further details regarding assessment of impacts to Inland Waters are provided in **Section 8.0**. |
| **Introduction of weeds impacting offsite areas** | Flora and Vegetation<br>Terrestrial Fauna<br>Social Surroundings | Unlikely | Minor | Low | The introduction and/or proliferation of weeds has the potential to occur during construction and operational activities. However, with the implementation of mitigation measures it is unlike to impact offsite areas including surrounding conservation areas. |
| **Changes to visual landscape within publicly accessible areas of conservation areas** | Social Surroundings | Unlikely | Minor | Very Low | Due to the distance between the Proposal and publicly accessible areas of the conservation areas it is unlikely that changes to the visual landscape will be significant. |
| **Changes to recreational amenity of publicly accessible areas conservation areas** | Social Surroundings | Possible | Minor | Low | Due to the distance between the activities and publicly accessible areas of the conservation areas it is unlikely that impacts associated with the Proposal will impact the recreational amenity. |

**Table 11.10 Qualitative Likelihood Definitions**

| Likelihood Rating | Qualitative definition |
|---|---|
| **Almost Certain** | The event is expected to occur multiple times over the life of the Project, or has occurred frequently in comparable facilities under similar conditions. |
| **Likely** | The event could reasonably be expected to occur at least once over the life of the Project, based on industry experience or sites specific conditions. |
| **Possible** | The event is known to occur in the industry but is not expected under normal operating conditions at this site; could occur under credible abnormal or external conditions. |
| **Unlikely** | The event is not expected to occur but remains credible under a combination of abnormal conditions, failures or external factors. |
| **Rare** | The event is highly unlikely to occur over the life of the Project but cannot be ruled out entirely at planning stage. |

**Table 11.11 Qualitative Consequence Definitions**

| Consequence Level | People | Property & Infrastructure | Environment |
|---|---|---|---|
| **Insignificant** | No injury or health impact. | Negligible damage; no interruption to operations. | No measurable environmental impact. |
| **Minor** | Minor injury requiring first aid only. | Localised, easily repairable damage. | Minor, short-term and localised environmental impact. |
| **Moderate** | Medical treatment injury to one or more persons. | Damage to equipment or associated infrastructure with short-term operational disruption. | Localised contamination requiring cleanup but no long-term harm. |
| **Major** | Serious injury or multiple injuries; potential for life-threatening exposure within the site. | Significant damage to infrastructure or adjacent infrastructure | Offsite or persistent environmental impact requiring regulatory involvement. |
| **Severe** | Fatality or multiple life-threatening injuries. | Major damage extending beyond the Proposal footprint. | Widespread or long-term environmental harm. |

**Table 11.12 Risk Matrix**

| Likelihood \| Consequence | Insignificant | Minor | Moderate | Major | Severe |
|---|---|---|---|---|---|
| **Almost certain** | Medium | High | Very high | Extreme | Extreme |
| **Likely** | Low | Medium | High | Very high | Extreme |
| **Possible** | Very low | Low | Medium | High | Very high |
| **Unlikely** | Negligible | Very low | Low | Medium | High |
| **Rare** | Negligible | Negligible | Very low | Low | Medium |

## 11.9 Proposed Environmental Outcomes

Proposed environmental outcomes and conditions to protect social surroundings are provided in **Table 11.13** Implementation of the Proposal in accordance with the Proposal Content Document and proposed outcomes-based conditions will protect social surroundings.

**Table 11.13 Proposed Environmental Outcomes for Protection of Social Surroundings**

| Proposed Environmental Outcomes | Consistent with EPA Objective? | How Can Environmental Outcomes be Measures and Assured? | Proposed Outcome-based Conditions |
|---|---|---|---|
| **Avoid impacts to six newly identified Aboriginal heritage sites that are outside of the Combined Proposal DF.** | Yes | Proposal design has avoided impacts to registered Aboriginal heritage sites.<br>Implementation of Aboriginal Heritage Management Plan (AHMP).<br>Consultation with the Yamatji Nation in accordance with the YPSHA and Stakeholder Engagement Plan.<br>Salvage and relocation of the culturally modified tree (Karara South CMT). | The Proposal will not result in any disturbance to newly identified or registered Aboriginal heritage sites within or surrounding the Combined Proposal DE.<br>Newly identified Aboriginal heritage sites have been avoided. Registered sites within the Combined Proposal DE have already received consent under section 18 of the AHA.<br>KML will take all reasonable steps to consult with the YSRC for proposed disturbance of lodged sites.<br>No cumulative impacts to Aboriginal heritage are expected. |
| **Yamatji Nation people are informed of ground disturbance and relevant development issues in a timely manner.** | Yes | Implementation of the AHMP.<br>Consultation with the Yamatji Nation in accordance with the YPSHA and Stakeholder Engagement Plan. | KML will take reasonable steps to consult with the relevant Yamatji Nation claimant groups on the implementation of the Proposal and the protection of Aboriginal heritage and cultural values within and adjacent to the Proposal. |

# 12.0 Other Environmental Factors

## 12.1 Terrestrial Environmental Quality

The EPA defines Terrestrial Environmental Quality as 'the chemical, physical, biological and aesthetic characteristics of soils' (EPA, 2016d). This section discusses direct impacts to soil properties though it is recognised that soil is inherently linked to other environmental values such as Flora and Vegetation and Landform, which are discussed in relevant sections of this ERD.

The potential impacts have previously been assessed and are not expected to substantially change with continuing operations under the KIOP MLE. This section provides a summary of updated information and current management strategies.

Terrestrial environmental quality will be effectively managed through continued implementation of KML environmental management procedures and regulation by DMPE. The environmental impact assessment for Terrestrial Environmental Quality is provided in **Table 12.1**.

**Table 12.1 Terrestrial Environmental Quality Factor Assessment**

| | |
|---|---|
| **EPA Objective** | To maintain the quality of land and soils so that environmental values are protected. |
| **Guidance and Policy** | • *Statement of Environmental Principles, Factors, Objectives and Aims of EIA* (EPA, 2023b).<br>• *Environmental Factor Guideline – Terrestrial Environmental Quality* (EPA, 2016d).<br>• *Guideline for Preparing Mining Development and Closure Proposals* (DMPE, 2025). |
| **Receiving Environmental Values** | The receiving environment relevant to terrestrial environmental quality is the soil quality, including suitability for use in revegetation.<br>The major soil type within the Karara region is massive red clay loams, although sands and sandy loams occurred in some areas.<br>Topsoils are typically poorly developed with only a minor accumulation of organic matter and nutrients, are non-saline and non-sodic with a pH range from acidic (pH5.1) to neutral (pH 7.3). |
| **Potential Impacts** | There is the potential for terrestrial environmental quality to be adversely impacted by:<br>• acid rock drainage (ARD) from PAF material in the WRD<br>• suspended sediment in runoff from construction and operation of the WRD, and erosion of the WRD landform<br>• seepage or leaching of poor-quality water from the TSF<br>• erosion of the dry stack TSF and suspended sediment in runoff from the TSF.<br>Updated waste rock geochemical characterisation has been undertaken to support the mine life expansion (RGS Environmental, 2021) (**Appendix 1-3**). The characterisation concluded that 56% of the waste rock samples were non-acid forming (NAF), with 44% classified as uncertain, potentially acid forming or acid-forming.<br>The risk of saline drainage was also assessed, with 66% of material classified as low risk of saline drainage, 11% moderate risk, and 23% high risk. The materials at high risk of saline drainage were largely associated with PAF material. Thus, the saline drainage risk will be mitigated by the PAF management methods.<br>The classification concluded there was a low risk of metalliferous leaching. |

| | |
|---|---|
| | Geochemical characterisation of the tailings was undertaken by Graeme Campbell and Associated in 2007, and the results were summarised in the recent *Dry Stack Tailings Storage Facility Southern Expansion Design Report* (Red Earth Engineering, 2023) (**Appendix 1-5**). This is the design report for the currently approved extent of the Dry Stack TSF. The tailings were classified as NAF, with pH between 7.8 and 8.4 (Red Earth Engineering, 2023). Trace element concentrations were generally low and were not considered to represent a significant risk of leaching under neutral pH conditions (Red Earth Engineering, 2023). The dry stack tailings are typically 15-18% moisture content (Red Earth Engineering, 2023). |
| **Mitigation and Management Actions** | Potential adverse impacts to terrestrial environmental quality will be mitigated in accordance with existing KML environmental management processes, as summarised below.<br>**Potential Acid Forming (PAF) Material**<br>PAF material will be managed as per the *PAF Material Management Procedure* (CORP-EN-PRO-1051) (**Appendix 1-4**). Key management measures include:<br>• Complete laboratory assays of mine material to identify PAF.<br>• Dispose of all PAF material in specially designed and designated PAF isolation cells within the WRD. The design of these cells ensures long term isolation from groundwater and surface water. The PAF cell design will be consistent with existing KIOP operations, which have proven to be effective in preventing ARD.<br>• Record the locations of these cells for future reference including during mine closure.<br>• Conduct monitoring of acidity, salinity and metals in a bore adjacent to the WRD to detect any contamination. Monitoring to date has not demonstrated any concerning results.<br>**Dry Stack TSF**<br>• Most of the tailings deposited is dry-stack tailings, with relatively low moisture content, which minimises the risk of seepage or runoff from the TSF (Red Earth Engineering, 2023).<br>• Design assumes operational outer slope of 35 degrees, which is conservative as the actual outer slope during operations has been recorded as 43–45 degrees.<br>• TSF Operator to shape the upper surface of the TSF to allow water to drain away from the outer edge of the facility to protect the safety windrows from ponding.<br>• Clean stormwater diversion around the TSF to the retention pond, with stormwater diversion channels designed for a 100-year Annual Exceedance Probability rainfall event.<br>• Reshape outer slopes of the TSF to achieve closure landform, nominally 18-degree slopes with 5 m wide benches retained at TSF lifts.<br>• Soil salinity is monitored adjacent to the existing KIOP TSF, with monitoring results ranging from 0.6 mS/m to 4.0 mS/m, indicating no salinity above detection levels (<22 mS/m) since commencement of monitoring in 2014.<br>• Groundwater quality is monitored near the existing KIOP TSF. The results show that groundwater quality has remained relatively consistent since monitoring commenced, with neutral to slightly acidic or slightly alkaline pH (5.3–8.1), brackish to hypersaline salinity (total dissolved solids 1,440-53,580 mg/L) and standing water level 0.6–17.5 m below ground level.<br>**Surface Water**<br>Surface water will be managed as per the *Surface Water Management Procedure* (CORP-EN-PRO-1011) (**Appendix 8-8**). Key management measures include:<br>• Sediment and erosion management including water discharge via sediment reduction controls, inspection of erosion and sediment control structures post heavy rainfall events, contouring to reduce velocity of water flow.<br>• Hazardous material management to ensure appropriate storage and containment. |

| | |
|---|---|
| | • Direct surface water drainage from the WRD to connect to the site stormwater management system, and recover stormwater for operational use to minimise the potential for sediment discharge off site.<br>**Soil**<br>Soil monitoring is undertaken in accordance with the *Flora and Vegetation Health Monitoring Plan* (CORP-EN-PLN-1012) (**Appendix 5-5**), which includes:<br>• Complete regular sampling and analysis of surface soil samples to check for salinity.<br>• Undertake visual erosion assessment as designated monitoring points to identify land instability and sedimentation.<br>**Other Decision-Making Authorities**<br>The MDCP that will be submitted to and assessed by DMPE will consider the following aspects of Terrestrial Environmental Quality: topsoil management and availability of growth media for closure and revegetation, storage of mined materials (WRD, TSF) during operations and post-closure landforms, risk of environmental contamination, erosion and sedimentation, or engineering landform failure.<br>DMPE's objective for terrestrial environmental quality is to maintain the quality of land and soils so that environmental values are protected (DMPE, 2024), which corresponds with the EPA objective. |
| **Residual Impacts and Predicted Outcome** | The Proposal is expected to meet the EPA and DMPE objective to maintain terrestrial environmental quality.<br>DMPE standard environmental or closure outcomes that are expected to apply to the Proposal include (DMPE, 2025):<br>• Mined and processed materials are managed to ensure any seepage and drainage is contained or controlled so that environmental values are protected.<br>• All environmentally hazardous chemicals, rubbish and materials are removed from site or stored in a manner that prevents detrimental impacts to the surrounding environment.<br>• Mined and processed material stockpiles are managed to be safe and geotechnically stable.<br>• Mining activities are managed to prevent erosion and sedimentation leading to detrimental impacts to the surrounding environment.<br>• All suitable topsoil, growth media or rehabilitation resources shall be harvested, stored and maintained in a manner that allows for its successful use in rehabilitation. |

## 12.2 Air Quality

The EPA defines Air Quality as 'the chemical, physical, biological and aesthetic characteristics of air' (EPA, 2020a). The EPA focus for Air Quality is protection of human health and amenity and minimising discharge of waste into the air.

The potential impacts have previously been assessed and are not expected to substantially change with continuing operations under the KIOP MLE Proposal. Existing mitigation measures have already proven effective, and no exceedances of air quality standards have been recorded at the closest sensitive receptors (i.e. Karara Homestead). This section provides a summary of updated information and current management strategies.

Air quality will be effectively managed through continued implementation of KML environmental management procedures and regulation by DWER. The environmental impact assessment for air quality is provided in **Table 12.2**.

**Table 12.2 Air Quality Factor Assessment**

| | |
|---|---|
| **EPA Objective** | To maintain air quality and minimise emissions so that environmental values are protected (EPA, 2020a).<br>In the context of this factor and objective, the EPA recognises that maintaining good air quality and minimising emissions protects human health and amenity, as well as the broader environment (EPA, 2020a). |
| **Guidance and Policy** | • *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023b).<br>• *Environmental Factor Guideline – Air Quality* (EPA, 2020a).<br>• *Guideline – Dust Emissions (draft)* (DWER, 2021).<br>• *Guideline – Air Emissions (draft)* (DWER, 2019)<br>• *National Environmental Protection (Ambient Air Quality) Measure 1998, as amended 2016* (Cth). |
| **Receiving Environmental Values** | The nearest sensitive receptor is the Karara Homestead, which is approximately 3 km from the proposed TSF expansion and more than 10 km from the proposed WRD expansion footprint.<br>Karara Homestead may be utilised by Bundi Yamatji Aboriginal Corporation (BYAC) as part of the Yamatji Nation Indigenous Land Use agreement (YNILUA). However, no permanent residents reside in this homestead. |
| **Potential Impacts** | The continued operations under the KIOP MLE Proposal will not result in any increase to air emissions of pollutants, such as those associated with diesel use, as the continuing operations are not expected to increase the use of diesel significantly and low-emissions diesel is being used for the current KIOP and the proposed KIOP MLE.<br>Expansion of the WRD and TSF could result in dust emissions during waste rock and TSF deposition and from the facilities during periods of strong winds. |
| **Mitigation and Management Actions** | Potential adverse impacts to air quality will be mitigated in accordance with existing KML environmental management processes, as summarised below.<br>**Dust**<br>Dust will be managed as per the *Dust Management Plan* (CORP-EN-PLN-1010) (**Appendix 12-1**), *Dust Management and Monitoring Procedure* (CORP-EN-PRO-1005) (**Appendix 12-2**) and *Flora and Vegetation Health Monitoring Plan* (CORP-EN-PLN-1012) (**Appendix 5-5**). Key management measures include:<br>• Undertake monthly monitoring of dust deposition at three locations near the dry stack TSF with analysis by a NATA accredited laboratory. Dust deposition is compared to the vegetation protection threshold of 10 g/m$^2$/month. This threshold has only been exceeded during one period in 2017 at a site near the Karara open pit. Typical depositional dust levels at KIOP mine site are 0.5-6.9 g/m$^2$/month, with ambient background levels 0.2-3.6 g/m$^2$/month. The guideline value for depositional dust for protection of human amenity (for sensitive receptors) is 4 g/m$^2$/month (maximum) and 2 g/m$^2$/month (above background) (DWER, 2021). Although the depositional dust concentrations at the KIOP mine site exceed these guidelines, there are no sensitive receptors at the mine site.<br>• Monitor real time ambient air quality at sensitive receptor sites.<br>• Undertake dust monitoring at Karara Homestead and comparison of recorded dust levels to National Environmental Protection Measure ambient air quality standards for $PM_{10}$ (50 µg/m$^3$ 24-hour average) and $PM_{2.5}$ (25 µg/m$^3$ 24-hour average). Long term dust monitoring has shown no exceedances of standards at the Karara Homestead that have been attributable to KIOP.<br>• Implement dust management measures, such as water sprays and cessation of work during windy periods. |

| | |
|---|---|
| **Residual Impacts and Predicted Outcome** | The Proposal is expected to meet the EPA objective to maintain air quality and minimise emissions.<br><br>The Proposal will be managed to maintain compliance with the following condition (2) in Licence L8721/2013/2: Manage dust lift-off from active construction and operational areas to protect the environment by preventing and, where that is not possible, minimising dust emissions that may cause unreasonable emissions, pollution or environmental harm. |

# 13.0 Residual Impacts and Offsets

Under the *WA Environmental Offsets Policy* (Government of Western Australia, 2011) environmental offsets are used to counterbalance significant residual impacts from a proposal. Residual impacts are unavoidable impacts that remain after avoidance, minimisation and rehabilitation. Offsets are actions undertaken outside the disturbance envelope and can be direct (i.e. restoration) or indirect (i.e. research). In accordance with the *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014) environmental offsets will only be applied where the residual impacts of a proposal are determined to be significant after avoidance, minimisation and rehabilitation measures were pursued.

This section summarises the significant residual impacts and proposed offsets.

## 13.1 Significant Residual Impacts

The significance of residual impacts resulting from the KIOP MLE mitigated disturbance footprint and potential for offset requirements have been assessed according to the:

- *WA Environmental Offsets Guidelines* (Government of Western Australia, 2014). The guidelines provide a framework for consistent application of environmental offsets to protect and conserve environmental and biodiversity values.
    - Residual Impact Significance Model outlined in the guidelines. Residual impact assessments for each environmental factor are presented in **Table 13.1**.
    - WA Offsets Template was used to assess the significance of impacts and requirement for offsets to meet EPA expectations.
- *Matters of National Environmental Significance – Significant impact guidelines 1.1* (Department of the Environment, 2013)
- International Union for Conservation of Nature (IUCN) Red List Categories and Criteria, as outlined in:
    - *Guidelines for assessing the conservation status of native species according to the EPBC Act* (Threatened Species Scientific Committee (TSSC), 2024a)
    - *Guidelines for nominating and assessing the eligibility for listing of ecological communities as threatened under national environmental law* (Threatened Species Scientific Committee (TSSC), 2024b).

The separate report *KIOP MLE Review Significance of Residual Impacts* (Umwelt, 2026c) presents the detailed evidence and assessment of significance of residual impacts to flora, ecological communities, landforms and fauna from the mitigated Proposal.

The assessment determined that residual impacts to the following ecological values are **considered significant** and would require an offset:

- Fauna:
    - Western Spiny-tailed Skink (Endangered – EPBC Act, Vulnerable – BC Act)
    - Malleefowl (breeding and foraging habitat) (Vulnerable – EPBC Act & BC Act)
    - *Idiosoma formosum* (Endangered – BC Act).

The residual impacts to the following ecological values are **potentially significant** and may require an offset:

- Flora:
  - *Persoonia pentasticha* (P3)
  - *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
  - *Crassula* sp. nov (undescribed species)
- Fauna:
  - Gilled Slender Blue-tongue (Vulnerable – BC Act)
  - Unidentified trapdoor spider (Aganippe (*Idiosoma*) sp.) (potential new species)
  - Karara Millipede (*Antichiropus* sp. nov. 'Karara') (short range endemic).

**Table 13.1** summarises the residual impacts that are considered significant or potentially significant, and those that were assessed and determined to be not significant.

**Table 13.1 Residual Impact Significance Model by Environmental Factor for KIOP MLE Mitigated Proposal**

| Significance Model | Flora, Vegetation and Ecological Communities | Terrestrial Fauna |
|---|---|---|
| **Residual impact that is environmentally unacceptable and cannot be offset** | Nil | Nil |
| **Significant residual impacts that will require an offset** | Nil | • Direct impact to 239.1 ha of habitat, 7 recorded active colonies and 326 potentially suitable colony sites (log piles) for Western Spiny-tailed Skink (*Egernia stokesii badia*) (Endangered – EPBC Act, Vulnerable – BC Act)<br>• Direct impact to 692.6 ha of nesting / foraging habitat, 239.1 ha of foraging only habitat, 2 recently active mounds and 27 historic mounds for Malleefowl (*Leipoa ocellata*) (Vulnerable – EPBC Act & BC Act)<br>• Direct impact to 811.3 ha of habitat and 167 recorded burrows of Ornate Trapdoor Spider (*Idiosoma formosum*) (Endangered – BC Act) |
| **Significant residual impacts that may require an offset** | • Direct impact to 363 individuals and 651.7 ha of habitat for *Persoonia pentasticha* (P3)<br>• Direct impact to 172 locations and 146.6 ha of habitat for *Caesia* sp. Koolanooka Hills (P1)<br>• Direct impact to 2 locations and 90.8 ha of habitat for *Crassula* sp. nov. (undescribed species) | • Direct impact to 612.6 ha of habitat and zero known locations of Gilled Slender Blue-tongue (*Cyclodomorphus branchialis*) (Vulnerable – BC Act)<br>• Direct impact to 3.8 ha of habitat and zero known locations of Aganippe (*Idiosoma*) sp.) (potential new species) |

| Significance Model | Flora, Vegetation and Ecological Communities | Terrestrial Fauna |
|---|---|---|
| | | • Direct impact to 369.7 ha of habitat and zero known locations of Karara Millipede (short range endemic) |
| **Residual impacts that are not significant** | • Direct impact to 1,347 individuals and 281.2 ha of habitat for *Acacia karinae* (P3)<br>• Direct impact to 583 individuals and 146.6 ha of habitat for *Allocasuarina tessellata* (P3)<br>• Direct impact to 175 individuals and 253.5 ha of habitat for *Grevillea globosa* (P3)<br>• Direct impact to 944 individuals and 437.8 ha of habitat for *Grevillea scabrida* (P3)<br>• Direct impact to 233 individuals and 134.6 ha of habitat for *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)<br>• Direct impact to 28 locations and 552.0 ha of habitat for *Calotis* sp. Perrinvale Station (P3)<br>• Direct impact to 21 locations and 239.1 ha of habitat for *Gunniopsis divisa* (P3)<br>• Direct impact to 347 individuals and 182.4 ha of habitat for *Rhodanthe collina* (P3)<br>• Direct impact to 104.4 ha of habitat and zero locations for *Eucalyptus synandra* (Vulnerable – EPBC Act, Threatened – BC Act)<br>• Direct impact to 86.9 ha of habitat and zero locations for *Calandrinia* sp. Warriedar (P2), *Millotia dimorpha* (P1) and *Stylidium scintillans* (Threatened – BC Act)<br>• Direct impact to 169.9 ha of habitat and zero locations of *Calandrinia kalanniensis* (P2)<br>• Direct impact to 3.8 ha of habitat and zero locations of *Swainsona picta* (P1)<br>• Direct impact to 89 ha of Blue Hills PEC (P1)<br>• Permanent impact to 32.5 ha of BIF landform | • Direct impact to 841.8 ha of mapped habitat, 7 ha of area of occupancy and zero recorded locations of Southern Whiteface (*Aphelocephala leucopsis*) (Vulnerable – EPBC Act & BC Act)<br>• Direct impact to 1,186.3 ha of potential habitat and zero known locations of Central Long-eared Bat (*Nyctophilus major tor*) (P3)<br>• Direct impact to 599.5 ha of habitat and 29 recorded burrows of Northern Shield-backed Trapdoor Spider (*Idiosoma clypeatum*) (P3)<br>• Direct impact to 369.7 ha of habitat and zero known locations of Millipede PM1 and Mt Gairdner Scorpion. |

## 13.2 Proposed Offset Approach

To counterbalance the residual significant impacts outlined in **Table 13.1**, KML proposes the following broad offsets approach:

- Direct offset site (Innovation Park and surrounding land owned by KML), potentially supplemented by indirect research offset for:
    - Western Spiny-tailed Skink (Endangered – EPBC Act, Vulnerable – BC Act)
    - Malleefowl (breeding and foraging habitat) (Vulnerable – EPBC Act & BC Act)
    - *Idiosoma formosum* (Endangered – BC Act)
- Indirect (research) offsets for ecological values with insufficient species information available to calculate habitat quality scores:
    - Gilled Slender Blue-tongue (Vulnerable – BC Act)
    - Unidentified trapdoor spider (Aganippe (*Idiosoma*) sp.) (potential new species)
    - Karara Millipede (*Antichiropus* sp. nov. 'Karara') (short range endemic)
    - *Persoonia pentasticha* (P3)
    - *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) (P1)
    - *Crassula* sp. nov (undescribed species).

The research-based offsets will be determined in liaison with DBCA and are expected to include the following broad outcomes (applicable per species):

- Further delineate the range or distribution of the species by undertaking further surveys
- Further delineate the habitat requirements / preferences of the species, informed by further surveys and desktop compilation of information where available
- Identify key threatening processes and risks to the species

The proposed direct offsets will be reviewed and calculated with reference to:

- *WA Environmental Offsets Policy* (Government of Western Australia, 2011)
- *Environmental offsets metric: Quantifying environmental offsets in Western Australia* (Government of Western Australia, 2021a) and associated WA Environmental Offsets Calculator.
- *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPC, 2012).
- *EPBC Act Offsets assessment guide* (DCCEEW, 2022a) will be used to calculate impacts and offsets to meet DCCEEW expectations.

Calculation of the habitat quality score (HQS) for each species was based on:

- research into the species' requirements
- ecology survey data for the impact site
- evaluation of rehabilitation outcomes by KML
- desktop information and conservative assumptions for the offset site, to estimate target size of the offset site.

A field survey of the proposed offset site is scheduled for March 2026, which will provide information to update the HQS. An overview of the approach for direct offsets for the KIOP MLE Proposal is provided in **Table 13.2** with more details in the Offset Strategy (**Appendix 13-1**).

**Table 13.2 WA Offsets Template – Approach for Direct Offsets**

| Existing Environment / Impact | Mitigation | | | Significant Residual Impact | Offset Calculation Methodology | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Avoid and Minimise | Rehabilitation Type | Likely Rehabilitation Success | | Type | Risk | Likely Offset Success | Time Lag | Offset Quantification |
| **239.1 ha of Western Spiny-tailed Skink habitat**<br>**7 recorded active Western Spiny-tailed Skink colonies**<br>**326 potentially suitable colony sites (log piles) for Western Spiny-tailed Skink** | **Avoid:** the development envelope avoids several active Western Spiny-tailed Skink colonies located to the east and south of the TSF expansion<br>The development envelope and proposed offset site avoid miscellaneous licence L59/80, which has been used as a translocation site for Western Spiny-tailed Skink in the past. | 239.1 ha (entire cleared habitat area) will be rehabilitated with vegetation comparable with pre-mining vegetation that achieves 70% species composition relative to the corresponding analogue site and no more than 10% or baseline weeds levels.<br>Western Spiny-tailed Skink colonies require log piles with several overlapping logs and dense shrubs. Log piles will be reintroduced into rehabilitated shrubland to provide potential colony sites.<br>York Gum or other hollow log-forming trees such as melaleuca are required to support ongoing regeneration of log piles – the revegetation will aim to reintroduce York Gum woodland. | KML has rehabilitated more than 300 ha to date of areas cleared under MS 805 & 806.<br>Evaluation of rehabilitation monitoring data by Umwelt (2025c) found that rehabilitated vegetation met the 70% species composition (taxon richness) target, typically within two years of completion of rehabilitation.<br>KML will undertake progressive rehabilitation. However, some areas will not be rehabilitated until completion of mining. The maximum time from impact until achievement of rehabilitation benefit (five years after cessation of mining) is 32 years. | 239.1 ha of Western Spiny-tailed Skink habitat (listed as Endangered under the EPBC Act and Vulnerable under the BC Act)<br>Vegetation is in Excellent condition, adjacent to disturbed areas and remnant native vegetation, with relatively high density of potentially suitable colony sites in northern impact area and moderately low density of potentially suitable colony sites in southern impact area. | Innovation Park is freehold land owned by KML and is adjacent to Karara Rangeland Park, which would expand the conservation area.<br>On-ground management to improve vegetation condition, improve habitat suitability by adding log piles or alternate suitable refugia, and planting tree seedlings to enhance future regeneration of log piles. | Land protection – low risk. KML owns the land.<br>On-ground management for restoration – moderate risk. While KML has demonstrated success in revegetation, the offset site is largely degraded agricultural land.<br>On-ground management to add refugia – low risk. Western Spiny-tailed Skink habitat requirements are well defined by published research papers, and this is a relatively low-cost action to implement.<br>On-ground management to enhance tree recruitment – moderate risk as successful tree establishment depends on aspects such as watering or rainfall, wind conditions, etc. | Target completion criteria:<br>• Vegetation condition is rated as excellent throughout offset site.<br>• Moderate density of potential colony sites / refugia (2-4 potential colony sites per 10 ha)<br>• Low density of predators on site (target to be determined after baseline survey).<br>• Management processes balance loss of trees with planting of trees.<br>• Management processes balance loss of logs with additional of alternate refugia.<br>• Western Spiny-tailed Skink active colonies one per 10 ha (target to be confirmed after baseline survey). | Land acquisition / protection – no time delay.<br>On-ground management – estimate 5-10 years for revegetation success, which would be longest time lag component. | Required offset area determined from offset calculator. See Offset Strategy for details (**Appendix 13-1**). |
| **692.6 ha of Malleefowl nesting & foraging habitat**<br>**239.1 ha of Malleefowl foraging only habitat**<br>**2 recently active (since 2020) Malleefowl mounds** | **Avoid:** the disturbance footprint has been reduced at the proposed TSF expansion, which avoids impact to 3 active and 3 historic Malleefowl mounds. | 931.7 ha (entire cleared habitat area) will be rehabilitated with vegetation comparable with pre-mining vegetation that achieves 70% species composition relative to the corresponding analogue site and no more than 10% or baseline weeds levels. | KML has rehabilitated more than 300 ha to date of areas cleared under MS 805 & 806.<br>Evaluation of rehabilitation monitoring data by Umwelt (2025c) found that rehabilitated vegetation met the 70% species composition (taxon richness) target, | 692.6 ha of Malleefowl nesting & foraging habitat (listed as Vulnerable under the EPBC Act and BC Act)<br>239.1 ha of Malleefowl foraging only habitat<br>Vegetation is in Excellent condition, | Innovation Park is freehold land owned by KML and is adjacent to Karara Rangeland Park, which would expand the conservation area.<br>On-ground management to improve shrub and herb species diversity and density, manage risk of | Land protection – low risk. KML owns the land.<br>On-ground management for restoration – moderate risk. While KML has demonstrated success in revegetation, the | Target completion criteria:<br>• Vegetation condition is rated as excellent throughout offset site.<br>• Abundant leaf litter (target to be determined after baseline survey)<br>• High shrub diversity (target to be | Land acquisition / protection – no time delay.<br>On-ground management – estimate 5-10 years for revegetation success, which would be longest | Required offset area determined from offset calculator. See Offset Strategy for details (**Appendix 13-1**). |

| Existing Environment / Impact | Mitigation | | | Significant Residual Impact | Offset Calculation Methodology | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Avoid and Minimise | Rehabilitation Type | Likely Rehabilitation Success | | Type | Risk | Likely Offset Success | Time Lag | Offset Quantification |
| **27 historic Malleefowl mounds** | | Malleefowl foraging habitat requires high shrub density and diversity combined with an open ground layer – this can be reestablished with revegetation.<br>Malleefowl nesting habitat requires a sandy or gravelly soil type – this would be feasible to achieve on flat areas of rehabilitation, but slopes (such as the sides of the WRD) will require rocky substrate for stability. | typically within two years of completion of rehabilitation.<br>KML will undertake progressive rehabilitation. However, some areas will not be rehabilitated until completion of mining. The maximum time from impact until achievement of rehabilitation benefit (five years after cessation of mining) is 32 years. | adjacent to disturbed areas and remnant native vegetation, with relatively low density of Malleefowl mounds in the impact area. | bushfire and eliminate pastoral grazing. | offset site is largely degraded agricultural land.<br>On-ground management to reduce bushfire risk and eliminate grazing – moderate risk.<br>If these activities are already well-managed in the offset site, there will be little room for improvement as part of the offset activities. | determined after baseline survey)<br>• Final bushfire management plan submitted to DBCA.<br>• Offset site fence (or other method as appropriate) is established to prevent incursion of pastoral stock<br>• Offset site is destocked.<br>• Number of active malleefowl mounds is stable or increasing in the offset site or surrounding area. | time lag component. | |
| **811.3 ha of Ornate Trapdoor Spider (*Idiosoma formosum*) habitat**<br><br>**167 recorded burrows of Ornate Trapdoor Spider** | | 811.3 ha (entire cleared habitat area) will be rehabilitated with vegetation comparable with pre-mining vegetation that achieves 70% species composition relative to the corresponding analogue site and no more than 10% or baseline weeds levels.<br>Mapped habitat for Ornate Trapdoor Spider in the Karara Mine Area is typically sandy loam and moderately heavy soils on plains, away from rocky ridges – includes Acacia and mixed shrubland and York Gum Woodland. Sandy loam soils would be feasible to achieve on flat areas of rehabilitation, but slopes (such as the sides of the WRD) will require rocky substrate for stability.<br>Trapdoor spiders rely on leaf litter and twigs to build the trapdoors over their burrow – this can be reestablished with revegetation. | KML has rehabilitated more than 300 ha to date of areas cleared under MS 805 & 806.<br>Evaluation of rehabilitation monitoring data by Umwelt (2025c) found that rehabilitated vegetation met the 70% species composition (taxon richness) target, typically within two years of completion of rehabilitation.<br>KML will undertake progressive rehabilitation. However, some areas will not be rehabilitated until completion of mining. The maximum time from impact until achievement of rehabilitation benefit (five years after cessation of mining) is 32 years. | Rehabilitation credit calculated as 105 ha using WA Environmental Offset Calculator (applicable as this species is not MNES).<br>Residual impact after rehabilitation is 563 ha of Ornate Trapdoor Spider habitat (nesting and foraging) (listed as Endangered under the BC Act).<br>Vegetation is in Excellent condition, adjacent to disturbed areas and remnant native vegetation, with moderate density of Ornate Trapdoor Spider burrows recorded in the impact area. | Innovation Park is freehold land owned by KML and is adjacent to Karara Rangeland Park, which would expand the conservation area.<br>On-ground management to improve vegetation condition, increase leaf litter and twig density, manage risk of bushfire and eliminate pastoral grazing. | Land protection – low risk. KML owns the land.<br>On-ground management for restoration – moderate risk. While KML has demonstrated success in revegetation, the offset site is largely degraded agricultural land.<br>On-ground management to reduce bushfire risk and eliminate grazing – moderate risk. If these activities are already well-managed in the offset site, there will be little room for improvement as part of the offset activities. | Target completion criteria:<br>• Vegetation condition is rated as excellent throughout offset site.<br>• Abundant leaf litter and twig density (target to be determined after baseline survey)<br>• Final bushfire management plan submitted to DBCA.<br>• Offset site fence (or other method as appropriate) is established to prevent incursion of pastoral stock<br>• Offset site is destocked. | Land acquisition / protection – no time delay.<br>On-ground management – estimate 5-10 years for revegetation success, which would be longest time lag component. | Required offset area determined from offset calculator. See Offset Strategy for details (**Appendix 13-1**). |

## 13.3 Proposed Offset Site

The proposed offset site (Innovation Park and surrounding land) is freehold land owned by KML.

The site is immediately west and adjacent to Karara Rangeland Park within the Avon Wheatbelt IBRA bioregion. Part of the Combined Proposal Development Envelope (access road) intersects the offset site (**Figure 13.1**).

The Innovation Park site is approximately 11,000 ha and is largely cleared ex-agricultural land, with some residual native vegetation areas. Malleefowl mounds and Western Spiny-tailed Skink occur in the eastern portion of the proposed offset site, as recorded from KML monitoring data and Atlas of Living Australia records. The Environment Information Viewer (DCCEEW, 2026) classifies Innovation Park environmental values as:

- Biodiversity Values: above 80%, with portions above 90%
- Ecological Representativeness: most areas below 50% (cleared land), with portions above 90% (remnant vegetation).

The proposed offset site has relatively low current ecological value but high potential biodiversity value. The proposed offset site provides linkages with conservation areas that are adjacent to the impact site at the Mine Area. Innovation Park is expected to provide suitable habitat for the direct offset species (Western Spiny-tailed Skink and Malleefowl). The possibility of habitat for Ornate Trapdoor Spider needs to be confirmed. An ecology survey is scheduled for March to confirm the habitat suitability and establish baseline habitat quality score (HQS) for the offset site.

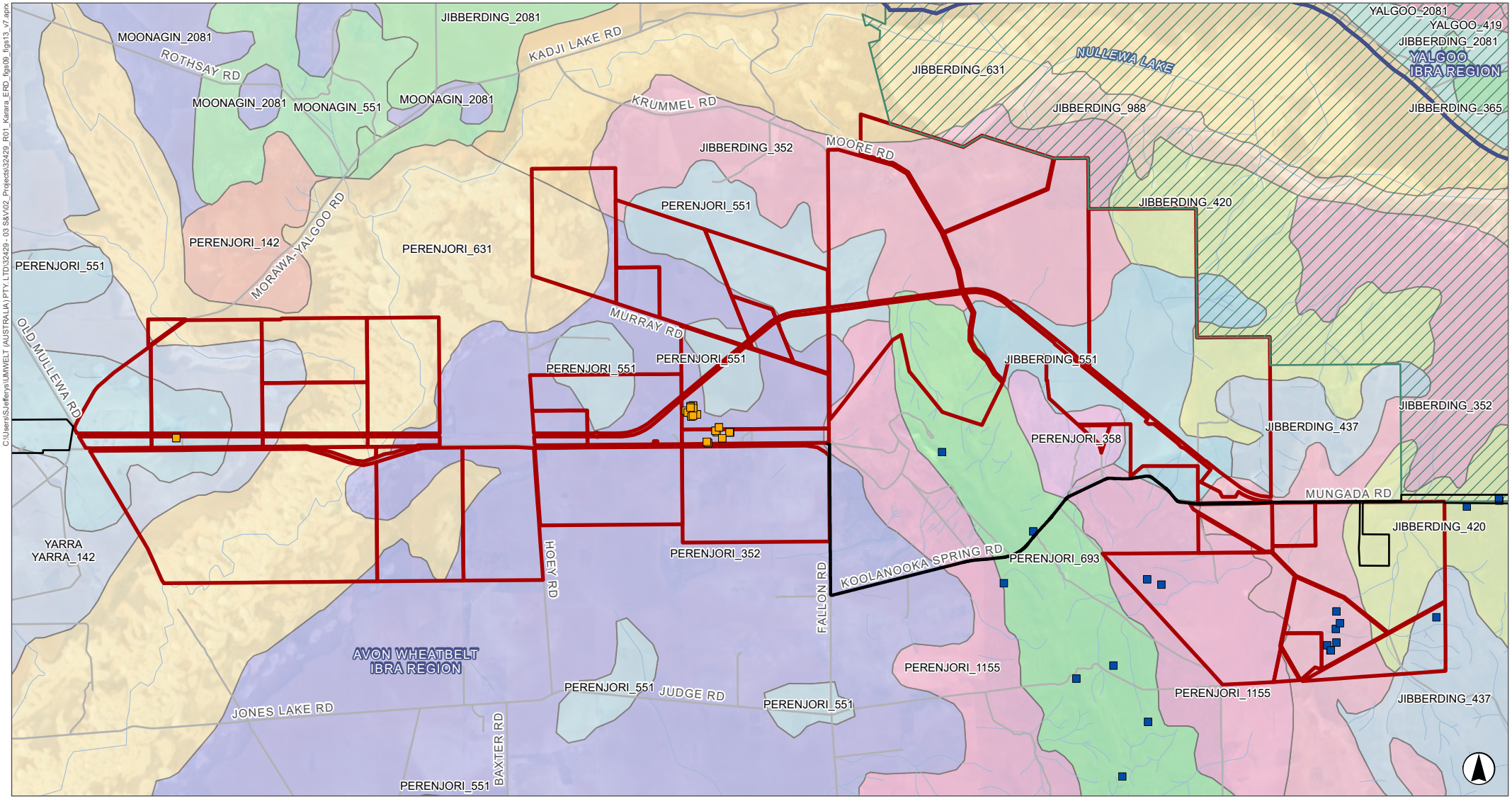
## 13.4 Ecology Survey

The ecology survey of the offset zone will comprise a desktop review, on ground reconnaissance survey and targeted fauna surveys, ensuring that the selected offset areas meet DCCEEW's requirement for recent, field-based evidence of suitable habitat and baseline condition. This process will ensure the proposed offset is both ecologically sound and aligned with offset objectives.

The initial desktop component will review any historical ecology survey results, pre-European vegetation associations, and the topography of the offset site. This will guide fine-scale site selection and highlight areas within the offset zone that are considered to most likely support suitable habitat for the focus taxa. Preference will also be given to locations that enhance ecological linkages across the wider landscape.

The reconnaissance survey will inform site familiarisation, on ground access constraints, and refine priority areas for targeted fauna survey effort. During the field component, the team will assess broad vegetation and substrate associations (VSA) to inform habitat suitability and guide efficient survey design. This initial visit will also include the deployment of remote cameras to commence passive fauna monitoring and support subsequent survey phases.

The targeted fauna surveys will assess whether the proposed offset area contains suitable habitat for Malleefowl, Western Spiny-tailed Skink and *Idiosoma* trapdoor spiders (Northern Shield-backed Trapdoor Spider, Ornate Shield-Backed Trapdoor Spider and an unidentified *Aganippe* species). Surveys will document species presence, habitat use and ecological condition, and establish a clear, repeatable baseline for long-term monitoring. Methods will be informed by general guidance and taxon-specific advice. The HQS and Offset Strategy will be updated following completion of the ecology survey.




Scale: 1:100,000 at A4, GDA2020 MGA Zone 50

**Legend**

- Combined Proposal Mitigated Development Envelope
- Innovation Park
- Karara Rangeland Park
- Road
- Watercourse
- IBRA Regions

**Western Spiny-tailed Skink**

- Active Colony
- Potential Colony

**Malleefowl Mound**

- Historic

**Pre-European Vegetation Associations**

- JIBBERDING_2081
- JIBBERDING_352
- JIBBERDING_365
- JIBBERDING_420
- JIBBERDING_437
- JIBBERDING_551
- JIBBERDING_631
- JIBBERDING_988
- MOONAGIN_2081
- MOONAGIN_551
- PERENJORI_1155
- PERENJORI_142
- PERENJORI_352
- PERENJORI_358
- PERENJORI_551
- PERENJORI_631
- PERENJORI_693
- YALGOO_2081
- YALGOO_365
- YALGOO_419
- YARRA YARRA_142

# FIGURE 13.1
## Nominal Innovation Park Offset Site

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0 2 4 km

**Image Source:** KML (2024), ESRI Basemap (2024) | **Data Source:** Landgate (2022, 2025), DBCA (2025), DCCEEW (2025), DPIRD (2025), KML (2025)

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# 14.0 Matters of National Environmental Significance

A key objective of the EPBC Act is to provide for the protection of the environment, especially MNES. Under the EPBC Act, proposals that have the potential to significantly impact MNES trigger the requirement for referral to the Commonwealth Minister for Environment for potential assessment as a 'controlled action'.

There are nine MNES defined under the EPBC Act:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- nationally threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- a water resource, in relation to coal seam gas development and large coal mining development.

The *Matters of National Environmental Significance: Impact Guidelines 1.1* (Department of the Environment, 2013) provides the overarching guidance to assist proponents in determining whether an action is likely to have a significant impact on an MNES.

The Proposal was initially referred to the Commonwealth Minister for Environment on 31 May 2023 (EPBC 2023/09566). On 1 September 2023 the Proposal was determined to be a 'controlled action', requiring assessment and approval under the EPBC Act. DCCEEW issued comments on the adequacy of the referral information and further information required for assessment and considered the Proposal as likely to have a significant impact on 'listed threatened species and communities' protected under s18 and s18A of the EPBC Act. DCCEEW also provided comments on the draft ERD (submitted September 2025). In response to comments on the draft ERD, KML has reduced the Development Envelope and proposed disturbance footprint for the KIOP MLE to mitigate impacts to ecological values. Mitigation efforts for the Proposal have resulted in the Wheatbelt portion of the significant amendment being excised, removing all potential impacts to the Eucalypt woodlands of the Western Australian Wheatbelt (BC Act: P3 / EPBC: CR). Remaining EPBC listed species with the potential to occur in the mitigated disturbance footprint include:

- Clearing of flora habitat:
  - Jingymia Mallee (*Eucalyptus synandra*) (BC Act, Threatened, EPBC Act: VU)
- Clearing of habitat for fauna:
  - Malleefowl (BC Act: VU; EPBC: VU)
  - Western Spiny-tailed Skink (BC Act: VU; EPBC: EN)
  - Southern Whiteface (BC Act: VU, EPBC Act: VU)

- *Idiosoma nigrum* (EPBC:VU), now recognised as *Idiosoma clypeatum* (BC Act: P3)

- Clearing of Ecological Communities:
  - 'Eucalypt woodlands of the Western Australian Wheatbelt' Threatened Ecological Community.

Additional desktop and field surveys have been undertaken since the original referral to define the potential impacts of the KIOP MLE Proposal on MNES, including for flora and vegetation (Umwelt, 2025a) and terrestrial fauna (Bamford Consulting Ecologists, 2025). An assessment of the potential impacts of the KIOP MLE Proposal on MNES is presented in **Table 14.1** and supported by *Karara Iron Ore Project Mine Life Extension - Review Significance of Residual Impacts* (Umwelt, 2026c) (**Appendix 5-4**), which was assessed against MNES guidelines.

KML is actively managing impacts to EPBC-listed fauna at KIOP and MIOP through mitigation measures and rehabilitation (see **Section 5.0** and **Section 6.0**) and propose to do so for the residual impacts of the KIOP MLE Proposal.

**Table 14.1 Assessment of Potential Impacts of KIOP MLE Proposal on MNES**

| MNES | Presence | Justification |
|---|---|---|
| **World heritage properties** | Not present | No world heritage properties occur in the vicinity of the Proposal area. The closest world heritage property is Shark Bay, which is approximately 265 km north-northwest of the KIOP MLE Mitigated Proposal (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2025a). |
| **National heritage places** | Not present | No national heritage places occur in the vicinity of the Proposal area. The closest national heritage place is Lesueur National Park, which is approximately 80 km southwest of the KIOP MLE Mitigated Proposal (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2025c) |
| **Wetlands of international importance (listed under the Ramsar Convention)** | Not present | No wetlands of international importance occur in the vicinity of the Proposal area. The closest Ramsar wetland is Forrestdale & Thomsons Lakes, which are approximately 300 km south of the KIOP MLE Mitigated Proposal (DBCA, 2017). |
| **Nationally threatened species and ecological communities** | **Flora** | |
| | Not present | The KIOP MLE Mitigated Proposal has been revised to avoid all impacts to the **Jingymia Mallee (Eucalyptus synandra)** (BC Act, Threatened, EPBC Act: VU) |
| | **Fauna** | |
| | **Present** | **Malleefowl:** Significant residual impact due to clearing of habitat critical to the survival of the species (habitat mapped as suitable for nesting, and active and historic mounds), leading to reduced area of occupancy for the bioregional population. All populations of Malleefowl are considered equally important.<br>**Western Spiny-tailed Skink:** Significant residual impact due to clearing of habitat critical to the survival of the species (known and potential colony sites), contributing to long-term trend of declining number of active colonies in the local area.<br>**Southern Whiteface:** Not a significant residual impact as the local population is not an important population of the species, and the impact to habitat is negligible at a bioregional level. |

| MNES | Presence | Justification |
|---|---|---|
| | | ***Idiosoma nigrum*** (assessed as impact to *Idiosoma clypeatum*): Not a significant residual impact as the population and extent of occurrence of *Idiosoma clypeatum* are substantially larger than the extent of *Idiomsa nigrum* known at the time of listing, and *Idiosoma clypeatum* does not meet IUCN criteria for listing. The predicted impact to *Idiosoma clypeatum* would not increase the threat level to the species such that it would trigger listing under IUCN criteria or increase the cumulative impact to a critical level. |
| | **Communities** | |
| | **Not present** | The KIOP MLE Mitigated Proposal has been revised to avoid all impacts to the **Eucalypt Woodlands of the Wheatbelt TEC**. |
| **Migratory species protected under international agreements** | Not present | While migratory species are known from within 40 km of the KIOP MLE Mitigated Proposal, no migratory species are predicted to be "residents" or "regular visitors" of the Proposal area (Bamford Consulting Ecologists, 2025). Therefore, the Proposal is not predicted to substantially impact, either directly or indirectly, any areas necessary to maintain ecological processes and functions for any EPBC-listed migratory fauna species. |
| **Commonwealth marine areas** | Not present | No Commonwealth marine areas occur in the vicinity of the Proposal area. The closest Commonwealth marine area is Jurien Marine Park, which is approximately 105 km southwest of the KIOP MLE Mitigated Proposal (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2025b). |
| **The Great Barrier Reef Marine Park** | Not present | The Proposal is more than 3,000 km west of the Great Barrier Reef Marine Park. |
| **Nuclear actions (including uranium mining)** | Not present | The Proposal will not involve any nuclear actions. |
| **A water resource, in relation to coal seam gas development and large coal mining development.** | Not applicable | The Proposal is not for coal seam gas development or large coal mining development. |

# 15.0 Holistic Impact Assessment

The preceding sections assessed potential impacts to environmental values separately. Nevertheless, it is recognised that there are inherent links between environmental factors. This section discusses connections and interactions between environmental factors and how Proposal activities might impact multiple environmental factors.

**Table 15.1** at the end of this section summarises the Proposal activities and how each activity might impact on a range of key environmental factors. This demonstrates any combined effects across multiple environmental factors, which are identified in the table and discussed below.

### Terrestrial Environment and Inland Waters

Flora and vegetation, terrestrial fauna, subterranean fauna and inland waters environmental factors are highly connected, and are directly impacted by Proposal activities, such as land clearing and establishment of infrastructure.

The Proposal is in an environmental landscape that has high cumulative impact from mining and agricultural activities. Vegetation clearing will directly impact regionally significant vegetation types, will have potentially significant impacts on Priority flora (remove and reduce health of individuals) and will remove habitats for BC Act and/or EPBC Act listed fauna.

Vegetation clearing and infrastructure establishment for the proposed KIOP MLE could impact inland waters by changing surface water flow, which may affect health of vegetation through sedimentation or change in water availability for surface water dependent vegetation. Mongers Lake (ephemeral lake system and registered Aboriginal heritage site) is crossed by current KIOP linear infrastructure, however there is no proposed new disturbance or changes to activities near this system. Surface water will be managed through operational procedures to minimise surface flow interruption, erosion and sedimentation.

Excavation of the open pit will directly impact on troglofauna individuals and habitat, however due to the low density of troglofauna specimens recorded in the area this impact is not expected to be considered significant. The Proposal includes pit dewatering, however there are no stygofauna values within the predicted groundwater drawdown extent. No groundwater dependent vegetation types or other significant groundwater-dependent environmental values are present within the predicted groundwater drawdown extent.

Pit dewater will be used in mining operations and for dust suppression where possible. Excess pit dewater will be discharged to Terapod West pit, which is expected to reduce the extent of groundwater drawdown near the pits. Uncontrolled loss of mine dewater or tailings discharge may impact on soil quality, health of vegetation and troglofaunal in situ. Water abstraction and discharge will be managed through operational procedures, EP Act Part V Works Approval and DWER Licence.

There is risk of emissions and accidental discharges from the WRD or TSF (potentially acidic or saline drainage), which could cause contamination of soil, groundwater or surface water, leading to decline in vegetation health and potential impacts on subterranean fauna. Waste rock and tailings storage will be designed, constructed and managed to ensure any runoff or leachate that might be acidic or have high concentrations of soluble salts is contained or controlled to protect surface and groundwater. Risks of discharge and contamination will be assessed and managed through the approvals required under the EP Act Part V and Mining Act.

### Social Surroundings

A direct connection exists between Aboriginal culture and the physical and biological characteristics of the environment. Impacts to terrestrial environment and inland waters may in turn impact on cultural heritage sites or values. Other social surroundings values such as conservation reserves may also be impacted.

The Proposal will impact eight registered Aboriginal cultural heritage sites for which KML holds section 18 consents for disturbance. Land clearing and infrastructure establishment may also impact culturally significant flora and terrestrial fauna species and reduce integrity of the cultural landscape. Potential impacts to cultural heritage will be managed via the Karara Mining Limited Aboriginal Heritage Management Plan (KML, 2025a) and the KML Approvals Request and Ground Disturbance Procedure (CORP-EN-PRO-1004).

Proposal activities that cause emissions of dust could impact on air quality and social surroundings. The Proposal is in a relatively remote location, the nearest sensitive receptor being the Karara Homestead, approximately 3 km from the proposed TSF expansion and more than 10 km from the proposed WRD expansion. Traditional Owners using the land are also a sensitive receptor, however their locations are variable, and a separation distance can't be defined. Their use of the land is intermittent, which would reduce the frequency and duration of exposure to any air emissions, reducing the health risk. Operational controls that protect the Proposal workforce will also protect Traditional Owners from health risks associated with air emissions.

Direct greenhouse gas emissions from the Proposal are predicted to be below the Safeguard Mechanism threshold for high-emitting facilities. Greenhouse gas emissions will be reduced by electrification of vehicles, use of renewable energy and optimisation of transport and logistics. KML proposes to purchase and surrender Australian Carbon Credit Units to meet offset requirements.

The combined or holistic effects have been assessed. No new significant impacts have been identified due to combined environmental effects. Proposed environmental outcomes address the combined environmental effects.

The holistic impact of the Proposal is not expected to be any larger or different than the impacts predicted for each environmental factor.

**Table 15.1 Holistic Consideration of Impacts to Environmental Factors**

| Proposal Activities | Impacts on Environmental Factors | | | | | | | | Combined Environmental Effects across Environmental Factors |
|---|---|---|---|---|---|---|---|---|---|
| | Flora and Vegetation | Terrestrial Fauna | Subterranean Fauna | Landforms | Inland Waters | Greenhouse Gas Emissions | Terrestrial Environmental Quality | Social Surroundings | |
| **Land clearing and establishment of Proposal Infrastructure or maintenance of previously approved infrastructure** | Direct<br>• Direct loss of native vegetation.<br><br>Indirect:<br>• Fragmentation of populations leading to decline in health and integrity.<br>• Potential introduction of Weeds of National Significance or Declared Pests.<br>Spread of *Phytophthora* dieback. | Direct habitat loss and potential loss of terrestrial fauna individuals. | None | Establishment of the proposed MLE including the adjusted open pit abandonment bund and the expanded WRD will increase impacts to the Mt Karara landform. | Changes to surface water flow. | GHG emissions for land clearing is included in Scope 1 operational emissions (below item). | Stripping and long-term storage of topsoil, leading to loss of topsoil value. | • Impacts to flora and fauna of cultural significance and their environment.<br>• Impacts to integrity of cultural landscape.<br>• Disturbance of cultural material, potential cultural material, or a possible unknown Aboriginal heritage site.<br>• Loss or interference of access to land within DE used for cultural activities.<br>• Impacts to integrity of cultural landscape. | Introduction of weeds could adversely impact on flora and vegetation (rehabilitation success), terrestrial environmental quality (topsoil) and social surroundings (cultural heritage).<br>Interruption of surface water flow (inland waters) could impact on flora and vegetation and social surroundings.<br>The residual impact and proposed environmental outcomes are in Section 5 (Flora and Vegetation), Section 6 (Terrestrial Fauna), Section 8 (Inland Waters) and Section 11 Social Surroundings. |
| **Development of open pits including dewatering**<br>**Mine operations including expansion of WRD and TSF** | Decline in vegetation health from dust emissions, water/sediment runoff, saline water dust suppression. | See above for direct impacts. | Removal of habitat and loss of troglofauna and stygofauna individuals. | See above for direct impacts. | Pit dewatering leading to extraction of saline groundwater; groundwater drawdown.<br><br>Possible adverse impacts to water from potentially acid rock drainage from the WRD or seeping of poor-quality water from the TSF. | • Operational Scope 1 emissions from the Combined Proposal will be comparable to current operations.<br>• Operational Scope 2 emissions are predicted to be lower than the current operations. | Possible adverse impacts to water from potentially acid rock drainage from the WRD or seeping of poor-quality water from the TSF. | Impacts to integrity of cultural landscape. | Pit dewatering could adversely impact on inland waters (drawdown of groundwater), and subterranean fauna. The residual impacts and proposed environmental outcomes are in both Section 8 (Inland Waters) and Section 11 Subterranean Fauna.<br>Leaching of acidic drainage from waste rock landforms could impact on surface water quality (inland waters). This risk is addressed in Section 12.1 (Terrestrial Environmental Quality).<br>Cultural heritage impact assessment is in Section 11 (Social Surroundings). |

| Proposal Activities | Impacts on Environmental Factors | | | | | | | | Combined Environmental Effects across Environmental Factors |
|---|---|---|---|---|---|---|---|---|---|
| | Flora and Vegetation | Terrestrial Fauna | Subterranean Fauna | Landforms | Inland Waters | Greenhouse Gas Emissions | Terrestrial Environmental Quality | Social Surroundings | |
| **Dewatering discharge into Terapod West pit** | None. | None. | None. | None. | Reduces groundwater drawdown in vicinity of pits. | No change. | Localised salinisation of soil in the event of pipeline leaks. | None. | Discharge to Terapod West pit is predicted to reduce the extent of groundwater drawdown.<br>There is risk of indirect impact to Terrestrial Environmental Quality (soils) from pipeline leak.<br>The residual impacts and proposed environmental outcomes are in Section 8 (Inland Waters) and Section 12 (Other Environmental Factors). |
| **Groundwater abstraction for water supply** | None. | None. | None | None | Drawdown of groundwater. | No change. | None. | None. | The residual impacts and proposed environmental outcomes are in Section 8 (Inland Waters). |

*Red shading = direct adverse effect. Yellow shading = indirect adverse effect. Green shading = beneficial effect*

# 16.0 Cumulative Impact Assessment

The *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA, 2024b) defines cumulative environmental impacts as the successive, incremental, and interactive impacts on the environment of a proposal with one or more past, present and reasonably foreseeable future activities.

## 16.1 Past, Present and Foreseeable Future Projects

The past (existing), present (approved) and reasonably foreseeable (proposed) projects located near the Proposal are listed in **Table 16.1**.

**Table 16.1 Projects Considered as part of the Cumulative Impact Assessment**

| Project | Status | Location | Relevance |
|---|---|---|---|
| **Karara Iron Ore Project** | Current | Inside Combined Proposal mitigated DE | Approved under MS 805 by EPA in 2009 and operated by KML. Consists of the Karara mine site including Karara open-cut pit, processing plant, a WRD, TSF, rail loading facilities, accommodation facilities, airport, access roads and linear infrastructure corridor. |
| **Mungada Iron Ore Project** | Mining completed | Inside Combined Proposal mitigated DE | Approved under MS 806 by EPA in 2009 and operated by KML. Includes Blue Hills North and Terapod open pits and WRDs and regional infrastructure. Mining was completed in 2014. Rehabilitation has been completed over most of the WRD and infrastructure footprints no longer required to support ongoing KIOP operations. Remaining infrastructure is required to support the KIOP mine life extension. |
| **Hinge Iron Ore Project** | Current | 10 km north of the Combined Proposal mitigated DE | Approved under MS 968 by EPA in 2014 and operated by KML. Mining ceased in 2016 and the project is basically in the decommissioning/rehabilitation stage. |
| **Blue Hills Mungada East Expansion Project** | Current | Northeast of the Combined Proposal mitigated DE | Owned by Sinosteel Midwest Corporation (SMC) and approved in 2017 under MS 1071. |
| **Several NVCPs** | Expired apart from NVCP 3399/4 | Intersect the Combined Proposal mitigated DE | • Karara Rail Loop (NVCP 3399/4)<br>• Yandanooka Borefield (NVCP 3867/1)<br>• Syncline Turner Haul Road Project (NVCP 5605/2)<br>• Railway construction or maintenance (NVCP 3518/4 and NVCP 3603/2)<br>• Weelhamby Borrow Pit (NVCP 3740/1)<br>• Part of the Eneabba to Koolanooka via Three Springs Transmission Lines (NVCP 3961/4). |

## 16.2 Cumulative Impact Assessment Approach

Data sources and methods for calculating cumulative impacts for each environmental factor are summarised in **Table 16.2**.

**Table 16.2 Data Sources and Method of Impact Calculation**

| Environmental Factor | Data Sources | Method for Calculation of Impacts |
|---|---|---|
| **Flora and vegetation** | A total of eight contributors were incorporated into the assessment, with records in the region going back over 20 years. Seven of these contributors are listed in Table 2.2 (Cumulative Impacts – RAA 1) of *Flora and Vegetation Impact Assessment - Karara Iron Ore Project Mine Life Extension* (Umwelt, 2025b). The additional contributor was data for 10 conservation significant flora species purchased from DBCA in 2026 (22-1225FL). | Cumulative impacts to flora and vegetation could occur as a combination of impacts from the KIOP MLE mitigated Proposal as well as historical clearing, including from other historical proposals in the region (as far as they can be assessed).<br>Cumulative assessment within RAA 1 considered a combination of impacts from KIOP, MIOP, HIOP, SMC, Warriedar Golden Range and Mt Mulgine projects in the area. |
| **Terrestrial fauna** | The data sources for terrestrial fauna were terrestrial fauna assessments undertaken in the area by BCE (Table 2.1 of *Terrestrial Fauna Impact Assessment - Karara Iron Ore Project Mine Life Extension* (Umwelt, 2025b)), fauna monitoring data from KML and ALA records of significant fauna.<br>Fauna habitat information was mapped original native vegetation presumed to have existed prior to European settlement in WA (PEVSAs) (DPIRD, 2019). | The cumulative impact assessments considered areas that would be potentially directly impacted by the Combined Proposal mitigated DF, in addition to impacts (both existing and previously approved, see projects in the area listed for flora and vegetation) from CCAC land (where data was available). Impacts to DPIRD (2019) PEVSAs were quantified to capture the total previous and potential loss of fauna habitat within CAA 1 (represented by 15 km buffer on the KIOP MLE mitigated disturbance footprint). |
| **Landforms** | KML provided layers for areas of disturbance for MS805, MS 806, the Proposal and previous NVCPs. Disturbance for the neighbouring projects (SMC) was digitised to estimate impact. | Areas of disturbance were assessed to calculate both temporary and permanent cumulative impacts to Mt Karara, the LAU and greater Tallering IBRA subregion. |

## 16.3 Predicted Cumulative Impacts

A description for predicted cumulative impacts for each environmental factor is given in **Table 16.3.**

**Table 16.3 Predicted Cumulative Impacts**

| Environmental Aspect | Description of Predicted Cumulative Impacts |
|---|---|
| **Flora** | Under IUCN criteria the proposed cumulative impact to *Persoonia pentasticha* and *Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78) both meet criteria for Endangered Population <2,500 and >20% decline in 5 years, as a result of the Proposal.<br>Cumulative impacts detailed in **Section 5.10.3** |

| Environmental Aspect | Description of Predicted Cumulative Impacts |
|---|---|
| **Vegetation Types** | The calculated cumulative impact to mapped FCTs is a total of 4,778.9 ha (including cleared land [86.5 ha]) out of the 58,306 ha mapped for RAA 1. The cumulative impact represents 8.2% of mapped FCTs in RAA 1. Cumulative impacts detailed in **Section 5.10.3** |
| **Ecological Communities** | Cumulative impacts to the Blue Hills PEC account for 15-20% of the recorded community extent (depending on mapped base extent used for assessment). Cumulative impacts detailed in **Section 5.10.2** |
| **Terrestrial Fauna Habitat** | All cumulative impacts to conservation significant fauna are less than 5% of original pre-European extent of PEVSAs in CAA 1. Cumulative impacts on habitat are detailed in **Section 6.0** |
| **Landforms** | The Proposal will permanently impact 389.5 ha out of 506 ha (77%) of the Mt Karara landform and 491.5 ha out of 1,939 ha (25.3%) of the Blue Hills LAU. Note that the Mt Karara landform is considered part of the LAU. |

## 16.4 Conclusion

Aside from KML's other operations in the region (KIOP, MIOP, HIOP and six additional areas covered under NVCPs) a further four projects (SMC, Rothsay Mine, Mt Mulgine Project and the Warriedar Golden Range Project) were considered as part of the cumulative impact assessment. While other minor disturbance may exist in the region (e.g. pastoral station roads and mine exploration tracks) the impacts from KML and surrounding projects accounted for the majority of ground disturbance.

The assessment of flora, vegetation and ecological communities utilised more than 20 years of survey data from the region and found that cumulative impacts will not substantially increase the impacts to significant ecological communities, landforms or terrestrial fauna values compared to the standalone impacts of the Proposal.

The cumulative impacts to two species of conservation significant flora are considered potentially significant: (*Persoonia pentasticha* and *Caesia* sp. Koolanooka Hills [R. Meissner & Y. Caruso 78]). The cumulative impacts will increase the threat level to the two species to an extent that the two species will meet IUCN criteria for Endangered. The potentially significant residual impacts to these species are identified in **Section 13.0.**

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